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**Identifying Leadership Skills Required
in the Digital Age**

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Abstract

Is leadership changing in an increasingly digitalised work environment? This question arises in corporate practice, societal debates, and in business management research. The evolution of digital technologies changes working environments considerably and creates new challenges for executives. So far, however, only little research has been conducted on how these challenges and technology-driven changes are associated with altered requirements for the skill set needed by executives. In this paper we bridge that gap by applying a three-stage research design. First, we develop a novel conceptual framework in which we categorise leadership skills and associate them with tasks, management level, and leadership experience. Building on this, we conduct semi-structured interviews with executives and systematically investigate job advertisements at the management level. Our interview results show that communication skills, subject-specific knowledge, self-organisation skills, and self-reflection skills are considered particularly relevant in times of rapid technology-driven change. Furthermore, many interview participants identify empathy and an open-mindedness towards the new as crucial personal traits. Our job advertisement analysis further reveals that executives need to be able to speak English, have IT skills, and be flexible, motivated, and stress tolerant.

JEL-Codes: M12, M15, M51, M54, O32, O33

Identifizierung erforderlicher Führungsfähigkeiten im digitalen Zeitalter

Zusammenfassung

Verändert sich die Führung in einem zunehmend digitalisierten Arbeitsumfeld? Diese Frage stellt sich in der Unternehmenspraxis, in gesellschaftlichen Debatten und in der betriebswirtschaftlichen Forschung. Die Entwicklung digitaler Technologien verändert die Arbeitswelt erheblich und stellt Führungskräfte vor neue Herausforderungen. Bislang wurde jedoch nur wenig untersucht, wie diese Herausforderungen und technologiegetriebenen Veränderungen mit den Anforderungen an die von Führungskräften benötigten Fähigkeiten verbunden sind. In diesem Artikel schließen wir diese Lücke unter Anwendung eines dreistufigen Forschungsdesigns. Zunächst entwickeln wir ein Framework, in dem wir Führungsfähigkeiten kategorisieren und mit Aufgaben, Managementebene und Führungserfahrung verknüpfen. Darauf aufbauend führen wir halbstrukturierte Interviews mit Führungskräften durch und untersuchen systematisch Stellenausschreibungen auf Führungsebene. Unsere Interviewergebnisse zeigen, dass Kommunikationsfähigkeit, fachspezifisches Wissen, Selbstorganisationsfähigkeit und Selbstreflexionsfähigkeit in Zeiten eines schnellen technologiegetriebenen Wandels als besonders relevant angesehen werden. Darüber hinaus identifizieren viele Interviewteilnehmer Empathie und Aufgeschlossenheit gegenüber dem Neuen als entscheidende persönliche Eigenschaften. Unsere Analyse von Stellenausschreibungen zeigt außerdem, dass Führungskräfte insbesondere englische Sprachkenntnisse und IT-Kenntnisse benötigen und zudem flexibel, motiviert und stresstolerant sein sollten.

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Identifying Leadership Skills Required in the Digital Age*

1. Introduction

Today, it would be difficult to find people or organisations that are not engaged in several aspects of digitalisation on a daily basis (Phelps, 2014). The growing use of modern technologies in organisations (Hunt, 2015) influences the competencies, interpersonal expectations, and self-awareness of the workforce, as well as the way that work is carried out and structured (Colbert, Yee & George, 2016). Furthermore, modern technologies enable new ways of communicating and interacting with each other (Phelps, 2014). An example is remote work, making a nine-to-five workday in the office less and less meaningful (Tarafdar, 2016). These developments create new career opportunities, while, on the other hand, shifting traditional activities considerably or even making them obsolete (Hunt, 2015).

In recent literature, authors use different terms to label modern leadership, such as *digital leadership* (El Sawy et al., 2016), *e-leadership* (Avolio & Kahai, 2003; Phelps, 2014), and *e-HRM* (Bondarouk & Ruël, 2009), where the titles are used as umbrella terms covering the topics of digitalisation, IT and HRM. When analysing the differences between traditional leadership and leadership in the digital age, it is remarkable that these differences are mainly attributed to a changing work environment (Avolio & Kahai, 2003), with computer-mediated communication playing a pivotal role (Phelps, 2014). Yet, even though the fundamentals of leadership do not seem to have changed considerably (Hunt, 2015), technology-driven developments in the work environment induce executives to rethink relevant issues such as corporate strategy, business models, and platforms (El Sawy et al., 2016). It is thus essential to understand how traditional settings differ from virtual environments (Phelps, 2014), to recognise the importance of digital technology for leadership concepts, to identify challenges, and to finally derive necessary leadership skills.

This paper aims to help identify relevant leadership skills in this age of digitalisation. The remainder of the paper is structured as follows. In Section 2 we conduct a systematic literature analysis to identify leadership skills that are generally considered relevant. We systematise these skills in a novel framework and highlight skills that have been linked to the topic of digitalisation in the underlying literature. This framework provides the theoretical basis for

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our empirical investigation, in which we examine digitalisation-related leadership challenges and identify skills that are particularly required. In our investigation we use semi-structured interviews and a systematic analysis of job advertisements. Section 3 provides an overview of our methodological approach and data. Our results are presented in Section 4 and discussed in Section 5. Finally, we conclude in Section 6.

2. Literature Review and Leadership Skill Framework

2.1. Leadership Challenges Arising in the Digital Age

Technological developments such as machine learning and robotics in conjunction with an increasing automation of routine tasks lead to difficulties both for executives and employees (Gratton, 2016; Tarafdar, 2016). For executives, questions arise such as how to manage virtual teams, how to handle multigenerational groups with different technology preferences, how to support a functioning knowledge transfer (Gratton, 2016), and how to create a mindful relation to ubiquitous digital technologies (Tarafdar, 2016).

In a virtual work environment, face-to-face communication and other traditional social mechanisms no longer prevail, making it necessary to carry out new ways of coordinating teamwork and communicating (Townsend, DeMarie & Hendrickson, 1998). A study conducted by Barley, Meyerson & Grodal (2011) shows that inappropriate management of technologically mediated communication leads to interruptions in employees' working processes and increases their perceived stress levels. Similar statements can be found in Colbert et al. (2016), who identified a continuous checking of e-mails at work and at home as "*ingrained habits for many people*" (Colbert et al., 2016, p. 736). Accordingly, employees spend much of their time answering e-mails, which can lead to the perception of being overloaded. Interestingly, the more time employees spend dealing with their e-mails, "*the greater their perceived ability to cope*" (Barley et al., 2011, p. 887). Sykes (2011) confirms that e-mails have become a significant cause of interruption during a workday. While the internet, e-mails and in some cases even social media have become standard tools for doing work, "*they also provide easy access to family, friends, online-shopping and other nonwork purposes while at work*" (Colbert et al., 2016, p. 734). Being electronically connected (to work) at all times makes a clear-cut separation between work and leisure challenging, which in turn can end up in work-nonwork conflicts (Butts, Becker & Boswell, 2015). If managers are not able to find appropriate ways to establish boundaries between work and leisure time, organisations might face the fallouts of information overload, technology addiction, and techno-stress (Tarafdar, 2016).

Another potential for conflict arises from the age structure of the workforce. In many cases, younger employees are more familiar with digital technologies than their older colleagues. If older employees work together with younger co-workers in a team, the different technology knowledge and preferences can lead to conflicts (Colbert et al., 2016). Managers should be able to identify the corresponding divergence at an early stage and avoid escalation. Finally, the issue of cyber-security needs to be considered. Modern technologies can bring about significant improvements through information capturing and processing, but they also make organisations more vulnerable to cyber-attacks (Lynch & Gomaa, 2003). Executives need to be aware of the respective benefits and risks to ensure adequate use.

Some of the changes that are needed to address today's organisational challenges may be in the design of the technology itself (Colbert et al., 2016), while others may require rethinking leadership-related topics. The potential associated with appropriate use of digital technology and the role that leadership plays in this context will be outlined in the next two subsections.

2.2. Technology-Driven Leadership Potentials

Even though digital technology is ubiquitous in modern work environments, its potential is often only used to an insufficient degree (Colbert et al., 2016). Even entry-level employees may bring high levels of digital know-how into organisations (Colbert et al., 2016), which can be valuable and thus should be exploited. Employees have access to a wealth of information that can be used to create multifaceted services at reduced costs (Colbert et al., 2016), with digital technology enabling collaboration among geographically distributed team members (Phelps, 2014). On a virtual level, an optimal composition of teams can be reached without resulting in clashes within the existing organisational structure (Townsend et al., 1998). Among the tools enabling virtually based forms of work and collaboration are web-based customer relationship management systems, web-based collaboration tools, and project or content management systems, ranging from simple applications to sophisticated suites of tools (Phelps, 2014). Digital tools may also enable employees to track and evaluate their working processes, making it easier for them to identify productivity issues (Gratton, 2016).

Overall, managing digital technologies efficiently can bring about many benefits. With the phrase "*Anyone can be as digitally sophisticated as they choose to be*", Hunt (2015, p. 50) points out that the attitude of both managers and employees is essential for making the best possible use of modern technology.

2.3. Role of Leadership in the Digital Age

As technological innovations need to be implemented appropriately, leaders seem to be critical to “*laying the foundation for and facilitating digital transformation*” (Hunt, 2015, p. 51). To be able to do this, leaders need to be aware that social and digital technologies change the nature of work, and they need to adapt their way of working accordingly (Hunt, 2015). Furthermore, leaders need to serve as role models, promote and perpetuate cultural values encouraging a supportive attitude towards change, implement appropriate governance and organisational structures, and ensure employees have profound digital know-how (Day et al., 2014). Executives also need to remove obstacles to the use of new technologies and provide opportunities for employees to work with them (Bondarouk & Ruël, 2008).

Furthermore, executives should be the ones to discover ways of supporting a shift towards flexibility, the flow-driven use of digital tools, and a mindful relationship with digital technologies (Tarafdar, 2016). Gratton (2016) found that many people use digital technologies more often in their everyday life compared to at work, and, accordingly, they associate positive technology-related influences with their daily lives rather than with their work. The establishment of mindful usage patterns for new technologies is a particularly relevant task of executives, considering the potential work-nonwork conflicts that may arise if employees feel permanently attached to work. According to Colbert et al. (2016), such mindful usage patterns are characterised by “*time for focused thinking, opportunities for recovery, and effective collaboration*” (Colbert et al., 2016, p. 735).

To retrieve the potential of virtual teamwork, executives should also be able to leverage virtual collaboration tools like Yammer or Slack for communication, Google Drive for collaborative writing and Trello for collaborative project management (Colbert et al., 2016). In this context, leaders should not only focus on their own preferences but take into account the different preferences of the individuals within their teams as well (Tarafdar, 2016). Further, virtual teams might feel less connected to their organisation, making it crucial that leaders define and communicate the team’s role within the greater mission of the organisation (Townsend et al., 1998). Identification of employees with their organisations can both increase intrinsic motivation and promote a sense of connectedness within the team and with the organisation. Furthermore, leaders need to clarify their expectations about employees’ performance and develop novel mechanisms to supervise and control geographically dispersed team members (Townsend et al., 1998).

2.4. Literature-Based Leadership Skill Framework

As Friedman, Fleishman & Fletcher (1992) distinguish the three core activities of leadership as personnel supervision, project management, and strategic planning,¹ we can now analyse the skills a leader would need to deal with these activities. Katz (1974) defines three basic skill categories to be crucial for successful leadership: technical skills, human skills, and conceptual skills. To develop our framework, we first compare and combine the core leadership activities and the basic leadership skills (see Figure 1).

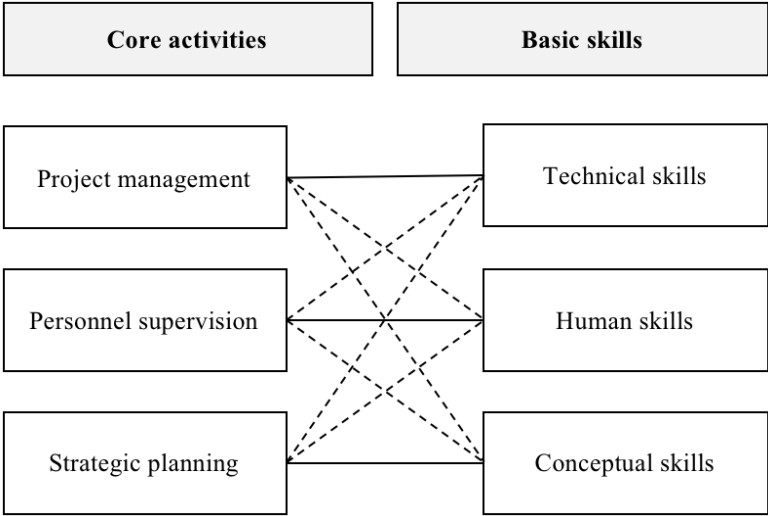


Figure 1: Connection between Core Leadership Activities and Basic Leadership Skills

Comparing the core activities and basic skills, we identify a noticeable connection between them. In Figure 1 we use bold lines to indicate a strong relationship between elements and dashed lines to denote a comparatively weaker connection. The underlying consideration is that specific core activities require certain basic skills to be particularly strong. For example, strategic planning will most likely require highly developed conceptual skills, as a wide variety of information must be taken into account. Nevertheless, in many cases strategic planning will also require adequate interaction with employees (human skills) and sound knowledge of different techniques (technical skills), albeit not to such a high degree.

Demarcating skills from traits is also important, as traits are stable constructs, while skills need to be developed (Lord & Hall, 2005). We introduce the concept trait into our framework and partition traits from skills to emphasise the difference between the two concepts. Personal traits describe something that persons have or bring with them and cannot be learned from

¹ Other categorisations of leadership activities exist, see for example Yukl (2012).

scratch, while skills can be learned or improved. However, developing leadership skills usually goes beyond the training of behavioural styles, as it requires a combination of cognitive, social and behavioural abilities (Lord & Hall, 2005). Individuals' motivation to learn and their interest in leadership are important prerequisites for the development of leadership skills (Chan & Drasgow, 2001).

Different approaches for structuring skills are proposed in the literature. For example, Mumford, Campion & Morgeson (2007) suggest subdividing skills into personal skills, business skills, and strategic skills, whereas Chan & Drasgow (2001) recommend distinguishing between cognitive, social, and behavioural skills. Another relevant aspect is the level of effort required to improve a skill. For example, skills can be separated into surface structure skills and deep level skills (Lord & Hall, 2005), where surface structure skills do not need much effort and time to be developed, but deep level skills are more complex and require more time and effort to improve (Lord & Hall, 2005). However, surface skills are relevant since they can be taught in training sessions over only a few days and can help novice leaders to make better decisions at the beginning of their careers (Lord & Hall, 2005). When comparing surface and deep-level skills, it appears that deep-level skills are less self-centred. This means that the development of surface skills takes place at the individual level, whereas the development of deep level skills requires knowledge and principles for developing other peoples' skills (Lord & Hall, 2005). This is confirmed by Hunt (2015), who states, for example, that leaders not only have to become digitally literate themselves but should likewise ensure that their employees become digitally literate as well. Furthermore, the distinction proposed by Pulley & Sessa (2001) in individual skills (e.g., storytelling and perspective taking) and team-based skills (e.g., dialogue and managing networks) confirms the relevance of distinguishing between the individual level and a less self-centred perspective.

Individuals, including leaders, often adopt provisional identities when trying out new roles to discover what kind of behaviour leads to success. This process requires individuals to have role models that show new behaviour and provide feedback (Ibarra, 1999). This is now an even more critical consideration because it is less common for teams in modern organisations to be co-located. Guillén, Mayo & Korotov (2015) investigated whether an individual's motivation to lead is influenced by comparing herself/himself to exemplary and prototype leaders. They found that self-comparison to both exemplary and prototype leaders is positively related to the motivation to lead, confirming that self-to-other comparison plays a vital role in developing skills. Furthermore, Miscenko, Guenter & Day (2017) identify leadership skills to be

associated with changes in leader identity over time. Lord and Hall (2005) differentiate between novice leaders, intermediate leaders, and expert leaders, and Mumford, Campion & Morgeson (2007) suggest considering the management level as a further dimension. The authors suggest that leaders at higher management levels “*require higher levels of all leadership skills*” (Mumford, Campion & Morgeson, 2007, p. 154). They additionally identify specific strategic skill requirements to be crucial at high-level positions (Mumford, Campion & Morgeson, 2007).

Contributions from Hambrick (1981), Katz (1974), Kraut et al. (1989), Paolillo (1981), Porter & Ghiselli (1957), Raes et al. (2011), and Wooldridge & Floyd (1990) suggest that strategic planning is one of the core tasks of top management executives. Although strategic planning is also part of the middle management’s responsibilities, lower levels of management seem to be more closely linked to tasks such as personnel supervision (Hales, 2005; Kraut et al., 1989; Paolillo, 1981) and project management (Hales, 2005; Porter & Ghiselli, 1957; Staehle & Schirmer, 1992; Wooldridge, Schmid & Floyd, 2008). However, the differentiation between middle management and lower management is challenging, since the boundaries are floating (Porter & Ghiselli, 1957). Considering the differences of core tasks depending on the management level and taking into account that different skills are needed to perform the respective tasks successfully, we conclude that executives need to adapt their skill set when switching to another management level.

In Table 1 we show leadership skills considered in the existing literature. We distinguish between leadership skills that were addressed in general and leadership skills that were mentioned with a reference to digitalisation.

A closer look at the underlying literature of the skills listed in Table 1 reveals that there is often no clear distinction between traits and skills as well as different skill dimensions. Among the digitalisation-related leadership skills are aspects such as becoming digitally mindful, partnering with “digital colleagues”, digital literacy, as well as technology-related skills. Furthermore, communication skills, flexibility, and adaptability seem to be particularly interesting in the context of digitalisation.

Source	Leadership Skills	
Marshall-Mies et al. (2000)	<ul style="list-style-type: none"> • Metacognitive Process 	Not Concerning Digitalisation
Gartzia & Baniandrés (2016)	<ul style="list-style-type: none"> • Task Orientation 	
Lord & Hall (2005)	<ul style="list-style-type: none"> • Social Expertise • Self-Monitoring • Emotional Regulation Skills • Emotional Empathy • Capacity to Develop Others 	
Goleman (2004)	<ul style="list-style-type: none"> • Self-Awareness • Empathy 	
Goleman (2004) Lord & Hall (2005)	<ul style="list-style-type: none"> • Self-Regulation 	
Riggio & Reichard (2008)	<ul style="list-style-type: none"> • Emotional Control • Social Control • Emotional Expressiveness • Social Expressiveness • Social Sensitivity • Emotional Sensitivity 	
Zaccaro et al. (1991) Mumford, Zaccaro et al. (2000)	<ul style="list-style-type: none"> • Social Perceptiveness 	
Gartzia & Baniandrés (2016)	<ul style="list-style-type: none"> • People Orientation 	
Marshall-Mies et al. (2000) Mumford, Marks et al. (2000) Mumford, Zaccaro et al. (2000)	<ul style="list-style-type: none"> • Social Judgment Skills 	
Khan & Ahmad (2012)	<ul style="list-style-type: none"> • Ability to Build Teams 	
Mumford et al. (2017)	<ul style="list-style-type: none"> • Problem Definition • Cause/Goal Analysis • Constraint Analysis • Planning Skills • Forecasting Skills • Idea Evaluation • Wisdom • Sensemaking/Visioning 	
Marshall-Mies et al. (2000) Lord & Hall (2005) Mumford, Marks et al. (2000) Mumford, Zaccaro et al. (2000)	<ul style="list-style-type: none"> • Problem Solving Skills 	
Marshall-Mies et al. (2000) Mumford, Marks et al. (2000)	<ul style="list-style-type: none"> • Solution Construction Skills 	
Marshall-Mies et al. (2000)	<ul style="list-style-type: none"> • Planning and Implementation Skills • Solution Evaluation Skills 	
Nelson, Zaccaro & Herman (2010)	<ul style="list-style-type: none"> • Adaptability 	
Mumford et al. (2017) Mumford, Zaccaro et al. (2000)	<ul style="list-style-type: none"> • Creative Thinking 	
Zaccaro et al. (1991) Mumford, Zaccaro et al. (2000)	<ul style="list-style-type: none"> • Behavioural Flexibility 	
Lord & Hall (2005)	<ul style="list-style-type: none"> • Greater Adjustment to Others • Flexibility in Emotional and Motivational Orientations 	
Goleman (2004) Khan & Ahmad (2012)	<ul style="list-style-type: none"> • Motivation 	
Tarafdar (2016)	<ul style="list-style-type: none"> • Becoming Digitally Mindful • Empathy for the Varying Technology Preferences of their Human Co-Workers • Partnering with “Digital Colleagues” 	
Hunt (2015)	<ul style="list-style-type: none"> • Digital Literacy 	
Phelps (2014)	<ul style="list-style-type: none"> • Technical Skills • Team Building Skills • Organizational Skills • Flexibility and Adaptability 	
Phelps (2014) Khan & Ahmad (2012)	<ul style="list-style-type: none"> • Communication Skills 	

Table 1: Overview of Leadership Skills

We propose a novel leadership skill framework depicted in Figure 2. This framework is based on two management levels, the core leadership activities suggested by Friedman, Fleishman & Fletcher (1992), the basic leadership skills proposed by Katz (1974), and the subdivision recommended by Lord & Hall (2005). We supplement the levels of Lord and Hall with leadership experience, suggesting a relationship between increasing experience and ascending leadership levels. Alongside the skills mentioned by Katz, we add individual traits as a further dimension, since some skills described in the literature represent, in our view, traits rather than skills. The first two levels of the framework link the top management and middle management to core leadership activities. As already discussed above and depicted in Figure 1, the second and third level of the framework link the core leadership activities to three basic leadership skills. In addition to the three basic leadership skills, we include individual traits also needed for the execution of core activities in a fourth column. Another dimension is the leadership level proposed by Lord & Hall (2005), which can be novice, intermediate, and expert. These leadership levels are not necessarily equivalent to the management levels, as a direct or quick career entry in a top management position is possible even when a manager lacks experience, making them a novice-level manager in a top management position. We take this context into account by supplementing leadership levels with leadership experience. This is depicted on the left side of the figure. Leadership level and basic skills span a matrix in which leadership skills are placed. Within the individual skills, we distinguish skills the literature links to digitalisation from other skills by marking them dark grey.

When inspecting those leadership skills and traits associated with digitalisation, it appears that soft skills are particularly relevant. This is in line with the results of a study conducted by Marques (2013), in which soft skills are found to be increasingly relevant for executives. Hard skills are typically measurable, they enable persons to perform a task properly on their own or with the help of technical devices, whereas soft skills are needed in interpersonal transactions, and thus allow for successful interaction (Laker & Powell, 2011; Robles, 2012). However, the majority of leadership skills have not yet been examined in the context of technological change. For this reason, we lay down this framework as a theoretical basis and use interviews as well as an analysis of job advertisements to find out what is particularly required today.

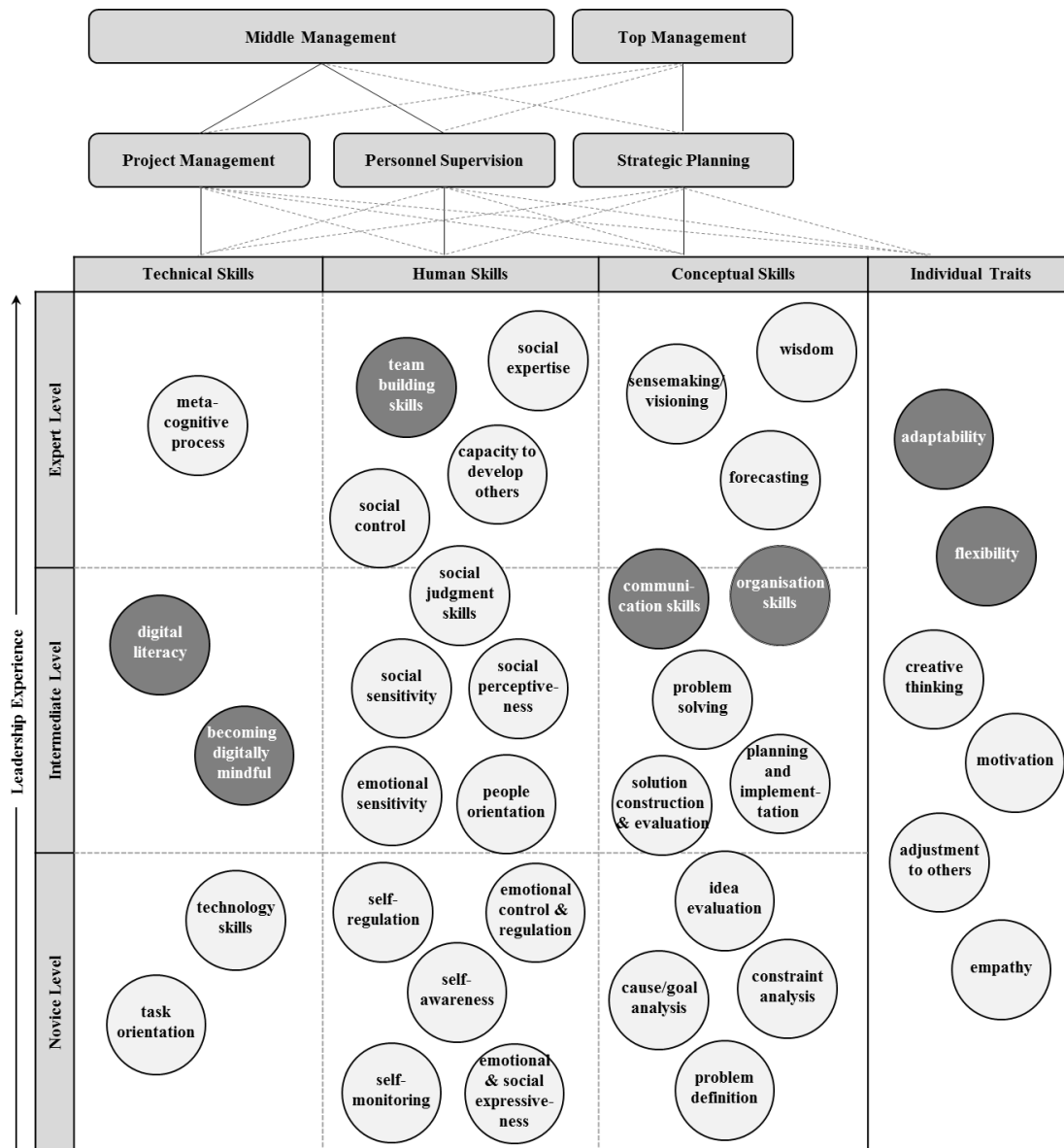


Figure 2: Leadership Skill Framework

3. Methodology and Data

The method of this paper comprises a three-stage process. In the first stage (described in the previous section), we provided a novel conceptual framework to lay a solid foundation for the empirical part. In the second stage, we conducted semi-structured interviews in which top and middle management executives were asked about their challenges and necessary leadership skills in the context of an increasingly digitalised work environment. In the third stage, we applied a systematic internet search to investigate job advertisements at management level. The structure of this chapter follows this process and describes stages two and three. We first present the interviews, then the job advertisement analysis.

3.1. Semi-Structured Interviews

We follow Eisenhardt (1989) and use semi-structured, exploratory interviews with open-ended questions. A crucial advantage of qualitative interviews over standardised surveys is their higher degree of sensitivity to context (Trinczek, 2009). Interview situations are dynamic and can develop a life of their own (Trinczek, 2009), which can be associated with a high and versatile gain of information. Open questions thus allow the collection of a variety of potentially relevant information. At least 12 interviews were set as the target sample, as this number is sufficient to reach saturation (Guest, Bunce & Johnson, 2006).

The interviews were conducted from May 2018 to September 2018 and followed our interview guideline. We audio-recorded, transcribed and coded all interviews. Transcribing was done using the software 4transcript and coding with MAXQDA. The Gioia method (Gioia, Corley & Hamilton, 2013) was applied for data analysis, as it allows a systematisation of many statements into viewer overarching dimensions. Saturation in our coding framework (Guest et al., 2006) was achieved when the repeated analysis did not reveal any new codes for stimulating exploration or exploitation, nor added additional details on existing codes (Havermans et al., 2015). To ensure the comparability of the interview results, the sample was limited to executives from industrial companies located in Northern Germany. To be able to identify differences between management levels, representatives of top management and middle management were interviewed. All interviewees were informed that the results would be evaluated anonymously to avoid biased statements.

In total, 23 executives from 21 companies participated in an interview, of which two did not agree to an audio recording. To ensure a consistent analysis, we only considered the remaining 21 interviewees from 19 companies in our investigation. Of the 21 interviewees, nine work in top management and twelve in middle management positions (see Table 2).

ID	Position	Management Level	Length in mins
1	HR Manager	Middle Management	51
2	Commercial Manager	Top Management	60
3	Corporate Strategy and Digital Transformation Manager	Middle Management	55
4	Managing Partner	Top Management	66
5	Commercial Manager	Top Management	48
6	Managing Partner (Commercial Responsibility)	Top Management	55
7	Manager Technic, Procurement, Production	Top Management	47
8	HR Manager	Middle Management	68
9	Commercial Manager	Top Management	61
10	Manager and Owner	Top Management	55
11	HR Manager	Middle Management	41
12	Manager and Shareholder	Top Management	55
13	Representative Department Chief	Middle Management	59
14	Service Manager	Middle Management	50
15	HR Manager	Middle Management	68
16	HR Manager	Middle Management	63
17	Director HR	Middle Management	56
18	Strategic Training Manager	Middle Management	48
19	Chief Executive Officer	Top Management	68
20	Head of Development and Talent Management	Middle Management	55
21	Procurement Manager	Middle Management	60

Table 2: List of Interviewees

3.2. Job Advertisement Analysis

Parallel to the interviews, we collected job advertisements for leadership positions using StepStone and Xing. As with the interviews, job advertisements were limited to industrial companies located in Northern Germany.² The data was extracted from StepStone on May 5, 2018, and from Xing on May 10, 2018. MAXQDA was used to analyse the data according to the Gioia method. Our initial sample comprised 377 job advertisements. Excluding duplications led to a final sample of 278 advertisements of which 11 are related to top management, 126 to middle management, and 150 to lower management positions. Most of the job advertisements are structured similarly and can be subdivided into qualification, experience, knowledge, and other requirements. To create a preliminary coding scheme, we encoded the first 10 % of the job advertisements according to the Gioia method. We derived 113 first-order concepts and 41 second-order themes. Based on this preliminary coding scheme, we developed a coding guide to ensure a consistent coding procedure. The coding

² To cover the region in the search, the cities Oldenburg, Osnabrück, and Herford were chosen as reference cities with a 100 kilometre radius around the cities.

guide includes, for example, the possibility of multiple encodings and integration of new categories, descriptions of the codes, and anchor examples.

We generated a total of 3,821 codes, of which only four could not be assigned to any of the 41 themes, suggesting a good fit of the coding scheme. In the next step, in line with the Gioia method, the 2nd-order themes were compressed into 3rd-order dimensions. At this point, we assigned the 41 themes to the dimensions *qualification*, *experience*, *knowledge*, and *other requirements*, and sorted them according to the frequency of their naming to be able to get an overview of all relevant details. The dimensions and related themes are depicted in Figure 3. The first number in parenthesis shows the absolute frequency with which a theme was named, and the second shows the number of job advertisements in which they were included. These numbers can be different, as selected themes may contain several aspects that are mentioned individually within one job advertisement. An example for this is subject-specific experience, which has 310 codes but is included in only 234 job advertisements. Since we interpret the frequency of naming as an indicator of relevance, a nuanced consideration of these numbers is crucial to avoid biases in the interpretation of the results.

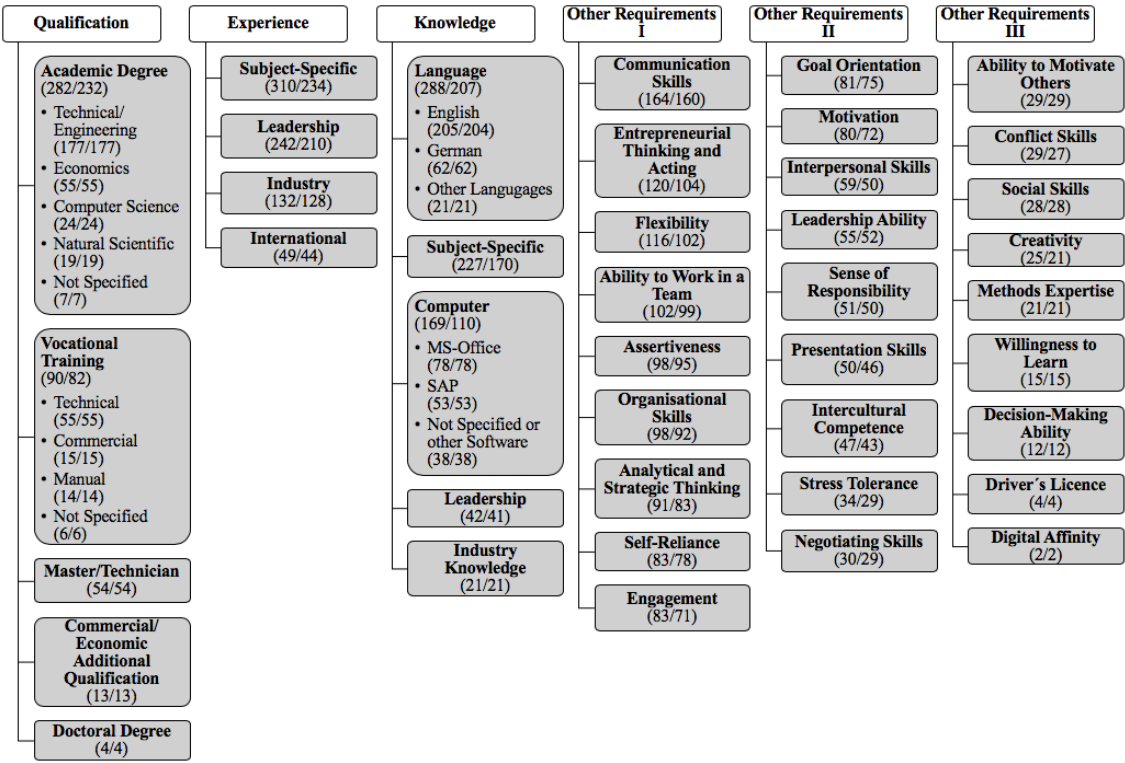


Figure 3: Leadership Skill Requirements Identified in Job Advertisements

4. Results

4.1. Interview Results

Strategic Challenges at Corporate Level

At the corporate level, the interview participants identified the three most significant challenges (in descending order) as being personnel acquisition, digitalisation, and pressure for innovation. In the context of personnel acquisition, demographic change in connection with a shortage of qualified applicants is seen as particularly challenging. Digitalisation is perceived both as a source of pressure for change and a potential for new digital business models. As competitors also recognise these new opportunities, an increasing pressure for innovation is reported, going hand in hand with *“always having to be ahead of the competition with innovations”* (I17). Our results confirm that digitalisation is finding its way into virtually all areas of companies, but predominantly affecting production and technique as well as sales and service.

Core Leadership Activities

We use the structure of our framework and assign core leadership activities to the categories project management, personnel supervision, and strategic planning. For each category, we take into account the four aspects most frequently named by the interviewees (see Figure 4).

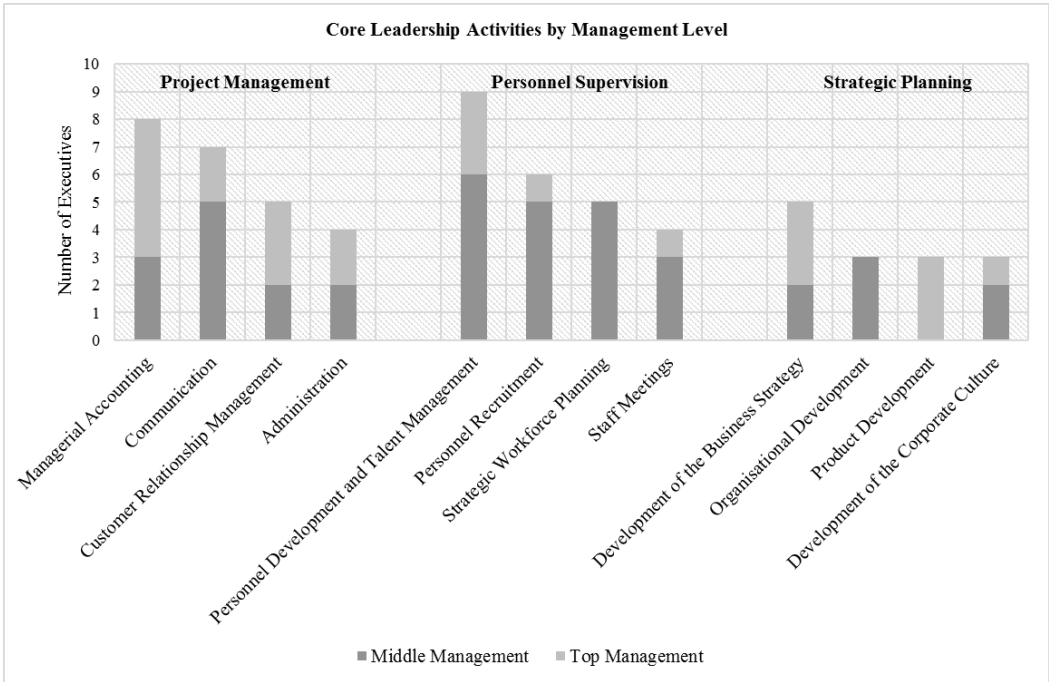


Figure 4: Core Leadership Activities by Management Level

Our results show that both middle management and top management executives take on tasks from all three categories with only minor differences between management levels. Accordingly, strategic workforce planning and organisational development seem to be particularly middle management tasks, while product development is associated more with executives in top management positions. Interestingly, tasks in the category of strategic planning are somewhat underrepresented compared to the tasks in project management and personnel supervision, indicating that executives spend a large amount of their time on operational tasks. Five middle management executives explicitly stated that strategic issues often fall behind because of a multitude of operational tasks. However, around 24 % of the interview participants indicated that they see a trend towards strategic tasks gaining priority.

Challenges on a Personal Level

To be able to identify digitalisation-related challenges on a personal level, the interview participants were asked for challenges they personally perceive at their position within the company. The topic of information diversity heads the list: *“Personally, I sometimes get annoyed by the flood of information that comes in every day and sometimes with things that make me wonder, ‘do I have to know that?’ or ‘what shall I do with it now?’”* (I15). Closely related and also frequently named were the variety of themes on *“where one constantly has to think again and constantly has to find new ways”* (I1). Also among the most relevant digitalisation-related challenges on a personal level were rapid changes and a high workload.

In interacting with employees, about 33 % of the interview participants said they find it challenging to motivate subordinates. In this context, it is about *“taking people with us when we do new things”* (I12) and about *“making the team work as a team”* (I19), thus strengthening cohesion. Middle management executives report difficulties with remote leadership, which is necessary to organise locally distributed employees: *“I had to learn that and I have to learn that until today. Because of cause, you are not on site, the staff is intangible and must use other media”* (I18). A remote supervisor *“tries to fix things via Skype and phone, even from another time zone. Of course, this often leads to not negligible distortions”* (I1). In the opinion of around 28 % of the executives interviewed, the corresponding technological possibilities facilitate work, whereas according to five interviewees, they also cause uncertainty among employees.

However, changes towards more digital means in communication are not limited to remote leadership, but they also manifest within organisations. Important questions are *“how do you*

communicate what, and what type of communication pathways do you use as a company?” (I2). “You can already see that there is a lot left on the track that cannot be transported along the way, something like nuances, but also a social style that gets lost somewhere when I communicate very much digitally” (I17).

Leadership Skills Required and Essential Traits

Based on our framework, we differentiate leadership skills and individual traits and take a nuanced look at differences between top management and middle management. Our results show that the executives interviewed perceive the four most important leadership skills (in descending order) to be communication skills, subject-specific knowledge, self-organisation skills, and self-reflection (see Figure 5). *“One essential thing is that you have to communicate on all levels. That means I have to be able to communicate with the factory employee, with the colleague from the warehouse but also with the board” (I16).* In this context, not only conveying content is needed, but also *“listening” (I12; I15)* and acting as a *“communication interface” (I5).* Among the most important subject-specific skills are language skills, technical knowledge and IT-skills, indicating that it is crucial for executives to be able to correspond with different countries, to have profound knowledge of the company’s business, and to make adequate use of digital technology. *“I have to be familiar with the management environment in which I operate. So you can’t just be a highly trained methodical management teacher and do not know how to control work” (I9).* Remarkably, both soft skills (communication skills) and hard skills (subject-specific knowledge, self-organisation skills, and self-reflection) are at the top of the list, suggesting that both skill categories are highly relevant to deal with today’s leadership challenges.

Middle management executives in particular named self-organisation skills as being important, indicating that much organisation has to be done by executives of this management level, while tasks may be delegated in top management positions. Particularly relevant aspects of self-organisation include the ability to prioritise, delegate, structure tasks and allocate time efficiently. Both middle management and top management executives consider self-reflection to be highly relevant today. *“Very important is the competence of self-reflection [...] to hold up a mirror to oneself and to say: ‘where are my own strengths and weaknesses?’” (I17).* This ability is closely related to self-awareness (see the framework in Figure 2), but goes beyond this by critically questioning one’s own position and actions.

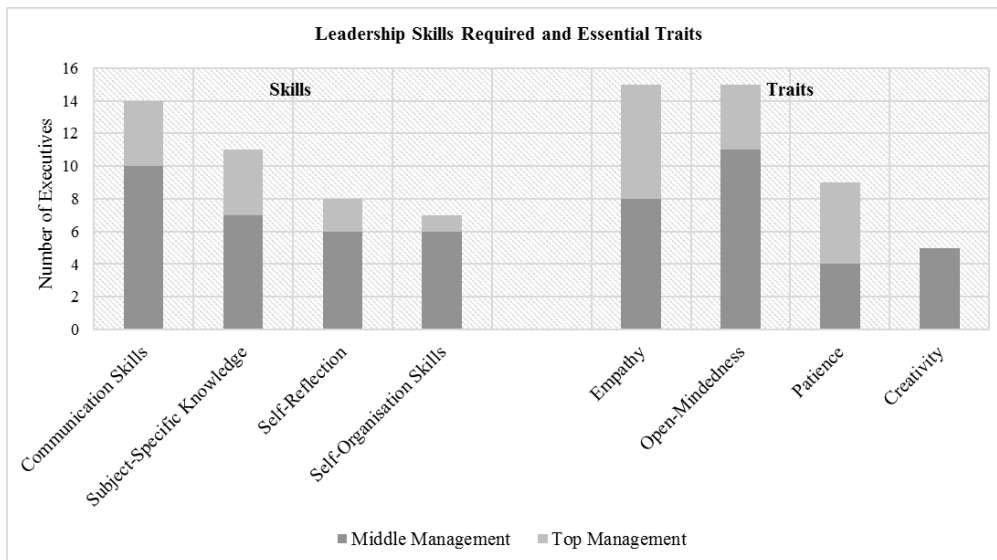


Figure 5: Leadership Skills Required and Essential Traits

In addition to the most relevant leadership skills shown in Figure 5, skills that are mentioned less frequently include, in descending order, analytical skills, decision-making skills, moderation skills, network skills, abstraction skills and assertiveness. Network skills and decision making skills are particularly needed when it comes to the growing interconnectedness of corporate activities and the increasing diversity of information within which fast and forward-thinking decisions must be made.

With regard to individual traits, those of empathy, an open-mindedness towards the new, patience, and creativity are considered crucial. Empathy is regarded as elementary, especially with regard to the near future: *“I believe that in the future we will need a generation of leaders who are very clear and aware of what the wishes and needs of employees are. I would classify that under the heading of empathy and as a trait” (I15)*. An open-minded attitude towards the new is also seen as a relevant facilitator of change, which is not yet anchored in our framework: *“But open-mindedness may also be a trait rather than an ability [...]. So the point is to really open up a new world of thinking with the possibilities and solutions at hand and to understand and initiate possibilities and make changes possible in order to be able to really break up the past” (I20)*. Patience is a trait that around 43 % of the executives perceive as being essential, which is, like open-mindedness, not well anchored in the existing literature on leadership skills. *“I think you definitely need a lot of patience. It is very helpful if you do not have nervous approaches that do not benefit anyone” (I4)*. In line with our framework, creativity is considered to be one of the most important traits, where creativity seems to be required particularly in middle management. In addition, humanity, self-confidence, willingness to change, initiative, courage, and trust were repeatedly stated to be relevant traits.

4.2. Results of the Job Advertisement Analysis

The analysis of job advertisements reveals that in the companies under consideration, the aspects particularly required for leadership positions are an academic degree (technical or engineering), select experience (especially subject-specific, leadership, industry), knowledge in languages (especially English), and subject-specific topics and computer programs (most often MS-Office and SAP). Furthermore, aspects such as communication skills, entrepreneurial thinking and acting, and flexibility are frequently included within the category of other requirements. Although speaking English is most often assumed, requirements for international experience are only named in a few job advertisements (15.8 %). Interestingly, aspects such as digital affinity, decision-making ability, willingness to learn, and creativity are included in less than 10 % of the job advertisements analysed.

Only minor differences can be identified in the top ten skill requirements between the different management levels (see Figure 6). Accordingly, goal orientation and engagement (top management), assertiveness (middle management), flexibility (middle and lower management), ability to work in a team (lower management) and organisational skills (lower management) vary between the management levels. Interpreting these differences between management levels as different requirements for top managers might be jumping to conclusions, as it also might be that individual skills explicitly mentioned for lower and middle management positions are presupposed at top management. Furthermore, the sample of job advertisements for top management positions is relatively small. Interestingly, across all management levels, subject-specific knowledge is more frequently demanded than softer factors such as communication skills.

Next, we limit our analysis to skills included in at least 10 % of the job advertisements. Then we categorise the skills into technical skills, human skills, conceptual skills, and individual traits (see Table 3).³ Noticeably, the majority of skills mentioned falls into the category of technical skills. A comparison of the relevant leadership skills identified in the job advertisement analysis with the skills included in our leadership skill framework (see Figure 2) reveals only a relatively small overlap.

³ In Table 3 we did not include the constructs *interpersonal skills* and *social skills*, although these were mentioned in more than 10 % of the advertisements. In our opinion, these two constructs are not at the same level as the other skills categorised, but they summarise several skills and thus coincide with the category human skills. Furthermore, we did not include leadership ability in the table since this is also an umbrella term covering several leadership skills.

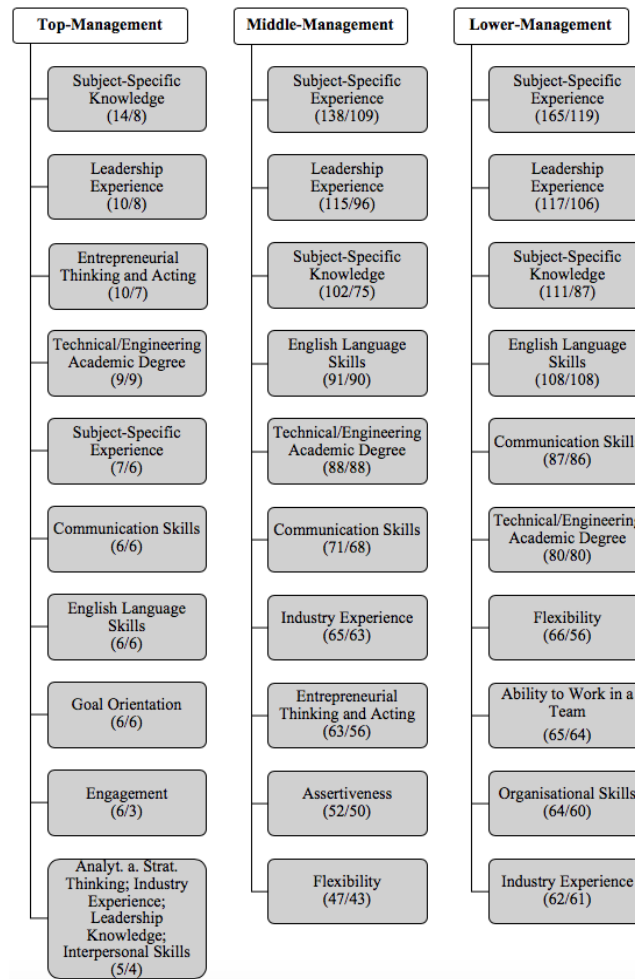


Figure 6: Assignment of Leadership Skills to Management Levels

Technical Skills	Human Skills	Conceptual Skills	Individual Traits	Not Assignable
Language Knowledge (288/207)	Ability to Work in a Team (102/99)	Communication Skills (164/160)	Flexibility (116/102)	Subject-Specific Experience (310/234)
Subject-Specific Knowledge (227/170)	Assertiveness (98/95)	Entrepreneurial Thinking and Acting (120/104)	Self-Reliance (83/78)	Leadership Experience (242/210)
Computer Knowledge (169/110)	Intercultural Competence (47/43)	Organisational Skills (98/92)	Goal Orientation (81/75)	Industry Experience (132/128)
Analytical and Strategic Thinking (91/83)	Ability to Motivate Others (29/29)		Motivation (80/72)	International Experience (49/44)
Presentation Skills (50/46)	Negotiating Skills (30/29)		Engagement (83/71)	
Leadership Knowledge (42/41)			Sense of Responsibility (51/50)	
			Stress Tolerance (34/29)	

In **bold**: Skills identified as relevant in the job advertisement analysis and included in the framework

Table 3: Leadership Skills Mentioned in at Least 10 % of Job Advertisements

We indicate similar aspects⁴ in Table 3 using bold letters. The joint aspects include the idea that executives need to be flexible and motivated, but they also need the ability to motivate and develop others. Furthermore, executives need to have communication and organisational skills, computer knowledge⁵, and leadership experience. In the job advertisements, analytical and strategic thinking is mentioned frequently, which is similar to meta-cognitive process from the framework, indicating that executives are required to process complex and cumbersome thoughts successfully.

For some skills a classification was not possible, so we include these into the fifth column in Table 3 named “Not Assignable”. The construct experience is such an example. It is difficult to assign to one of the categories, as international experience might result, for example, in human skills, such as intercultural competence, and technical or conceptual skills, like knowledge about international business systems.

Most of the skill constructs presented in Table 3 are not included in the leadership skill framework. Language knowledge and international experience seem to be related to globalisation and digitalisation-related topics such as co-located teams and remote leadership. The skill construct of intercultural competence in the category of human skills completes this picture. In the dimension of individual traits, engagement blends in with traits like motivation, which is included in the framework. Other traits like stress tolerance seem natural requirements in a complex and changing work environment with many tasks.

To further analyse the skills identified as relevant by the analysis of job advertisements (presented in Table 3), we now compare hard skills and soft skills (see p. 9 for the differentiation). Such a comparison requires classifying the skills into these two categories. We present this grouping in Table 4. Interestingly, a comparison between the total number of codes for hard skills and soft skills reveals that hard skills are demanded more frequently than soft skills (see Figure 7).

⁴ In Table 3, we indicate similar skills in bold, as sometimes a skill is named differently in the literature and in the job advertisements. For example, we identify *computer knowledge* in the job advertisements with *technology skill* in the literature.

⁵ Computer knowledge is included in around 40 % of the job advertisements analysed, which suggests that executives today need to be able to handle digital technologies adequately.

Hard Skills	Soft Skills	Not Assignable
Language Knowledge (288/207)	Communication Skills (164/160)	Subject-Specific Experience (310/234)
Subject-Specific Knowledge (227/170)	Ability to Work in a Team (102/99)	Leadership Experience (242/210)
Computer Knowledge (169/110)	Assertiveness (98/95)	Industry Experience (132/128)
Entrepreneurial Thinking and Acting (120/104)	Organisational Skills (98/92)	International Experience (49/44)
Analytical and Strategic Thinking (91/83)	Intercultural Competence (47/43)	
Presentation Skills (50/46)	Negotiating Skills (30/29)	
Leadership Knowledge (42/41)	Ability to Motivate Others (29/29)	

In **bold**: Skills identified as relevant in the job advertisement analysis and included in the framework

Table 4: Classification of Leadership Skills into Hard Skills and Soft Skills

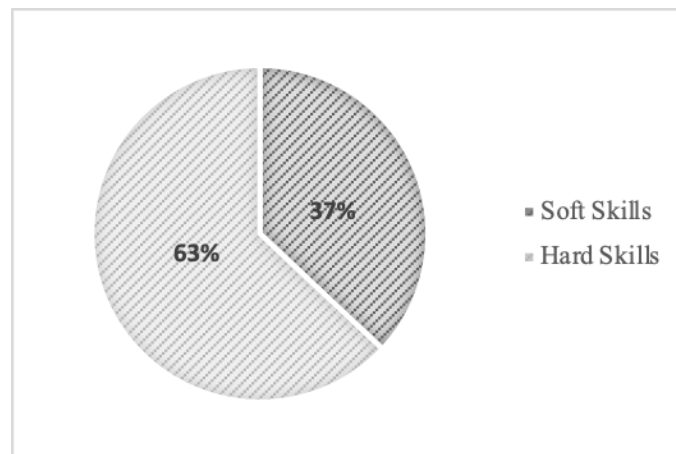


Figure 7: Percentage of Codes Assigned to Hard Skills and Soft Skills (n = 1555 Codes)

5. Discussion

In this paper we identified challenges arising for executives working in an increasingly digitalised work environment and examined what leadership skills are needed. We used a three-step research design comprising the development of a novel leadership skill framework, semi-structured expert interviews, and a systematic internet search to analyse job advertisements.

Our framework systematises leadership skills included in the existing literature and allows for a deeper understanding of the relationship between leadership skills and superordinate dimen-

sions. Furthermore, we include traits alongside skills and explicitly differentiate traits from skills. Based on our interview data, we can confirm that digital technologies are finding their way into virtually all areas of organisations and change the working conditions both for employees and executives considerably. Even though the fundamentals of leadership have not changed much, our study clearly shows that executives are facing digitalisation-related challenges and that certain skills and traits are particularly relevant in this context.

Many executives interviewed outlined that the pace of change has increased and that they need to deal with a lot of information as well as more and more multifaceted tasks. Our interview results indicate that it is important for executives to be patient in this fast-paced work environment. This fits well with the need to be able to reflect on oneself, which, according to our interview results, is also considered among particularly relevant leadership skills. Self-reflection requires patience and inner peace to take time to think about one's own actions and behaviour despite a high workload.

Furthermore, technological developments allow for new forms of work and communication, making it compulsory for executives to stay informed about new software so they can evaluate what might bring improvements to their company and enable their teams to implement new tools into their work. This, for example, requires an increased level of flexibility and adaptability, digital literacy, communication skills, and the ability to organise both physical and virtual working environments. Without exception, the interviewees confirmed the importance of leadership experience. This leads to challenges, since it is particularly the digital natives who bring technological know-how into firms. In addition to the difficulty of integrating innovations into existing structures, some younger executives interviewed find it challenging to be accepted by their subordinates.

Our results further suggest that communication skills are crucial, since modern technologies enable an immediate exchange of information via various channels and at any given time. This requires an adequate, context-specific selection of communication channels, an adaption of the communication to the respective channel, a suitable selection of the addressees and an appropriate timing. If even one of these components is wrong, misunderstandings and conflicts may arise and they might not be immediately apparent, as there is no face-to-face contact. Another important topic is organisation, which is characterised not only by integrating new digital tools into existing workflows, but it also involves managing virtual teams and structuring new processes in both physical and virtual workspaces. Our research suggests that

it is not sufficient to have proper communication and organisational skills, but that executives also need to be able to motivate employees to implement changes and innovations.

Interestingly, the job advertisements examined call for more hard skills than soft skills, although the executives interviewed tend to consider soft skills more important than hard skills. This raises the question of whether companies are not adapting their job advertisements fast enough to cover the current demands for the skill set of executives. Furthermore, the job titles of fifteen job advertisements indicated they were advertising a lower management position, but the job descriptions rather described a position in middle management. This indicates that it is difficult to differentiate between lower and middle management, and, at the same time, it supports the assumption that at least some job advertisements are not used effectively as an instrument for identifying suitable candidates for vacant management positions. However, a more extensive survey of executives is needed to allow a well-founded matching of job advertisements with current leadership skill requirements.

5.1. Practical Implications

Our study allows one to derive practical implications both at the company level and for individual executives. At the company level, we suggest creating structures that enable young executives with digital know-how to introduce new ideas and implement them in a timely manner. To promote the necessary acceptance of new technologies in the workforce, organisations should encourage collaboration between younger and older executives, for which interfaces in the work processes are needed. Furthermore, firms should reevaluate individually what leadership skills should be requested when creating job advertisements for leadership positions at different management levels. Based on what we have learned from the interviews, executives most often have a good feeling of what skills are needed to succeed in their positions. This information should be transferred to the recruiting department in order to bridge a potential gap between what skills candidates need to meet today's challenges and what skills have been requested traditionally when filling leadership positions. In line with Phelps (2014), we recommend that both practitioners and educators clarify to firms and candidates what is currently needed regarding leadership skills. Also, universities and other educational institutions are crucial for equipping candidates with what they need to navigate their careers successfully through the digital age and should adapt the curricula properly. This requires new research insights, so we recommend future studies to further address the impact of digitalisation on leadership-related aspects. For example, the empirical analysis of the present study

could be replicated based on other industries and regions or countries to identify possible sectoral or location differences.

5.2. Limitations and Future Directions

Within our framework, we assigned leadership skills discussed in the literature to different dimensions. Although the corresponding assignment is based on the conceptual understanding in the underlying literature, it requires more empirical evidence. Accordingly, the framework raises no claim to general validity, but tries to connect the versatile findings of the existing literature and to illustrate them vividly.

Our final sample size of 21 interviews is adequate for an interview study and in line with other such studies. Still, the relatively small sample of interviewees can be seen as a limitation, making larger-scale studies compulsory to validate the results. Although our industry focus and local constraints allow a better comparison of the results, the transferability of the results to other industries and regions or countries might only be limited.

6. Conclusion

In this paper we used a three-stage research design to allow for a comparison of leadership skills discussed in the literature with statements of executives and data extracted from job advertisements for leadership positions. By merging these sources of information, we provide insight into what challenges executives face in today's digitalised work environment and what skills and traits are particularly needed.

We identified that the key challenges for executives include a high level of information diversity, a wide range of business issues, the speed of change, and a high workload. Accordingly, executives must be able and willing to adapt to an ever faster changing business environment and to continually review managing practices. This requires empathy, an open-mindedness towards the new, and creative ideas, but also patience and the ability to reflect on one's own behaviour. Although the majority of interviewed executives consider soft skills to be increasingly important, our results suggest that both soft and hard skills are needed. We identify key leadership skills to be communication skills, language knowledge, organisational skills, subject-specific knowledge, digital literacy, and self-reflection. Furthermore, our results suggest that it is particularly important for executives to be emphatic, open-minded, flexible, motivated, and stress tolerant.

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Seit Institutsgründung im Oktober 2010 erscheint monatlich ein Diskussionspapier. Im Folgenden werden die letzten zwölf aufgeführt. Eine vollständige Liste mit Downloadmöglichkeit findet sich unter <http://www.wiwi.uni-muenster.de/io/de/forschen/diskussionspapiere>.

- DP-IO 11/2018** Identifying Leadership Skill Required in the Digital Age
Milan F. Klus/Julia Müller
November 2018
- DP-IO 10/2018** 8. Jahresbericht des Instituts für Organisationsökonomik
Alexander Dilger/Milan Frederik Klus
Oktober 2018
- DP-IO 9/2018** Konzeption einer direktdemokratischen Plattformpartei
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September 2018
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Alexander Dilger/Joachim Prinz/Daniel Weimar
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- DP-IO 6/2018** Strategic Alliances between Banks and Fintechs for Digital Innovation
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