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The Impact of Leadership on Establishing a Data-Driven Organization: A Qualitative Study

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ABSTRACT

This paper analyzes the impact of leadership on a data-driven culture (DDC) as part of establishing a data-driven organization (DDO). As the costs for gathering, storing and processing data decrease and the volume of data increases, the trend of "democratization of data" continues. It is a concept to make data available to as many employees as possible, across all organizational departments and thereby breaking down organizational and hierarchical silos. In parallel, artificial intelligence will play a pivotal role in changing workplace processes, particularly in how data is handled and interpreted. Therefore, organizations pursue data-driven initiatives to improve decision-making, develop innovative business models and gain a competitive advantage. Those initiatives and trends can be challenging for employees at all levels, regardless of managerial responsibility. They require considerable effort to acquire new knowledge and to re- or upskill one's skill set. Establishing a DDC is essential to supporting employees and thus organizations in becoming more data-driven. This includes fostering continuous learning, adapting to new technologies, and collaborating cross-functionally. In this transformation, the eminent role of leadership teams comes into play, as the required leadership skills are changing as well. The concept of DDOs has drawn academic and practical attention in previous research. The different aspects of a DDO are researched from various perspectives and theories and a new discipline is evolving by combining leadership research and information systems research. Based on a socio-technical framework, this article examines the impact of leadership on establishing a DDO from a DDC perspective. By drawing upon the existing literature on leadership in DDO and enriching the results with semi-structured expert interviews conducted in a German multinational corporation, we identifiy critical factors for leaders while implementing a DDC, offering guidance for both academic research and practical application. As a result, we contribute to a common understanding of the leadership requirements and the impact of leadership in a DDO by fostering a DDC.

Keywords: Data-driven organization, Leadership, Organizational development

INTRODUCTION

In a dynamic and technology-driven business environment, companies are increasingly feeling the pressure to transform their organization toward

becoming data-driven. This shift seems no longer an option but a necessity for gaining competitive advantages, fostering innovations and enabling data-driven decision-making (Lee et al., 2024; Li et al., 2022). Decreasing costs for IT infrastructure for data collection, storage and processing, the increased performance of emerging technologies and changes in internal processes are resulting in the growing use of big data analytics across all organizational departments and promoting 'data democratization' (Awasthi and George, 2020; Lemmon and Lemmon, 2013). Despite the significant advancements in technology, the use of emerging technologies for a data-driven organization requires substantial organizational and cultural changes. Establishing a data-driven culture influences shared values, norms, and attitudes and puts data more at the forefront. Especially in times of transformation, leadership teams have an eminent role for the organization, fostering a culture of learning, adapting to new technologies and collaborating cross-functionally by breaking down organizational silos (Hupperz et al., 2021; Schmidt et al., 2023). Some studies describe that leaders perceive cultural barriers as the most serious on the road towards a DDO (Bean, 2022). Leaders have significant influence on the culture and are part of it at the same time.

Concurrently, managers themselves have to keep up with the of technical progress as their role might change as well.

In this study, we apply the socio-technical system (STS) theory, where the technical subsystem must be considered and optimised jointly with socio-subsystems and vice versa (Clegg et al., 2017; Trist and Bamforth, 1951; Trist, 1981). We thereby focusing on the people and cultural dimension of the STS framework and its interactions with other dimensions within the framework. This paper aims to explore the multifaceted role of leadership and to provide an overview of the current research in data-driven organizations. By conducting a systematic literature review, we answer our first research question (1): How is the role of leadership described in the data-driven organization literature? (RQ1). Secondly, we conducted 16 expert interviews to answer the following question (2): What insights can be gained about the impact of leadership on establishing a data-driven organization within a multinational company? (RQ2). The following sections are structured as follows. First, we provide an overview of the theoretical foundation and the research approach of our study. Then, we present the results of the systematic literature review and the conducted qualitative expert interviews.

THEORETICAL BACKGROUND

This study is grounded on the socio-technical systems (STS) theory (Trist and Bamforth, 1951). The STS framework views human and technological aspects within organizations as a system (Leavitt et al., 1964; Trist, 1981). The socio-system consists of the dimensions, people, culture and goals, whereas the technical-system contains infrastructure, technology and processes (Clegg et al., 2017). All dimensions mentioned interact with each other and since the STS is established as an open system (Bertalanffy, 1950) it interacts with the organizations' environment as well (Abbas and Katina, 2023; Emery and Marek, 1962). Each dimension can be viewed as a several

research field. This study focuses on the people and culture dimensions of data-driven organizations and specifically on the role and impact of leadership.

RESEARCH APPROACH

To answer our first research questions, we conducted a systematic literature review (Cooper, 1988; Newbert, 2007; Randolph, 2009). The sample process followed certain selection criteria, which are briefly described as follows: First, we used the search string ("data-driven" OR "datadriven" OR "data driven") AND (organi* OR compan* OR firm*) in Title or Abstract. We used three databases namely Web of Science, EBSCO Host Business Source Complete and EconLit. For the Web of Science database we have used the following Web of Science Categories, Computer Science Information Systems, Management, Business and Information Science Library Science. We included only articles and review articles, thereby excluded proceeding papers, books, editorial materials, data papers, meeting abstracts, retracted publications, letters and corrections. We filtered for peer-reviewed and English-language literature. Furthermore, publications in journals with a AJG 2024-ranking of 3 or better or a VHB 2024-ranking of B or better as well as a publication date between 2019 and 2024 (until November 20th) were considered. We found 192 papers, deleted duplicates (54 papers) and conducted an abstract analysis for substantive context. As a result of our systematic review approach, we found 54 papers left in our review scope.

Answering our RQ2, we used a qualitative research method. The underlying framework of our study, the socio-technical system, presents a range of research areas for which qualitative research methods are appropriate. These methods are suitable for developing, elaborating and verifying theories and concepts. We performed 16 expert interviews and followed the guidelines for semi-structured interviews to extend the outcomes of the literature review and discuss the impact of leadership in establishing a data-driven organization, which are not covered by the literature (Bogner et al., 2009; Magaldi and Berler, 2018). The interviewees were employees at management and top management level at a multinational German company with over 10,000 employees. Their business areas responsible were organisational development, software development, data analysis, business model innovation and corporate strategy. Some interviews were conducted via Microsoft Teams, others were conducted in person. The average interview duration was around 70 minutes, and the interviews were recorded and transcribed. We used MAXQDA to code and to analyze all 16 interviews. Therefore, we applied a hybrid deductive and inductive thematic-analysis approach (Fereday and Muir-Cochrane, 2006). We used an initial codebook based on the theoretical/conceptional framework for the deductive aspect. In the inductive phase, codes from the empirical data supplemented the theory-based coding scheme. We based the inductive code-generation process on two approaches. First, we added new codes to identify additional dimensions in the context of the transformation of firms towards data-driven organizations. Second, we analyzed the interviews for frequently

mentioned contextual knowledge, different types of knowledge about the core dimensions (people, leadership, technology, culture) to help answer the research questions outlined. In addition, we used an autonomous counting approach to summarize the entire dataset. This approach allowed us to present and interpret findings on the hexagonal socio-technical systems framework (data-driven organization). Arguably, reliability and validity criteria do not apply to qualitative studies, so quality standards are not met. This criticism implies that demonstrating the study's is high quality is essential to declare it credible, so adopting measures to confirm the trustworthiness of the study is in order.

The Impact of Leadership

Literature Review. The transformation into a data-driven organization comes along with personal challenges for all employees, managers and individual contributors, and it involves motivational aspects, personal attitudes, resilience and creativity. Therefore, the people dimension focuses on how employees cope with and respond to changing organizational structures, new responsibilities, emerging technologies as well as the associated training and skill development within a data-driven organization. Due to the growing need for companies to leverage data-driven decision-making and innovations through emerging technologies such as AI, big data, and machine learning, new knowledge and training is essential (Sultana et al., 2022; Wong and Ngai, 2024).

Leadership teams are a critical component and act as a role model for the development of employees and their skills. While the leaders themselves have to upskill or reskill their own abilities to understand how technology can be used, impacts processes and thus set the future company strategy (Szukits and Móricz, 2024). Otherwise, managers themselves are at risk of no longer being able to understand decision proposals from analytics tools (Giermindl et al., 2022). This can be referred to as management buy-in, which is viewed as a critical success factor and important to lead organizations towards being more data-driven (Babalghaith and Aljarallah, 2024). Developing specific training strategies and setting incentives for employees to commit themselves accordingly is considered (Abubakar et al., 2024). Furthermore, clear communication about why this transformation is necessary and worth the effort and establishing a common understanding of the benefits of working data-driven can facilitate the adoption of big data analytics tools e.g. using statistical methods, data reporting and visualization tools or data platforms (Barbala et al., 2024; Staudt and Hoffmann, 2024; Strauss et al., 2024; Thanabalan et al., 2024). Szukits and Móricz (2024) found that the leadership team can improve data quality in an organization by emphasizing and supporting the awareness and importance of using BDA tools. The focused use of BDA tools and improved data quality can increase the confidence of the workforce in working more data-driven (Duan et al., 2020).

Thus, the top management can foster a data-driven culture (DDC). To analyse and understand big data and enabling data-driven decision-making, the concept of a DDC is often defined as shared beliefs, values,

norms attitudes and behaviours regarding the use of data that results in organisational and process adaptions (Duan et al., 2020; Gupta and George, 2016; Kiron et al., 2013). The aim of a DDC is to change the way to approach discussion within an organization. Shifting the thinking away from a 'gut feeling" point of view to what the company really knows based on data (McAfee and Brynjolfsson, 2012). Culture influences interpersonal relationships, leadership styles and processes. It affects the acceptance of new technologies, but culture can also be shaped and therefore it is an essential aspect of becoming a data-driven organization. As leadership can impact the development of a data-driven culture, employees can also impact and shape culture. By utilizing their deep operational knowledge, the use of rapidly developed use cases and demonstrating productivity gains can affect management buy-in as well (Kotlarsky et al., 2024; Staudt and Hoffmann, 2024). This requires the leaderships' willingness to invest in new technology, infrastructure, as well as training to enrich business analytics capabilities and the ability to make data-driven decisions (Bilkstyte-Skane and Akstinaite, 2024; Lee et al., 2024; Shet et al., 2021).

With the strategic shift towards a data-driven organization, the top management can promote collaborative working and ensure that information asymmetries between the different departments are reduced by changing processes using state-of-the-art infrastructure and technology to establish a single point of truth and fostering "data democratization" (Barbala et al., 2024; Chen et al., 2022; Szukits and Móricz, 2024). It was found that in establishing a DDO, leadership support has a mediating effect on the relationship between process and product innovation and firm performance (Chatterjee et al., 2024). For cross-functional collaboration, management teams can facilitate upskilling programs and various exchange events in the form of workshops and conferences to exchange ideas and knowledge to increase data literacy, which can become an integral part of the company and break down organizational silos (Bilkstyte-Skane and Akstinaite, 2024; Browder et al., 2024; Staudt and Hoffmann, 2024). This considers the interactions within the STS theory, e.g. the interaction between the people or culture dimension, with the technical subsystem dimensions of infrastructure, technology and processes.

To further reduce barriers in the transformation process towards becoming a DDO leadership can further shape a culture by creating trust within an organization through psychological safety, which is defined as shared values, views, know-how and a culture of failure tolerance without being punished (Malik et al., 2024). They found that psychological safety has a positive impact on data-driven digital transformation. This part of leadership can be very crucial as employees will work more in cross-functional and more diverse teams (Akhtar et al., 2019; Shao et al., 2023). At the same time, this creates further challenges for managers, who have to orchestrate teams with newly established job roles e.g. data stewards or data governors and different needs of employees, which may occur from generational belonging such as digital natives and digital immigrants (Shet et al., 2021; Staudt and Hoffmann, 2024).

Qualitative Study. The qualitative, empirical study uncovered some conflicting insights within the "People" dimension that is strongly related to the topic of leadership. On one hand, respondents stressed the crucial role of employees - including technical experts, managers, leaders and organizational developers - along with their skills and expertise in enabling the transition to a data-driven organization. One interviewee specifically underscored the need for employees to acquire new skills and competencies to stay relevant to the organization.

> *"We have established that extensive changes will be necessary in many areas that currently require a lot of employee [manual] capacity. The optimization and transformation of such employee-intensive processes and activities will of course also be based on data, data competencies and the way in which data is processed and handled. This will have a massive impact on our organization, and in this respect, every employee is well advised to develop an appropriate understanding as quickly as possible."*

This observation highlights that the company's transition to a data-driven organization is likely to disrupt both internal and external processes and workflows, necessitating a redefinition of the required employee skill profiles. On one hand, employees' expertise is crucial as change agents to drive the transformation forward. On the other hand, the transformation itself may diminish the demand for certain roles that were previously considered essential. As a result, employees are not only active participants (subjects of change) in the transformation process but also directly affected by it (objects of change). This perspective was further reinforced by a statement from another interviewee:

> *"To develop data-driven models, you need a lot of human resources to be able to penetrate such a model in terms of data and analyze it properly. There are so many potential starting points that it's a really big board. You also need the cooperation of those you are actually targeting with such a data-driven solution and who may then make themselves superfluous."*

One interviewee pointed out that successfully implementing data-driven transformation in specific processes and workflows could lead to a reduced need for workforce capacity. Furthermore, it was highlighted that data-driven solutions can execute the same tasks with greater accuracy and without the risk of human errors. Additionally, maintaining and enhancing these technical solutions would primarily depend on specialized expertise, with an emphasis on monitoring and continuous development:

> *"I would rather take a strategic approach, if there is a corresponding data-driven solution that can do this reliably, I need far fewer people to carry out this process, but only the super experts who then monitor the tool."*

In the context of the "technology" dimension, interviewees predominantly emphasized the impact of AI solutions in facilitating the transition toward

a data-driven organization and on the role of employees and leaders. The interviews often highlighted that the expanding availability of data, technological advancements, and artificial intelligence are enabling more processes, workflows, and activities within the organization to function autonomously, reducing the need for human involvement. In addition to this decoupling—along with the potential cost savings in employee-related expenses discussed in the previous section—another major factor driving the adoption of data-driven solutions is their superior accuracy and reliability compared to human performance. This perspective is reinforced by the following quote from an interviewee:

> *"There are many processes and singular activities [in the company] that can be further dehumanized using AI technologies, for example production planning processes, and also have a high potential for improvement in terms of accuracy and variability."*

The last category examined and associated with the topic of leadership was "culture." In addition to the need to cultivate or shift toward a data-driven organizational culture, the significance of "trust and acceptance of analytics" was particularly highlighted. One interviewee pointed out that transitioning into a data-driven organization is an iterative learning process for both the company and its employees, strongly influenced by the accumulation of practical experience:

> *"This is also a learning process and employees must be able to familiarize themselves with AI and data [...] so that any errors from artificial intelligence, analyses or pattern recognition can be eliminated in an iterative process. Both sides - IT/data analytics and specialist departments - also need to gain experience in areas such as expectation management."*

As the organization adopts increasingly sophisticated data-driven models and analytical methods, fostering trust and acceptance in these technologies becomes essential. Leadership plays a pivotal role in this transformation by setting a clear vision, promoting a culture of data-driven decision-making, and actively supporting employees through the transition. This is particularly crucial in scenarios where manual processes are replaced by automated systems, as employees must not only adapt to new workflows but also develop confidence in the reliability and accuracy of data-driven solutions. To build this trust, leaders must ensure transparent communication about the benefits and limitations of these technologies, provide continuous training opportunities, and create an environment where employees feel empowered to engage with and question data-driven decisions. Additionally, strong leadership is required to drive cultural change, break down resistance, and foster a mindset that sees technological advancements as opportunities for growth rather than threats. By championing data literacy and reinforcing the value of human expertise alongside automation, leadership can ensure a smoother and more effective transition into a data-driven organization.

CONCLUSION

Our study found that establishing a data-driven organization is a major challenge for managers. Leadership plays a pivotal role when it comes to fostering a data-driven culture through developing suitable upskilling and communication strategies, selecting tools and technologies and taking care of their employees by building trust and providing psychological safety, particularly during this transformation. Shifting and rebuilding organizational structures and forming new teams with new roles is a sensitive task for managers. Leaders themselves are required to take responsibility of their skill set and understand the fundamentals of technology such as big data, machine learning or AI to make smart decisions and lead the company. The analysis of the qualitative study confirmed and further strengthened many insights from the literature review. Organizations exhibit a clear understanding of the need for transformation, as well as the challenges and opportunities that come with it. The interviews further emphasized the crucial role of leadership in equipping employees with opportunities to develop the necessary, and often entirely new, skills required for the transformation. Effective leaders must actively support capacity-building initiatives, ensuring that employees engage in iterative experiential learning processes that foster trust in data-driven solutions. This is especially critical for managers, as the transformation extends beyond merely adopting new technologies—it also requires strong leadership capabilities to guide, motivate, and empower employees throughout the transition. Leaders must create an environment that encourages continuous learning, provide clear direction, and address concerns proactively to ensure that employees not only adapt to change but also embrace it as an opportunity for growth and innovation.

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