Human Factors, Business Management and Society, Vol. 176, 2025, 242–249
https://doi.org/10.54941/ahfe1006321

Sociotechnical Leadership for the Digital Transformation of Global Corporations

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ABSTRACT

Literature assumes that leaders can successfully implement transformation like strategic changes by leading the social systems with the desired behaviors while the technological behaviors are of minute nature. Meanwhile, the thesis of our paper is that the wide-scale and diverse nature of digital transformation requires that leaders must learn socio-technical behaviors. We conducted a grounded theory-based pilot case study with twelve leaders of digital transformation from four large multinational corporations in energy, forestry, and mobility businesses. The thematic analysis of our data reveals eight socio-technical behaviors. We grouped these behaviors into the social, technical, ecosystem, and organizational design of traditional industrial organizations.

Keywords: Sociotechnical, Leadership, Behaviors, Case study, Industrial organization

INTRODUCTION

Wide-scoped digital technology-led transformations i.e. digital transformation (DT) could involve a continual renovation to the business value propositions (Sony & Naik, 2020; Parida et al., 2019; Porter & Heppelmann, 2015; Verhoef et al., 2021). Even though digital technology advancements concern less with the work performed by the leaders, however, the issue concerns how leaders can re-optimize their organizations to capture value from digital technologies (Björkdahl, 2020). Meanwhile, the abundance of digital technologies also needs leaders to enable the digital vision to make the right choices (Kane et al., 2019). Hence, DT requires leadership behaviors that support organizational agility, ecosystem-wide collaboration, and customer centricity (Imran et al., 2021). However, the extant leadership lacks guidance on state-of-the art behaviors (Banks et al., 2023).

DT literature has conceptualized upper-echelon leaders as digital leaders who have digital literacy and practice digital leadership (Weber et al., 2022) e.g., chief digital transformation officer (El Sawy et al., 2016). Furthermore, most of the published research in mainstream journals has been based on literature reviews. A major portion of the literature-review reviews deploy outdated leadership models. These models have limitedly addressed the challenges faced by today's business organizations (Bank, 2023; Stock et al., 2023), for example, successfully leading DT (Erhan et al., 2022).

Meanwhile, it is ignored that DT is sociotechnical phenomena (Pasmore et al., 2019; Trist & Bamforth, 1951) enabled by dynamic leaders (Kane et al., 2019; Wager & Warner, 2019). The sociotechnological perspective of DT depreciates technologies & machines as the controlling factor with human subordinates (Mumford, 2006). Rather the social embeddedness of technological interactions with organizational and ecosystem-wide actors has a decisive role in business value generation (Dacin, 1999). The sociotechnical perspective incorporates the organizations' goals, people, infrastructure, processes, technology, and culture (Davis et al., 2014). Therefore, DT should be led (Vial, 2019) through the social and technical system perspective (Bockshecker et al., 2018) considering the organizational and ecosystem elements of a business (Butt et al., 2024; Pasmore et al., 2019). Extant literature lacks guidance on sociotechnical leadership behaviors in support to DT.

Sociotechnical studies on the lead and control of systematic change (e.g., DT) are rich in literature. For example, personnel job design (Rousseau, 1977), human factors e.g. trust (Flechais & Riegelsberger, 2005), ergonomics (Carayon, 2006), self-regulating teams and groups (Appelbaum, 1997); the application of technological innovations (Flichy, 2007) and innovation ecosystems (Geels, 2004; Volberda et al., 2021), business operations (Huber & Brown, 1991) supply chain management (Siawsh et al., 2021), business processes (Mumford, 1994), sustainability (Geels, 2010), organizational change processes (Geels & Kemp, 2007), digital technology adoption (Schroeder et al., 2020) and strategic design of culture (Butt et al., 2024). Leaders are required to dynamically influence (Kane et al., 2019) the joint optimization of social and technical systems (Sarker et al., 2019) through behaviors (Banks, 2023) embedded in the organizational design (Pasmore et al., 2019).

While DT demands modernized leadership (Imran et al., 2021; Kane et al., 2019), our thesis is that sociotechnical phenomena can be better led by sociotechnical behaviors (compare: Levitis et al., 2009). Leading with sociotechnical behaviors therefore is significant to internally coordinate responses to the internal (organization) and/or external (ecosystem) stimuli of digital technology advancements. Accordingly, this study attempts to answer "why industrial organizations need sociotechnical leadership behaviors for success in digital transformation?" Because by learning sociotechnical behaviors (Stock et al., 2023) the leaders in traditional industrial organizations can better lead digital technology-laden business transformation (Kane et al., 2019). Acknowledging DT as a sociotechnical phenomenon led by sociotechnical leaders addresses the leadership research gaps (Banks, 2023), especially, the DT leadership (Erhan et al., 2022; Wager & Warner, 2019) that is imperative to the future-ready business organizations (Parida et al., 2019; Porter and Heppelmann, 2015).

METHODOLOGY

A digital transformation strategy is successful with a deliberate leadership approach (Kane, 2019). This research explores leadership as a set of

behaviors (Banks, 2023) that are practiced aligning the social and technical systems with the organization and ecosystem of an industrial organization (Pasmore et al., 2019). To explore the required leadership behaviors, we did a pilot case study and interviewed twelve leaders globally operating industrial organizations. Our approach to data collection and analysis was based on grounded theory. The overview of the interviewed leaders is in Table 1. The interview transcriptions and data analysis results are captured in NVivo. The findings of our research are presented as leadership behaviors (Stock 2023) for sociotechnical system design in the context of DT (Pasmore et al., 2019).

Table 1: Interviewed leaders of digital transformation.

Code	Expert	Role in the Digital Transformation
VP	Vice President Digital Product Development	Leading member of Digital Transformation strategy implementation portfolio team at the Case-1
GM	General Manager	Leading the mobilization and operation of digital products and related cloud infrastructure at the Case-1
DDC	Head (Director) of Digital Culture	Leading the business strategy and growth through changes in digital knowledge, skills and ways of working at the Case-1
SMDT	Senior Manager Digital Transformation	Leading people-first, customer-centric, smart-tech enabled, collaborative and innovative culture at Case-1
SPM	Senior project manager digitalization	Leading the digital strategy implementation projects at the Case-1
MDT	Manager Digital Transformation	Leading team of IT and business experts taking part in DT projects of various business units at Case-1
MD	Manager Digital and IT Systems	Leading team of IT experts working on digital services used by ecosystem stakeholders of Case-2
PM	Project Manager	Leading the product development team of new digital product (platform) for the customers of Case-1
SMD	Senior manager digitalization	Leading the development of strategy development and execution planning with senior leaders at Case-2
GH	Global Head	Leading the service team for DevOps of product lifecycle management at Case-2
GBM	Global Business Program Manager	Leading the business-wide digital transformation strategy implementation projects at Case-4
VPIT	Vice President, IT Strategy and Governance	Leading the company wide strategy implementation through service development units of Case-3

RESULTS AND DISCUSSION

Most of the interviewed leaders emphasized that the traditional approach to leadership does not support digital transformation success at the required speed and flexibility. Therefore, it is important that leaders of the future

are more "tech. savvy than has historically been" so that they are able to "as technology ambassadors who are paving the road and showing the way and leading by example" (SMD). During our discussions with the interviews various leadership styles were mentioned e.g. "transformational leadership", "digital leadership", "smart technology leadership", "shared leadership", "servant leadership", and "90's style leadership". Intriguingly, with the progression of discussion during the interviews, they stressed the combination of different leadership styles. According to the interviewees digital transformation is in need of leaders who are sharp with social as well as technical skills, and they have the competencies to lead not only the people within their business organizations but the wider groups of stakeholders without stressing out people with the pace of the ongoing hyper change due to digital technologies.

Our pilot study found (see Table 2) a set of sociotechnical behaviors that leaders, especially in traditional industrial organizations, must learn. Each of these behaviors plays a vital role in ensuring effective digital transformation and fostering an environment that embraces technological advancements and organizational agility. The research findings reinforce that successful digital transformation requires more than just technological investments; it demands a leadership approach that integrates both technical and social elements. By adopting these twelve leadership behaviors, leaders can effectively navigate the complexities of digital transformation, drive innovation, and create a resilient organizational culture. The role of the sociotechnical leader is, therefore, instrumental in shaping the future of digital-first industrial organizations.

Table 2: Taxonomy of sociotechnical leadership behaviors for digital transformation.

	Behavior	Definition	Example Quotes by the Interviewed Leaders
Ecosystem	Delightful adaptability	Cheer up the followers to evaluate and adapt to the expanding options by new technologies adopted in the business ecosystem.	"*It's always about being able to, based on the new information, the changing markets, the changing situations, except that you need to review, you need to adopt the change.*"
Ecosystem	Collate for diversity	Make followers gather and assemble digital technology application ideas for diverse business situations.	"[it is] *kind of startup mentality needed for to try out the ideas. But you need to have some control as it will link to budget and people or resources that how many ideas you are trying.*"
Organizational	Seeking customer interactions	Make followers approach digital technologies with an aim to enhance customer interactions.	"*What is different is that we connect customers more closely. I think that is the biggest difference.*"

Continued

Table 2: Continued

	Behavior	Definition	Example Quotes by the Interviewed leaders
Organizational	Catalyst for Smart Culture	Encourage a culture of agility, collaboration, and continuous improvement.	"*Digitalization is a very big opportunity, but it disrupts your value generation capacity, it is disrupting your organizational culture, so leaders need to understand this*."
Social	Trail-driven strategy process	Encourage followers to gauge the value creation potential of digital technologies with small-scale experiments prior to big-shot digital strategy.	"[en]*courage to go areas and solutions where we haven't been before*." "*Get people faster in testing things and making trial and error.*"
Social	Curios for technology	Creates curiosity about digital technologies that can give more meaning to people's work.	"*For example, robotic process automation for tasks which are repetitive, and in a way boring, and those employees who are doing those tasks, they can use their time to do something meaningful.*"
Technical	Business and IT-function partnership	Make followers approach IT functions as partners of business value creation, instead of backend service.	"*They must break the silos and enforce more collaboration among the people to get things done*"
Technical	Data-supported empowerment	Make the followers utilize data insights to feel empowered and make informed business decisions.	"*…move towards taking data-driven approach when making decisions… and focus on the delegation of power… decisions should be fast, and it should be there based on knowledge.*"

CONCLUSION

The thesis of our paper is that digital transformation needs a fresh approach to sociotechnical system leadership. Based on the limited data analysis of our pilot study we have found eight leadership behaviors of sociotechnical leaders of digital transformation. Based on these initial findings we aspire to further develop the concept of sociotechnical leadership. First, we shall extend the dataset with more interviews and secondary sources to extend the evidence on the found behaviors, refine the definition of these behaviors, and find new leadership behaviors that are imperative for digital transformation success. We also need to study how these sociotechnical

behaviors support the development of capabilities e.g., dynamic capabilities for digital transformation. A further step could be to establish how the sociotechnical leadership behaviors support the adoption of a specific digital technology, e.g., advanced analytics adoption in day-to-day tasks by the followers.

REFERENCES

Appelbaum, S. H. (1997). Socio-technical systems theory: An intervention strategy for organizational development. *Management Decision, 35*(6), 452–463.

Björkdahl, J. (2020). Strategies for digitalization in manufacturing firms. California Management Review, 62(4), 17–36.

Bockshecker, Alina; Hackstein, Sarah; and Baumöl, Ulrike, "Systematization of the term digital transformation and its phenomena from a socio-technical perspective – A literature review" (2018). Research Papers. 43.

Banks, G. C., Woznyj, H. M., Mansfield, C. A.: Where is "behavior" in organizational behavior? A call for a revolution. T. Leader. Quart., vol. 34 (101581), (2023)

Butt, A., Imran, F., Help, P., Kantola, J.: Strategic design of culture for digital transformation. Long Rang. Plann., vol. 57 (2024).

Butt, A., Imran, F., Help, P., Kantola, J (2021). "Cultural Preparation for Digital Transformation of Industrial Organizations: A Multi-case Exploration of Socio -technical Systems". Advances in Physical, Social & Occupational Ergonomics. Lecture Notes in Networks and Systems. Vol. 273. pp. 457–463. ISBN 978–3 -030-80712-2. S2CID 237298363.

Sony, M., Naik, S.: Industry 4.0 integration with socio-technical systems theory: A systematic review and proposed theoretical model. Technol. Soc., vol. 61 (2020).

Banks, G. C.: Eight puzzles of leadership science. T. Leader. Quart., vol. 34 (101710), (2023)

Carayon, P. (2006). Human factors of complex sociotechnical systems. *Applied Ergonomics, 37*(4), 525–535.

Dacin, M. T., Ventresca, M. J., Beal, B. D. (1999). The embeddedness of organizaitons: Dialouge & directions. Journal of Management, 25(3), 317–356.

Davis, M., Challenger, R., Jayewardene, D. N., & Clegg, C. W. (2014). Advancing socio-technical systems thinking: A call for bravery. Applied Ergonomics, 45(2A), 171–180.

Flechais, I., & Riegelsberger, J. (2005). Divide and conquer: The role of trust and assurance in the design of secure socio-technical systems. *Proceedings of the 2005 workshop on New security paradigms*. NewYork: Association for Computing Machinery New York NY United States.

El Sawy, O. A., Amsinck, H., Kræmmergaard, P., Vinther, A. L. (2016). How Lego built the foundations and enterprise capabilities for digital leadership. MIS Quarterly Executive, 15(2), 141–166.

Erhan, T., Uzunbacak, H. H., Aydin, E. (2022), "From conventional to digital leadership: Exploring digitalization of leadership and innovative work behavior". Management Research Review, 45(11), 1524–1543.

Flichy, P. (2007). *Understanding technological innovation: A socio-technical approach*. Massachusetts: Edward Elgar Publishing.

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory. *Research Policy, 33*, 897–920.

Geels, F. W. (2010). Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective. *Research Policy, 39*(4), 495–510.

Geels, F. E., & Kemp, R. (2007). Dynamics in socio-technical systems: Typology of change processes and contrasting case studies. *Technology in Society, 29*(4), 441–455.

Gioia, D. A., Corley, K. G., Hamilton, A. L.: Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. Organ. Res. Methods, vol. 16, no. 1, pp. 15–31 (2013).

Huber, V. L., & Brown, K. A. (1991). Human resource issues in cellular manufacturing: A sociotechnical analysis. *Journal of Operations Management, 10*(1), 138–159.

Imran, F., Shahzad, K., Butt, A., Kantola, J.: Digital transformation of industrial organizations: Toward an integrated framework. Journal of Change Management, vol. 21(451-479), (2021).

Imran, F., Shahzad, K., Butt, A., & Kantola, J. (2018). Leadership competencies for digital transformation: Evidence from multiple cases. In J. Kantola, S. Nazir, & T. Barath (Eds.), Proceedings of the AHFE 2020. Springer. https://doi.org/https://doi.org/10.1007/978-3-030-50791-6_11(open in a new window).

Imran, F., & Kantola, J. (2018). Review of Industry 4.0 in the light of sociotechnical system theory and competence based view: A future research agenda for the evolute approach. In J. Kantola, S. Nazir, & T. Barath (Eds.), Proceedings of the AHFE 2018 (pp. 118–128). Springer. ISBN 978-3-319-94709-9.

Kane, G. C., Phillips, A. N., Copulsky, J., Andrus, G.: How digital leadership is (n't) different. MIT Sloan Management, vol. 60(3), 34–39 (2019).

Levitis, D. A., Lidicker, W. Z., Freund, G.: Behavioural biologists do not agree on what constitutes behaviour. Animal Behaviour, vol. 78 (1), 103–110.

Mitki, Y., Shani, A. B. R., Greenbaum, B. E.: Developing New Capabilities: A Longitudinal Study of Sociotechnical System Redesign. J. Chang. Manag., vol. 19, no. 3, pp. 167–182 (2019).

Mumford, E. (2006). The story of socio-technical design: Reflections on its successes, factors and potential. *Info Systems JOurnal, 16*, 317–342.

Pasmore, W., Winby, S., Mohrman, S. A., Vanasse, R.: Reflections: Sociotechnical Systems Design and Organization Change. J. Chang. Manag., vol. 19, no. 2, pp. 67–85 (2019).

Rousseau, D. M. (1977). Technological differences in job characteristics, employee satisfaction, and motivation: A synthesis of job design research and sociotechnical systems theory. *Organizational Behavior and Human Performance, 19*(1), 18–42.

Sarkar, S., Chatterjee, A., Xiao, X., Elbanna, A. (2019). The sociotechnical axis of cohesion for the IS discipline: Its historical legacy and its continued relevance. MIS Quarterly, 43(3), 695–720.

Schroeder, A., Naik, P., Ziaee Bigdeli, A. and Baines, T. (2020), "Digitally enabled advanced services: A socio-technical perspective on the role of the internet of things (IoT)", International Journal of Operations & Production Management, Vol. 40, No. 7/8, pp. 1243–1268.

Siawsh, N., Peszynski, K., Young, L., Vo-Tran, H. (2019): Exploring the role of power on procurement and supply chain management systems in a humanitarian organisation: A socio-technical systems view, International Journal of Production Research, 59(12), 3591–3616.

Trist, E. L., Bamforth, K. W: Some social and psychological consequences of the Longwall method of coal-getting. Human Relations, vol. 4(3–38), (1951).

Verhoef P. C., et al.: Digital transformation: A multidisciplinary reflection and research agenda. J. Bus. Res., vol. 122, pp. 889–901, (2021).
Vial, G.: Understanding digital transformation: A review and a research agenda. J. Strateg. Inf. Syst., vol. 28, no. 2, pp. 118–144 (2019).
Volberda, H. W., Khanagha, S., Baden-Fuller, C., Mihalache, O. R. (2021). Strategizing in a digital world: Overcoming cognitive barriers, reconfiguring routines, and introducing new organizational forms. Long Range Planning 54(5), 102110.
Warner, K. S. R., Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. Long Range Planning, 52(3), 326–349.
Weber, E., Büttgen, M., Bartsch, S. (2022). How to take employees on the digital transformation journey: An experimental study on complementary leadership behaviors in managing organizational change. *Journal of Business Research*, *143*(February), 225–238.
Yin, R. K.: Applications of case study research. Appl. Soc. Res. Methods Ser., (2013).