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Full Length Article

The role of transformational leadership in navigating digital servitization

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ABSTRACT

Digital servitization converges two current innovation activities in industrial companies: shifting from product-oriented to service-oriented business models and integrating digital technologies in market offerings. Adding digitalized services offers significant growth and diversification opportunities, but companies have struggled to reap its potential. Establishing digital servitization business models is underpinned by complexity, making it difficult for companies to manage. Digital servitization is a relatively new research stream, especially needing more guidance on how companies should be led to succeed in its implementation. We addressed this research gap and conducted thirty semi-structured interviews with leaders in digital servitization holding ranks ranging from first-level Managers to Vice Presidents and Executives with more than 20 years of leadership experience active in industries such as machinery, electrical equipment, or IT services. We identified transformational leadership as vital to building digital servitization business models and navigating their inherent complexity and change management requirements. Our findings include three focus areas as recommendations for leadership: giving direction, being employee-oriented, and creating an innovative and collaborative environment. Furthermore, transactional leadership aspects should be considered for specific use cases to maintain the business model, for example, improving after a certain amount of time or managing crisis mode.

Introduction

Digitalization is a megatrend that fundamentally changes existing value chains across industries (Calderon-Monge & Ribeiro-Soriano, 2024). Digitalization in companies creates opportunities for new services, intelligent products, and business models (Kohtamäki et al., 2019; Proksch et al., 2024). Servitization is another strategy companies pursue to generate additional growth potential (Khanra et al., 2021). Servitization is an organizational change process, first introduced by Vandermerwe and Rada (1988), that generates new revenue streams and delivers value through selling integrated products and service bundles (Baines et al., 2009; Bustinza et al., 2015; Leocádio et al., 2024). The introduction of digital technologies to service-oriented business models enables connectivity, monitoring, control, optimization, and autonomy of smart product-service bundles (Chen et al., 2021), resulting in innovative business models such as predictive maintenance and remote control systems (Sklyar et al., 2019; Tronvoll et al., 2020). This combination of both growth opportunities, digitalization and servitization, is called digital servitization and represents an opportunity to increase value creation for companies through digitally enabled services and new business models (Paschou et al., 2020; Shen et al., 2023; Sjödin et al.,

2023).

The reconfiguration of business models through digital servitization involves a complex organizational change process due to the required transition of resources and competencies (Bustinza et al., 2018; Raja et al., 2024). Tronvoll et al. (2020) described digital servitization as a process underpinned by transformational shifts. Leaders are essential in implementing organizational change and transforming organizations from their current to their desired future state (Nging & Yazdanifard, 2015; Potosky & Azan, 2023). Transformational leadership is a scientific research concept closely associated with change management (Eisenbach et al., 1999; Warrick, 2011), where leaders are associated as role models who lead their organizations beyond self-interest with a clear vision and a sense of purpose (Stewart, 2006). Transformational leadership positively correlates with leading companies in times of change (McCleskey, 2014).

Despite the expected positive contributions, Pham and Vu (2022) describe companies failing behind their expectations in advancing digital servitization activities, amongst others, caused by the complexity and difficulty of managing them. Even though there is a rising academic interest, digital servitization is still a relatively new research stream, lacking emphasis on decision-making models (Paschou et al., 2020) and

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guidance for managing and organizing digital servitization (Sklyar et al., 2019; Tagscherer & Carbon, 2023; Tronvoll et al., 2020). Furthermore, Cimini et al. (2021) outline the focus on technical skills development within digital servitization research, lacking focus on developing leadership competencies or soft skills. Due to the complexity and difficulty of leading digital servitization, scholars call for further research supporting managing digital servitization more effectively (Gebauer et al., 2021; Tóth et al., 2022; Tronvoll et al., 2020).

Therefore, the present study elaborates and guides how leaders should approach the complex change process of implementing digital servitization business models through transformational leadership. Furthermore, we provide insights into which aspects of transformational leadership most support digital servitization. Our research aims to expand the scholarly discussion on navigating digital servitization and guide practitioners on how leaders can succeed in strengthening innovative capabilities within their firms. To ensure an exploratory perspective into the under-researched area of digital servitization and leadership, we conducted 30 semi-structured interviews with leaders in the field of digital servitization. The results were structured based on a hybrid approach of deductive and inductive methods to allow a well-rounded view of our research question. On the one hand, using examples of transformational leadership attributes as the foundation for the deductive approach provides structure to our results. On the other hand, adding inductive analysis complements the study by additional insights not retrieved through the pre-determined deductive framework. Our research design provides insights into filling the research gap of required management models for successful implementation and change towards innovating through digital servitization.

The following article is structured by first introducing digital servitization and transformational leadership as central keywords of our research and putting them into the context of existing research. Furthermore, we reflect on existing literature focusing on leadership elements for digital servitization to further specify the existing research gap. Next, the Methods section outlines our research approach, including data collection and analysis. Subsequently, we present our results, including research participants' statements, and discuss their relevance and interconnections. The article ends with our conclusions, acknowledgments of our study's limitations, and recommendations for further research.

Theoretical background

Digital servitization

The concept of servitization was first introduced by Vandermerwe and Rada (1988). They coined the phenomenon as adding value to companies' core offerings through services. More specifically, Vandermerwe and Rada (1988) described servitization as a customer-focused combination of goods, services, support, self-service, and knowledge to offer bundles to the market to sharpen companies' competitive edge. The research area of servitization is mainly allocated within manufacturing companies, where manufacturers provide services tightly coupled to their products (Baines & Lightfoot, 2014; Zahoor et al., 2023). Practical examples of successful servitization business models can be seen in Rolls-Royce Holdings plc's introduction of guaranteed flight hours from their aero engines—"Power by the Hour" (Bıçakcıoğlu-Peynirci & Morgan, 2023; Leocádio et al., 2024) or Xerox's move from providing photocopiers to offering document management (Ahn et al., 2023; Baines et al., 2009).

While adding services to existing products, companies can gain several advantages. Compared to product-only offerings, services are more resistant to economic cycles (Oliva & Kallenberg, 2003; Vendrell-Herrero et al., 2022), supporting companies to generate more stable and recurring revenue streams (Bustinza et al., 2013; Gebauer et al., 2005; Leocádio et al., 2024). Companies achieve competitive advantages through tailoring product-service bundles and integrated

solution packages (Baines et al., 2007, 2009; Tian et al., 2022), which are more difficult to imitate (Gebauer et al., 2005; Oliva & Kallenberg, 2003) and help avoid price-based competition (Baines et al., 2007; Leocádio et al., 2024). Consequently, the business relationship with customers shifts from transactional to more long-term and relationship-based customer relationships (Kramer et al., 2024; Oliva & Kallenberg, 2003), locking out the competition and binding customers to the company and its offerings (Bustinza et al., 2013; Chiu et al., 2023; Vandermerwe & Rada, 1988).

Digital as the second component of digital servitization, besides servitization, arises from developing and implementing information and communication technology (Larjovuori et al., 2018). Digitization refers to the technical process of converting analog information into digital bits that can be transferred quickly, accurately, and cheaply (Brennen & Kreiss, 2016; Paul et al., 2023). Digital technologies are now incorporated into everyday products such as TVs, watches, or cars, creating intelligent systems based on sensors, networks, and processors (Yoo et al., 2012). Digital technologies are also described with the SMACIT acronym: Social, Mobile, Analytics, Cloud, and Internet of Things (Samuelson & Stehn, 2023; Vial, 2019). When companies use digital technologies to alter their existing business processes, offer digital products, or create digital business models, scientific research introduced the term "digitalization" (Verhoef et al., 2021), which gained increased scholarly attention since 2015 (Reis et al., 2018).

Current scientific research sees a strong link between digitalization and servitization. Digital servitization converges the two concepts and enables a new dimension of sophisticated and innovative service offerings for manufacturing companies (Gebauer et al., 2021; Paschou et al., 2020; Shen et al., 2023). Several authors have published definitions of digital servitization. Kohtamäki et al. (2019, p.4) see it as "transition toward smart product-service-software systems enabling value creation and capture through monitoring, control, optimization, and autonomous function." Paschou et al. (2019) point out the development of new services or improvement of existing ones using digital technologies by enabling new digital business models, finding ways of co-creating value, and generating knowledge from data. As a result, companies gain competitive advantages through digital servitization, leading to an increase in companies' operational performance. Digital technologies are the basis for digital servitization activities such as reporting real-time information, monitoring customers' usage behavior, responsive and proactive or predictive maintenance, remote control of operations, and equipment availability services (Chávez et al., 2023; Paiola & Gebauer, 2020). Data availability and analytics are crucial for these digital services (Chávez et al., 2023; Tronvoll et al., 2020). These use the installed base of existing customers based on previously sold equipment and products to leverage digital servitization as a customer-oriented business model for companies (Paiola & Gebauer, 2020; Raja et al., 2024).

A change in a business model such as digital servitization can significantly impact companies and requires an organizational change effort to benefit from it (Bustinza et al., 2018; Kohtamäki et al., 2019; Momeni et al., 2024; Sklyar et al., 2019). The increased complexity of digital service offerings is accompanied by changes in involved stakeholders in various areas of the value chain (Marelli & Dello Sbarba, 2024). Companies must interact with hardware and software providers, might have different contacts on the customer end, and a change of departments' internal resource and responsibility allocation (Sklyar et al., 2019). Kohtamäki et al. (2019) and Dalenogare et al. (2023) call for collaboration across company boundaries within the ecosystem when implementing smart product-service bundles, as changes in one company's business model affect others due to the interconnectedness of processes, data, and information. A change in a business model must be governed and implemented by leaders within an organization (Adama & Okeke, 2024; Turyadi et al., 2023). Digital servitization is a complex change process from various perspectives. On the one hand, new digital technologies and their application is introduced. On the other hand, the shift to combined product-service offerings and the resulting change in

market approach and customer interaction are being pursued. Transformational leadership is a leadership style that scientific research associates suitable for change processes and employee commitment to organizational change (Anderson, 2017; Bagga et al., 2023; Ly, 2024; Shadraconis, 2013), which is further described in the following chapter.

Transformational leadership within the full range leadership model

Initially introduced in a political context, Burns (1978) first published ideas on the concept of transformational and transactional leadership, which was further developed by Bass (1985) for organizational research (Eisenbach et al., 1999). The Multifactor Leadership Questionnaire (MLQ), developed by Bass and Avolio (1997), is the most widely used instrument to measure transformational and transactional leadership. Based on a total of 45 questions, the questionnaire distinguishes between three leadership styles (Kirkbride, 2006; Muenjohn & Armstrong, 2008):

- Non-leadership (laissez-faire),
- Transactional leadership,
- Transformational leadership.

Laissez-faire leadership is associated with indecisiveness, un-involvement, withdrawal, or reluctance (Bass & Avolio, 1990). Transactional leadership builds on agreement and compliance with the leader in return for rewards and recognition, implying close monitoring of deviances and mistakes, resulting in corrective action (Bass et al., 2003). Transactional leadership is achieved by management through exception and contingent reward strategies (Kirkbride, 2006). Thus, transactional leadership seeks to maximize efficiency in well-ordered societies.

Transformational leadership is seen as suitable for times of distress and change (Bass, 1985; McCleskey, 2014). Transformational leaders elevate the desires of followers for achievement and self-development, increasing followers' confidence and gradually moving them from concerns of existing to achievement, growth, and development (Bass & Avolio, 1990). Comparing the three leadership styles, laissez-faire leadership is rated as inactive (passive), transactional leadership is in the middle, and transformational leadership is the most active of the three styles. This classification is depicted in Fig. 1, which describes the Full Range Leadership Model and explains the continuum of leadership styles (Humphreys, 2001). Moreover, the model ranks efficiency among the three styles, with laissez-faire leadership as the least efficient and transformational leadership as the most efficient (Kirkbride, 2006).

Over several decades of research and revisions of the original

concept, most authors in this field of research characterize transformational leadership with the four common I's—idealized influence, individualized consideration, inspirational motivation, and intellectual stimulation (Hay, 2006). Leithwood and Jantzi (2000) proposed six transformational leadership characteristics—building vision and goals, providing intellectual stimulation, offering individualized support, symbolizing professional practices and values, demonstrating high-performance expectations, and developing structures to foster participation in decisions. We see similarities in both categorizations but continue to use the common four I's as the central concept for future discussions due to its empirical validation in several research works.

More specifically focused on the four common I's of transformational leadership, idealized influence means that transformational leaders have a clear vision and a sense of purpose and are role models with whom followers identify. Inspirational motivation is shown through clear communication of expectations and the generation of enthusiasm to demonstrate a commitment to a common goal. Transformational leaders stimulate their followers to be creative and promote new ideas and ways of doing things through intellectual stimulation. This skill set is complemented by individualized consideration, which highlights a supportive climate and the attribute of paying attention to the needs and development of others (Stewart, 2006). We summarized various transformational leadership characteristics based on existing research within the dimensions of idealized influence, inspirational motivation, individual consideration, and intellectual stimulation.

The orientation towards the employee is a central element directly described within individual consideration. However, transformational leaders are also concerned with generating a high level of performance from their followers through indirect measures such as creating a clear sense of purpose (Stewart, 2006), motivating and inspiring (Hay, 2006), ultimately leading to increased creativity and innovation capability (Bass & Avolio, 1990). Transformational leaders create the necessary boundary conditions without detailed instructions on how to reach the given goal. Nevertheless, their attitude promotes an environment that motivates employees to achieve those goals based on their distinct approaches. According to Hay (2006), followers gain confidence in transformational leaders, the baseline for accepting change.

Leadership for digital servitization

Despite the recognized complexity (Jovanovic et al., 2022) and difficulty of managing digital servitization (Kohtamäki et al., 2021), current scientific research so far lacks holistic perspectives on required leadership aspects or recommendations for specific leadership styles for

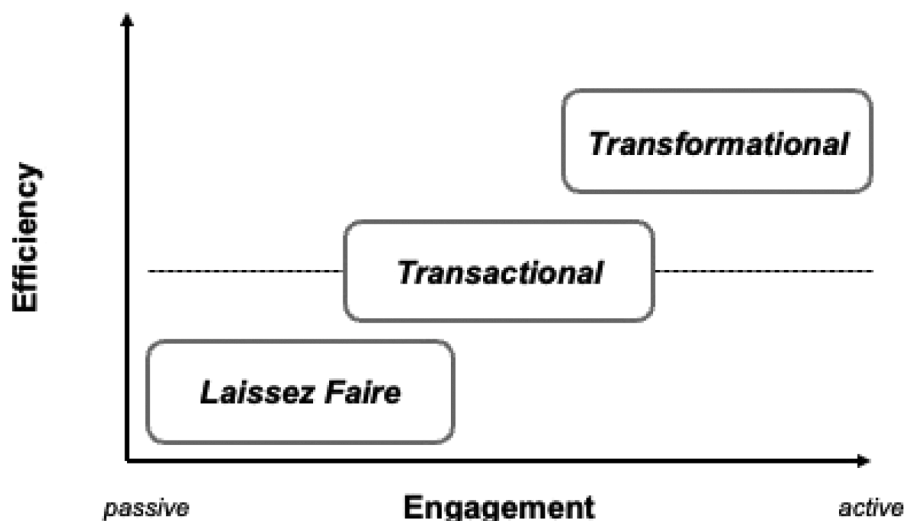


Fig. 1. Full Range Leadership Model - own illustration based on Banerjee et al. (2019); Kirkbride (2006).

digital servitization. Nevertheless, several researchers outline specific aspects associated with topics such as organization (Sklyar et al., 2019), tensions in digital servitization (Tóth et al., 2022), dynamic capabilities (Coreynen et al., 2020), organizational change framework (Bustinza et al., 2018), competence development (Cimini et al., 2021), and capabilities supporting digital servitization (Marcon et al., 2022). Table 2 summarizes our findings to represent the current scientific findings about leadership aspects for digital servitization.

Despite many listed aspects, we can identify patterns of frequently mentioned leadership subjects concerning digital servitization. Firstly, several authors emphasize the importance of creating a compelling vision for digital servitization (Chirumalla et al., 2023; Favoretto et al., 2022; Marcon et al., 2022; Pham & Vu, 2022; Sklyar et al., 2019; Tronvoll et al., 2020). The vision for digital servitization serves multiple purposes, such as legitimization (Tronvoll et al., 2020) and guidance for change (Sklyar et al., 2019), which is also deeply anchored in the definition of a transformational leader (Kirkbride, 2006). Furthermore, extant literature describes significant organizational change processes as a result of the digital servitization journey (Bustinza et al., 2018; Coreynen et al., 2020; Favoretto et al., 2022; Kim & Toya, 2018; Marcon et al., 2022; Tronvoll et al., 2020). Leaders are asked to actively manage the change on a strategic, organizational, and personal level arising from the convergence of the two subjects, digitalization and servitization (Bustinza et al., 2018). These requirements fit the description of a transformational leader (Hechanova & Cementina-Olpoc, 2013).

Another aspect frequently mentioned refers to the need for promoting internal and external collaboration for organizations in the context of digital servitization (Cimini et al., 2021; Favoretto et al., 2022; Marcon et al., 2022; Pham & Vu, 2022; Sklyar et al., 2019; Tóth et al., 2022; Tronvoll et al., 2020). Especially opening up and collaborating within ecosystems across organizational boundaries is a critical success factor for digital servitization (Pham & Vu, 2022; Tóth et al., 2022). Besides the ecosystems perspective, Sklyar et al. (2019) also outline the importance of close intra-firm collaboration between organizational units and departments. An area that has been finding lesser attention in digital servitization research so far is the focus on soft skills. Cimini et al. (2021) recommend finding the right balance between technical and soft skills and argue that underestimating soft skills is a challenge for companies undergoing digital servitization. In their study on transformational shifts through digital servitization, Tronvoll et al. (2020) recognize the close link between applying soft and social skills and the success of change initiatives for digital servitization.

Existing research positively relates digital servitization with an innovative (Marcon et al., 2022; Pham & Vu, 2022; Tronvoll et al., 2020) and entrepreneurial mindset (Favoretto et al., 2022; Tronvoll et al., 2020) for leadership. Especially the openness to innovation (Marcon et al., 2022) and the ability to create an environment for innovation deployment (Pham & Vu, 2022) are vital aspects that leaders and organizations should recognize for digital servitization. Similar to the previously mentioned leadership aspects, the innovation characteristics also fit the intellectual stimulation dimension of a transformational leader (Gumusluoglu & Ilsev, 2009; Stewart, 2006). In summary, despite not being specifically mentioned in the extant literature, we can match several discussed leadership characteristics for digital servitization to transformational leadership attributes.

Despite outlining various leadership characteristics promoting digital servitization, existing research lacks specific research emphasis on leadership skills for digital servitization as the primary research objective. Furthermore, as leadership encompasses a wide array of characteristics and styles (Piwovar-Sulej & Iqbal, 2023), a more structured approach is required to guide how to succeed in digital servitization. Thus, our research focused on transformational leadership to contribute to the existing research gap. The specific structure and focus on a dedicated leadership style aid in guiding practitioners in overcoming the current complexity and difficulties of implementing digital servitization business models.

Methods

Data collection

The selection process for our research participants for the semi-structured interviews followed the concept of purposive sampling (Etikan et al., 2016). We contacted potential research participants through the business-focused platform “LinkedIn” searching for “digital services,” “servitization,” “digitalization,” and “digital transformation” in job titles. We ensured they matched our target group by initial questioning. This approach warrants sufficient knowledge and experience to contribute to our qualitative research (Bernard, 2017). One researcher conducted and recorded the interviews from April 2023 to July 2023 via the program “Microsoft Teams.” The raw data of the transcripts was enhanced using the intelligent verbatim transcription method (McMullin, 2023) with the support of the MAXQDA program (VERBI Software, 2021). We reached code saturation after thirty interviews.

Our interview guideline consists of open-ended questions to answer our research question about which aspects of transformational leadership support digital servitization. With open-ended questions, we certify that the answers provide the necessary exploratory background on why the leaders responded this way, as digital servitization is still a new research area. The semi-structured interviews followed the logic of starting with a short introduction to familiarize with the research participant and the inquiry about the demographical background, such as hierarchy level or industry association. Afterward, we created a common understanding of the research subjects of digital servitization and transformational leadership by outlining and discussing their definitions. Thus, this increases reliability and validity by ensuring the researcher and research participant have the same understanding of the research topic. The first substantial question was intentionally kept general, inquiring about the required leadership skills for digital servitization. After that, the outlined transformational leadership dimensions (Idealized Influence, Inspirational Motivation, Individual Consideration, and Intellectual Stimulation; see also Table 1) served as a baseline to derive the following open-ended interview questions. We included probing questions to deepen the understanding and nuances of the participants’ responses further (Adams, 2015). Following this section,

Table 1
Characteristics of transformational leadership based on Avolio et al. (1991); Bass and Avolio (1990); Hay (2006); Kirkbride (2006); Stewart (2006).

Transformational leadership dimension	Transformational leadership characteristics
<i>Idealized influence</i>	<ul style="list-style-type: none"> • being a role model • having a clear vision • creating a sense of purpose • obtaining the required extra effort from followers
<i>Inspirational motivation</i>	<ul style="list-style-type: none"> • being emotionally mature • being able to attract and inspire others • being an effective communicator • generating optimism and enthusiasm • demonstrating commitment to goals • setting an example of a hard worker
<i>Individual consideration</i>	<ul style="list-style-type: none"> • being considerate of the personal needs of employees • being an active listener • mentoring • promoting self-development • listening to all viewpoints to develop a spirit of cooperation • establishing a supportive climate • building individuals’ confidence
<i>Intellectual stimulation</i>	<ul style="list-style-type: none"> • fostering creativity and innovation • soliciting new ideas • encouraging a new look at old problems • being open to the ideas of followers

Table 2
Literature review on leadership aspects for digital servitization.

Reference	Leadership aspects
Tronvoll et al. (2020)	<ul style="list-style-type: none"> • Transformational shifts • Collaboration • Agility • Vision • Focus on soft & social skills • Entrepreneurial culture • Innovation • Discipline
Sklyar et al. (2019)	<ul style="list-style-type: none"> • Change management • Collaboration • Trust • Vision for change • Sharing of knowledge
Pham and Vu (2022)	<ul style="list-style-type: none"> • Organizational transformation • Collaboration with ecosystem • Vision • Environment for innovation deployment
Tóth et al. (2022)	<ul style="list-style-type: none"> • Complexity to intra-organizational relationships • Resistance to change • Multi-actor involvement • Balance openness and control • Strong stakeholder management skills
Coreynen et al. (2020)	<ul style="list-style-type: none"> • Collaboration • Strategic change • Flexibility • Adaptability
Bustinza et al. (2018)	<ul style="list-style-type: none"> • Organizational change process • Constantly reconfiguring the firm's strategic capabilities • Long-term commitment to digital servitization
Cimini et al. (2021)	<ul style="list-style-type: none"> • Strategic agility & flexibility • Communication skills • Ambiguity tolerance • Agile and collaborative mindset • Cultural shift
Favoretto et al. (2022)	<ul style="list-style-type: none"> • Soft skills are underestimated but highly important • Vision • Collaboration • Commitment • Agility • Entrepreneurship • Change culture
Chirumalla et al. (2023)	<ul style="list-style-type: none"> • Vision • Flexibility
Marcon et al. (2022)	<ul style="list-style-type: none"> • Openness for innovation • Know-how development • Collaboration • Shared vision • Business model change
Kim and Toya (2018)	<ul style="list-style-type: none"> • Charisma • Organizational change • Soft skills

we concluded the interview's main section with a question about the fit of transactional leadership for digital servitization to gain insights into the interview partners' opinions on the opposing leadership style compared to transformational leadership. We further increased the study's reliability as the quality and understanding of the respondents' statements were additionally challenged and verified. Lastly, we asked about additional insights that were not covered and concluded the interview.

We can classify the research participants based on their company rank, industry, and years of leadership experience (Table 3). Our digital servitization leaders can be attributed to different company levels, ranging from first-level Managers to Vice Presidents and Executives. We considered an even allocation between company levels based on the distribution among the different ranks. For classifying our thirty research participants to the industry, we used the Global Industry Classification Standard (GICS) as a globally valid standard (MSCI, 2022). Most of our research participants were active in the machinery, automobile, or electrical equipment industry, which can be seen as a

Table 3
Research participants.

Company level	Number	Share in %
Executive	6	20 %
Vice President	5	17 %
Director	6	20 %
Head of ...	7	23 %
Manager	6	20 %
Total	30	100 %
Industrial sector	Amount	Share in %
Professional Services	5	17 %
Machinery	15	50 %
Automobiles & Components	1	3 %
Chemicals	2	7 %
Electrical Equipment	3	10 %
IT Services	4	13 %
Total	30	100 %
Leadership experience	Amount	Share in %
<5 years	6	20 %
6–10 years	6	20 %
11–20 years	10	33 %
>20 years	8	27 %
Total	30	100 %
Gender	Amount	Share in %
Female	6	20 %
Male	24	80 %
Total	30	100 %

focus area of digital servitization. Another category included consultants active in business and IT, supporting their clients in digital servitization activities, classified as professional or IT services. Another criterion for clustering our research participants is their leadership track record, measured in years of leadership experience. Whereas six research participants were at the beginning of their leadership career (<5 years), sixty percent of the respondents had more than ten years of leadership experience. A balanced distribution, including younger leaders, represents recently developed leadership concepts and approaches. Lastly, six of our research participants were female, whereas twenty-six were male.

Data analysis

We analyzed our data set based on thematic analysis following Braun and Clarke (2006). More specifically, we applied a hybrid approach of deductive (Crabtree & Miller, 1992) and inductive (Boyatzis, 1998) thematic analysis. We chose this combined approach to analyze the responses to answer our research question (Fereday & Muir-Cochrane, 2006). On the one hand, we used our outlined transformational leadership characteristics (Table 1) as a template from a deductive view. We counted the references of the specific attributes of the four I's (idealized influence, inspirational motivation, individual consideration, and intellectual stimulation) within the transcripts. On the other hand, we reviewed the data set inductively by adding attributes to the transformational leadership categories mentioned during the interviews. The results were structured with a three-stage system summarizing the original codes into themes, which were further aggregated into dimensions (Gioia et al., 2013). Within the analysis, we excluded initially created codes, which resulted in five or fewer counts due to their statistical relevance. Furthermore, we added a coding in shades of grey based on the number of counts for which the specific code is used in our analyses (Brauer et al., 2021). Lastly, we included a question on the fit of transactional leadership for digital servitization in our questionnaire, in which we summarize the statements inductively as a separate category in the results section. Researcher bias was addressed through an inter-coder check between the research partners, which resulted in agreement on the coding results (Mayring, 2014).

Results

The following will present our results by displaying the deductive and inductive thematic analysis for digital servitization and transformational leadership (the data and analyses are also to be found here: https://osf.io/5y4xg/?view_only=48a7e578bfd0470daf81b66002d9fcd4).

The following section shows the characteristics mentioned by our research participants as applicable use cases for transactional leadership in digital servitization.

Transformational leadership for digital servitization

Fig. 2 depicts our results of the deductive and inductive analysis. Besides structuring our findings into initial codes, themes, and dimensions, we add further information to the structure. On the one hand, we describe whether the code originates from the deductive or inductive analysis. If derived from the deductive analysis on transformational leadership characteristics, we add the information to which dimension (idealized influence, inspirational motivation, individual consideration, or intellectual stimulation) we classified the code in Table 1. On the other hand, we depict the number of codes that were applied during the coding process. We structured the coding numbers into categories and included a coloring label to better identify frequently mentioned items. We organized our coding scheme into three dimensions: *giving direction*, *being employee-oriented*, and *creating an innovative and collaborative environment*. Furthermore, each dimension is further detailed by themes and the corresponding initial codes.

Leaders should be able to *create a vision* and *be goal-oriented* within the dimension of *giving direction*. *Having a clear vision* was identified as a critical leadership characteristic associated with digital servitization. As it is one of the most mentioned characteristics within the analysis, we see it as a crucial success factor for digital servitization. The interviewed digital servitization leaders emphasized this by statements such as “you need to have a strong vision” (Interview #22), “it is about the vision” (Interview #16), or “you need to have a clear vision, and you need to be

able to communicate that vision (Interview #3).” *Demonstrating commitment to goals* is complementary to creating a vision to ensure digital servitization is pursued effectively to achieve the desired targets. For example, one research participant emphasized, “you still need to set clear targets and expectations, so it does not go off in the wrong direction (Interview #21).” “You need to have the leadership skills that you can make the whole organization work towards that goal (Interview #13)” is another reference made by a Manager in the machinery industry. The second theme summarizes the leadership skills to *motivate employees* for digital servitization. Within this theme, leaders should consider multiple aspects from the deductive analysis of transformational leadership characteristics. Our research participants especially emphasized the two subjects of *being a role model* and *being able to attract and inspire others* based on the number of codes. A statement mentioned multiple times in the context of role modeling is “leading by example (Interview #4, #11, #15).” The other codes associated with the theme of motivating employees, *creating a sense of purpose*, *obtaining extra effort from followers*, and *generating optimism and enthusiasm* received fewer individual mentions than those outlined before. In the theme of *allowing for freedom*, we summarized the three leadership characteristics: *creating freedom within boundaries*, *empowering employees*, and *enabling employees*. Those provide further details to the previously mentioned ability to formulate a clear vision by leadership but grant employees the autonomy to work towards the agreed targets independently. For example, leaders “should not do everything on [their] own, but enable the people (Interview #27),” or “leadership means setting boundaries where you want to go but also giving people the freedom (Interview #2).”

The second dimension, being employee-oriented, summarizes the two themes *applying soft skills* and *driving change*. By explicitly outlining specific aspects of soft skills, our findings explain details which skills especially support the organizational change process around digital servitization, which extant literature describes as critical but underestimated (Cimini et al., 2021; Tronvoll et al., 2020). A code arising from the transformational leadership dimension of individual consideration, *being considerate of employees’ personal needs*, received more than twenty

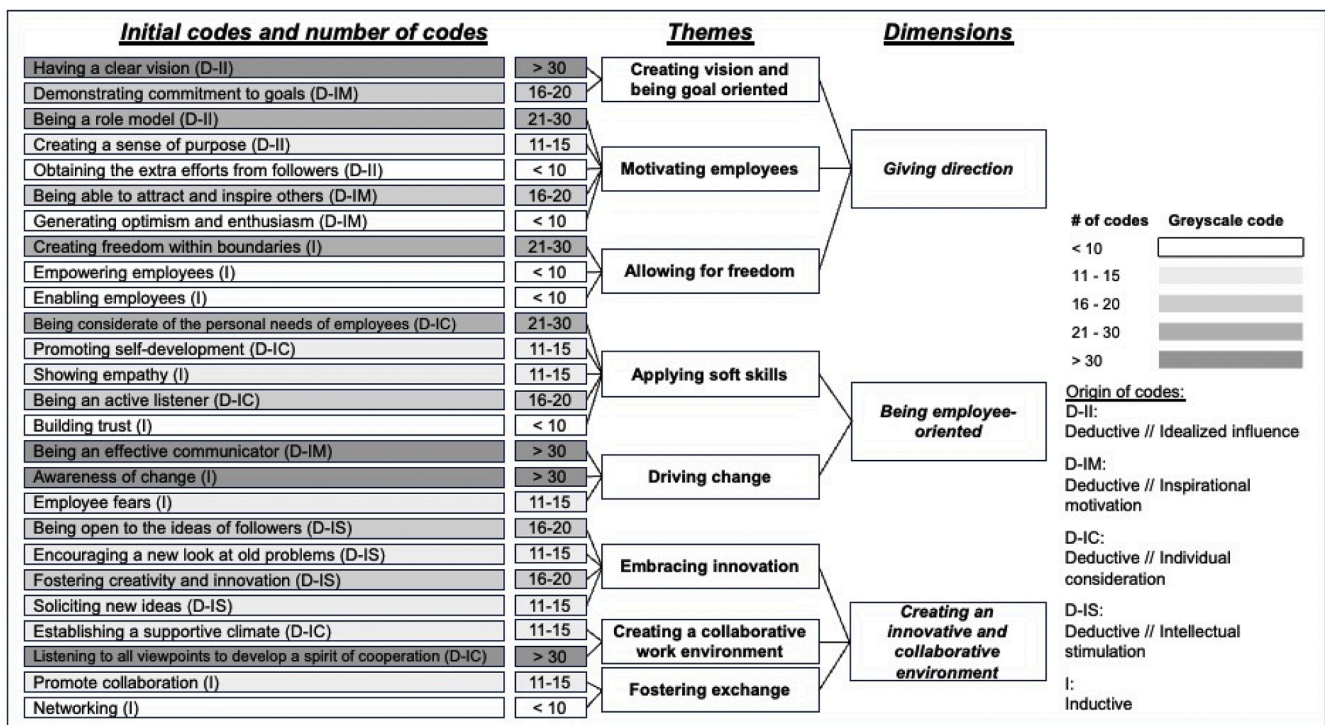


Fig. 2. Results of deductive and inductive analysis—transformational leadership for digital servitization.

codes, thus showing significant importance for leading digital servitization. For example, one Manager emphasized: “I try to understand what is important for people (Interview #9).” Another perspective from a Director outlined that “it is a lot about personal contact and always understanding what drives them (Interview #7).” In conjunction with *promoting self-development, showing empathy, being an active listener, and building trust*, we outline specific attributes leaders should consider in their relationships with their teams and employees. Those can also be seen as foundational blocks for the theme *driving change*. Mainly driven by the significantly changing business models and job descriptions of employees, leaders must focus on change management, which is associated with digital servitization (Bustinza et al., 2018; Kim & Toya, 2018). Furthermore, leaders should consider *employees’ fears* arising from digital servitization changes. One executive stated that “change very often also creates fear (Interview #18)”, which underlines our previous statement. Our research participants saw a critical success factor in *being an effective communicator*. A Manager in the IT services industry mentioned, “[...] you also need to understand that communication, effective communication is a critical success factor for change management (Interview #25)”. Furthermore, communication also links to the topic of vision, as one Director mentioned, “[...] making a vision come to life (Interview #26)”. Based on our analysis’s high number of codes, we can conclude that focusing highly on employees and their well-being and communication are central success factors in applying transformational leadership for digital servitization.

The third dimension was labeled *creating an innovative and collaborative environment*. Mainly from the transformational leadership dimension of intellectual stimulation, the codes associated with *embracing innovation* received similar codes in the medium range compared to other items. All four characteristics, *fostering creativity and innovation, soliciting new ideas, encouraging a fresh look at old problems, and being open to the ideas of followers*, should be considered by leaders to complement their skills to advance digital servitization. Even though digital servitization offers new business model capabilities, our research participants did not perceive spurring innovation and creativity as the utmost priority for leadership priorities. Nevertheless, leaders must keep this transformational leadership dimension on the radar to complement their skills for digital servitization. One research participant stated, “[...] you have to be truly open-minded and have to see all the possibilities that are outside the box (Interview #13).” Another executive confirmed the link between digital servitization and innovation: “One thing is when we want further to drive this kind of service products to the market, then I think that has to do a lot with innovation. The required competencies are computation, curiosity, and creativity, but also topics like risk-taking (Interview #8).” The second theme, *creating a collaborative work environment*, entails *establishing a supportive climate and listening to all viewpoints to develop a spirit of cooperation*. The latter of the two was coded more than thirty times, highlighting the importance of this transformational leadership characteristic for digital servitization for our research participants. One Manager emphasized the need for close cooperation and listening to each other: “Work with your employees and try to understand together with them (Interview #25)”, which is also underlined by a statement from an Executive: “It is usually better to create it together with the people to bring in different perspectives (Interview #15).” Lastly, leadership for digital servitization requires *fostering exchange* through *promoting collaboration and networking*. Leaders should encourage the exchange between departments, disciplines, and different business units, primarily driven by the cross-functional characteristic of digital servitization.

Transactional leadership for digital servitization

As a complementary analysis, we summarized our research participants’ statements regarding the fit of transactional leadership for digital servitization. Even though some characteristics were only mentioned once or twice, certain elements gained significant mentions,

highlighting the situational awareness needed to distinguish between transactional and transformational leadership for digital servitization. We clustered the identified items based on the associated context in Table 4.

We classified the responses from three of our research participants as *goal context*. This implies the argument that transactional leadership fits digital servitization if there is a *defined end goal* and it is suitable for *goal achievement*. In this context, transactional leadership aspects can be applied if the innovation character of the digital servitization activities is incremental, thus requiring less transformational leadership attributes. Eight responses were associated with *application context*, meaning there can be certain situations where leaders are better equipped with transactional leadership characteristics than transformational leadership. For example, one research participant saw benefits in applying transactional leadership elements in leading *data analytics* tasks due to the high expertise and structure required. Another research participant preferred the leadership style for *setting up structures*. Within this data set, a significant mention of five codes is the application of transactional leadership for *crisis mode*, for which existing research sees advantages over transformational leadership (Anwar, 2017). For instance, this could occur with failing data connections or customer relationship issues within digital servitization business models. A research participant’s statement underlines this: “If something is not working and there is a loss at the customer because the machine stands still, you cannot be creative for months until you come up with a solution there. I think immediate action is required, and you are coming up with strict follow-up and ToDos (Interview #2).” Another research participant preferred aspects of transactional leadership for structured *problem-solving*, which can also be associated with emergencies or failures. This analysis’s highest number of codes is attributed to the *time context*. Several leaders recognized a difference between *different stages* of the digital servitization journey, thus requiring a shift from a transformational to a transactional leadership style. Especially once the initial development of the business model is successful, our research participants recommended gradually shifting from transformational to transactional leadership elements for *scaling, implementing, and improving* the existing business models. A Director mentioned, “towards the end of an implementation, or the more it is about implementing it, just scaling it up, the more transactional elements could fit in (Interview #2).” We connected four responses with the *people context*, meaning that our research participants emphasized the need to apply transactional leadership for specific groups within digital servitization. On the one hand, two research participants recommended using more transactional leadership elements for *sales and service employees*. On the other hand, two leaders pointed out that *cultural differences* require a more transactional leadership approach for certain cultures. Finally, two of our

Table 4
Transactional leadership for digital servitization.

Context	Characteristic	# of total codes
Goal context	Defined end goal	2
	Goal achievement	1
	<i>Subtotal</i>	3
Application context	Data analytics	1
	Setup structures	1
	Crisis mode	5
	Problem-solving	1
	<i>Subtotal</i>	8
Time context	Scaling	3
	Different stages	1
	Implementation & improving	7
	<i>Subtotal</i>	11
People context	Cultural differences	2
	Sales & service personnel	2
	<i>Subtotal</i>	4
No fit for digital servitization		2
Total		28

research participants emphasized seeing *no fit for transactional leadership regarding digital servitization*.

Discussion

Based on the three analyses described, we summarized our findings on connecting transformational leadership to digital servitization in Fig. 3. Based on the most mentioned leadership characteristics from the deductive analysis, we enhanced the depiction by adding frequently stated activities from the inductive analysis. Lastly, we pointed out the use cases where our research participants saw high applicability of transactional leadership for digital servitization.

Our findings summarize that the effective application of transformational leadership for digital servitization consists of three focus areas. Firstly, leaders should give direction to their employees by creating a compelling vision for digital servitization within the company. Thus, our findings agree with discussions in extant literature describing vision as a vital success factor for digital servitization (Chirumalla et al., 2023; Sklyar et al., 2019; Tronvoll et al., 2020). Within this vision, we summarized that employees must be given freedom within the aligned boundaries. This emphasizes a clear tendency towards the fit of transformational leadership, whereas transactional leadership would imply a much stricter monitoring and deviation management (Bass et al., 2003; Kirkbride, 2006). Additionally, leaders should firmly commit to goals to succeed in digital servitization which is also outlined by Favoretto et al. (2022). Enriching the essential task of vision creation for digital servitization (Marcon et al., 2022; Pham & Vu, 2022; Tronvoll et al., 2020), with the additional transformational leadership characteristic of providing freedom within boundaries, we provide further and more specific context to the more high-level topic of vision creation. Additionally, leaders should focus on motivating their employees and act as role models to lead digital servitization activities.

Secondly, we derived a strong employee orientation to implement business models in the context of digital servitization. Consequently, understanding how to consider employees' personal needs and incorporate those into the leadership decision-making process is an essential leadership task. In line with the previous statement, leaders should take the time to listen to their employees. In the context of digital servitization, our research participants emphasized a vital need for communication skills, which fits the definition of a transformational leader (Hay, 2006). Digital servitization is a significant change process for the company and its employees. Thus, leaders must actively manage the inherent change process. With the leadership activities associated with the focus area of employee orientation, we provide further insights into

the so far acknowledged but under-researched area of soft skills for digital servitization (Cimini et al., 2021).

As digitalization and servitization are two novel attributes for incumbent companies, we recommend focusing on creating an innovative and collaborative environment as a third focus area for leaders. Leaders enable innovations by supporting and creating collaboration within the firm and across organizational boundaries. Collaboration can be seen between individual employees, different departments, or across organizational borders with customers, suppliers, or other stakeholders. Our findings also correspond to the call by Pham and Vu (2022) to develop an environment for innovation deployment. Furthermore, leaders should be open to ideas and feedback on a continued basis. These aspects align with the transformational leadership characteristics of cooperation and establishing a supportive climate (Stewart, 2006) and are also underscored by the research work of Sklyar et al. (2019) describing the need for increased intra-firm collaboration and cooperation in ecosystems.

Besides the strong correlation between transformational leadership attributes, we recommend using certain transactional leadership aspects for specific use cases within the digital servitization journey. After a certain amount of time, the innovative character of digital servitization will decrease, and specific business models will be seen as part of regular business operations. Therefore, after building the business model, transactional leadership skills support implementing, scaling, and improving digital servitization activities. Another essential use case is the use of transactional leadership in crisis scenarios during digital servitization to ensure clear guidance and order to solve the present situation.

Based on the outlined leadership aspects, we recommend applying transformational leadership characteristics to build digital servitization business models. Furthermore, guiding the inherent change through giving direction and employee orientation is attributable to transformational leaders. Nevertheless, we conclude that transactional leadership aspects find their use cases for maintaining the business model, such as improving or managing crises. Therefore, the more the maturity level for digital servitization increases, the more transactional leadership elements support further scaling the business. Our findings align with existing research that recommends that the effectiveness of transformational and transactional leadership styles depends on situational use and environmental factors. For example, this relates to regional characteristics (Wamalwa, 2023), aiming at exploration or exploitation activities (Asif, 2019; Hoessler & Carbon, 2024), or industry-specific differences (Abbas & Ali, 2023).

Furthermore, putting our findings in a broader context of existing research on leadership in general and leadership for digitalization, we



Fig. 3. Focus areas for leadership for digital servitization (own illustration based on the empirical findings).

find the following conclusions. The focus area of giving direction that we outlined as crucial for leading digital servitization, mainly including the aspect of creating a vision, is also often referred to in research on leading digital transformation (Cortellazzo et al., 2019; Klein, 2020; Larjovuori et al., 2016; Sainger, 2018; Tagscherer & Carbon, 2023). In the same context, change management as part of being employee-oriented correlates with findings of extant digital leadership research that sees embracing and managing change as a central leadership characteristic (Kane et al., 2019; Porfirio et al., 2021; Shah & Patki, 2020; Zulu & Khosrowshahi, 2021). For leading digitalization activities, previous research has indicated transformational leadership as well suited (Diller et al., 2020; McCarthy et al., 2022; Philip, 2021; Sow & Aborbie, 2018), which we also confirmed for digital servitization as a sub-topic of digitalization. Compared to the original works of transformational leadership (Bass, 1985; Bass & Avolio, 1990; Hay, 2006), creating a strong vision, being an effective communicator, and the consideration of employees' needs is shared with the presentation of our results of leadership skills for digital servitization. However, established leadership research has not explicitly described change management and innovation-orientation characteristics. Nevertheless, those skills have become more relevant with the rising interest in digitalization. Therefore, our research outcomes of transformational leadership skills for digital servitization expand the existing leadership by considering current industry movements.

Regional or cultural differences in leadership effectiveness are acknowledged in research areas neighboring leading digital servitization. For example, Espina-Romero et al. (2023) offered insights into cultural differences in digital leadership. In servitization research, Kim and Toya (2018) concluded that transformational leadership supports advancing servitization in Japanese manufacturing firms. Also, the effectiveness of transformational leadership among different cultures was reviewed by Budur (2020), who concluded that transformational leadership is more effective in low-avoidance cultures. On the contrary, cultures with high power distance are more suited to transactional leadership styles. Moreover, the advancements in digitalization vary between countries based on regional development and maturity levels (Boikova et al., 2021).

Conclusion

Our research was targeted to contribute to existing digital servitization research, especially the under-researched area of managing the inherent complexity of digital servitization (Tóth et al., 2022; Tronvoll et al., 2020), by elaborating on transformational leadership style and especially which specific attributes support leaders in digital servitization activities. Through conducting 30 semi-structured interviews, we gained valuable insights from leaders involved in digital servitization initiatives within their companies. Based on analyzing the interview transcripts deductively and inductively, we derived a set of leadership attributes our experts saw as important for digital servitization. Therefore, we can conclude that transformational leadership can be seen as a supportive pathway approaching and building digital servitization business models. Formulating a vision and focusing on change management are vital elements for leaders in digital servitization, simultaneously being closely associated with a transformational leader (Hay, 2006; Kirkbride, 2006). Through applying the specific lens of leadership for digital servitization, we present three focus areas: giving direction, being employee-oriented, and creating an innovative and collaborative environment, including the corresponding activities (see Figs. 2 and 3).

Furthermore, we confirm the findings of previous digital servitization research outlining creating a vision (Favoretto et al., 2022; Marcon et al., 2022; Pham & Vu, 2022; Sklyar et al., 2019; Tronvoll et al., 2020), internal and external collaboration (Cimini et al., 2021; Favoretto et al., 2022; Marcon et al., 2022; Pham & Vu, 2022; Sklyar et al., 2019; Tóth et al., 2022; Tronvoll et al., 2020), and organizational change (Bustinzin et al., 2018; Coreynen et al., 2020; Favoretto et al., 2022; Kim & Toya,

2018; Marcon et al., 2022; Tronvoll et al., 2020) as critical success factors for digital servitization. Nevertheless, we combine all those elements with further aspects, such as an innovative environment and, especially, detailing the under-researched aspect of soft skills (Cimini et al., 2021) within the view of transformational leadership. Moreover, by including the specific use cases for transactional leadership, such as maintaining and scaling business models or managing crises in digital servitization, we provide a differentiated view and situational requirements for leaders to shift their approach.

From a theoretical perspective, our findings contribute to the scientific discussion on digital servitization. Linking digital servitization with leadership provides a better understanding of why several authors considered implementing digital servitization business models complex (Gebauer et al., 2021; Tóth et al., 2022; Tronvoll et al., 2020). The intersection of digitalization and servitization as a significant disruption of companies' competitive landscape requires a holistic leadership approach involving multiple facets such as change management, innovation, or commitment to goals. Furthermore, using transformational leadership as a specific research direction presents a distinct and actionable approach for use cases in leading digitalization activities. Expanding those thoughts opens the door for future research in this direction. Outlining the most relevant transformational leadership aspects for digital servitization through the thematic analysis provides a structure that can be used as a template for other use cases of transformational leadership or other digitalization activities.

Practitioners can also gain insights from our research. On the one hand, we propose applying transformational leadership elements to approach digital servitization. Moreover, boards and top management are supported by assigning transformational rather than transactional leaders to lead companies' digital servitization initiatives. On the other hand, leaders better understand the required focus areas for digital servitization: Giving direction, being employee-oriented, and creating an innovative and collaborative environment. When applying the associated leadership activities, leaders have better guidance on approaching and managing digital servitization. Besides focusing on strategic and technical advancements, ensuring that soft skills are applied to involve employees and stakeholders is a vital success factor for the required organizational change towards digital servitization. Finally, specific use cases requiring transactional leadership support more explicit decision-making in crisis scenarios. It reminds organizations to constantly re-evaluate whether digital servitization initiatives have matured and should be treated more with transactional leadership elements. Our study contributes to practitioners by providing a structured roadmap, including central leadership aspects and skills to advance digital servitization business models within their companies.

From a social perspective, our research findings also provide value to extant literature. On the one hand, we specifically outline the consideration of employees' needs and listening to them as key success factors in leadership for digital servitization. This offers a human perspective within our fast-paced environment and contributes to managing employees' stress levels (Harahap et al., 2023). Transformational leadership's distinct focus on those social-oriented subjects improves employee well-being within companies (Arnold, 2017), especially in the context of digital servitization activities. Also, creating a collaborative work environment, which we outlined as a success factor for digital servitization, creates an inclusive work atmosphere. On the other hand, effective leadership in digital servitization activities allows advancements in sustainability (Lyu, 2024) by providing proper resource allocation strategies. Thus, it indirectly supports the efficient use of energy due to the resource intensity of digitalization (Deming et al., 2023).

Limitations and further research implications

Although applying a well-established qualitative scientific research approach through semi-structured interviews and analyzing them by content analysis, we acknowledge the limitations of our study. Firstly,

although conducting thirty interviews represents a significant foundation of data collection, our chosen qualitative research method is incumbent on its restrictions of statistical validity. The selection of research participants through purposive sampling offers the risk of biased and unbalanced research data. However, our research participants represent different hierarchical levels, industries, and leadership track records, thus covering a wide range of expertise. Also, initial questioning before conducting the interview ensured the research participants' knowledge of digital servitization and leadership. Furthermore, gaining the insights of thirty leaders in digital servitization offers more diverse insights than case-study-based research in extant literature covering only a few companies. As we pursued gaining insights from different industries, management levels, or leadership experience, we did not specify or cluster our research findings according to those categories. Focusing on a dedicated industry would offer further research possibilities to provide more details on our findings. Additionally, a deductive approach in our first analysis initially limits the results based on the defined coding criteria. However, establishing them on a literature review (see Table 1), adding an inductive analysis of our data set, and analyzing the responses concerning transactional leadership negates these restrictions. Also, linking several of our identified results to existing research on digital servitization solidifies our results.

Although our findings contribute to the identified research gap on managing and guiding the complexity of digital servitization (Gebauer et al., 2021; Tóth et al., 2022; Tronvoll et al., 2020) by identifying transformational leadership style as a viable orientation, we recommend further research to the digital servitization research community. We suggest deepening the convergence of digital servitization and leadership research. As indicated earlier, the selected research method and purposive sampling aimed to gain balanced insights across industries or geographical regions. A more specific and deepened understanding of individual industries offers future research potential. For example, additional research could compare the degree of specific transformational or transactional leadership attributes between the machinery and the electrical equipment industry sectors. As our research participants acknowledged potential regional differences in the effectiveness of transformational leadership, we propose research that differentiates leadership styles for digital servitization across geographical regions. The specific research could benefit the scientific community when industry or regional-specific findings can be abstracted to the discourse on leading digital transformation.

Digital servitization has been recognized as an organizational change process (Bustanza et al., 2018). However, we recommend conducting further research on how leadership influences the acceptance of organizational change and the subsequent success in digital servitization. Furthermore, we see benefits in focusing on leaders as individuals and their required skill sets as they are responsible for driving change within organizations (Faix, 2020).

Despite offering more concrete details on the required leadership soft skills for digital servitization, we acknowledge the need for further research. On top of our exploratory research outcomes for soft skills for digital servitization, using a quantitative research design will gain further and statistically rich data. Lastly, we recommend further research on the gradual shift from transformational to transactional leadership based on the maturity stage of digital servitization, providing more insights into time frames or trigger points for adapting the leadership style.

CRedit authorship contribution statement

Florian Tagscherer: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Claus-Christian Carbon:** Writing – review & editing, Writing – original draft, Visualization, Supervision, Resources, Project administration, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.stae.2025.100098.

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