Digital and Transformational Maturity:
Key Factors for Effective Leadership in the Industry 4.0 Era

Paweł POSZYTEK, PhD, DSc
Associate Professor, WSB University, Dąbrowa Górnicza, Poland

ABSTRACT

In an era of rapid technological advancement, precipitating significant global changes and novel socio-economic patterns, a re-evaluation of contemporary leadership paradigms is necessitated to guide societies successfully through these socio-economic transformations. Given that leadership is an inherently general and abstract phenomenon, this paper proposes a practical examination through the lens of the transformational maturity of individual leaders, alongside the digital and transformational maturity of organizations aspiring to spearhead market changes. In the latter context, both digital and transformational maturity are subsumed under the broader concept of organizational maturity, which serves as a tangible metric of leadership at the organizational level. Accordingly, this paper will present and analyze selected contemporary approaches to leadership, the global context of change relative to pervasive digital transformation, and empirical research findings pertaining to European leaders and companies. The overarching framework for this analysis is Industry 4.0, characterized by process automation and integration within enterprises, and the emerging Industry 5.0, which incorporates a human-centric dimension into this concept [1].

Keywords: digital transformation, digital maturity, transformational maturity, Industry 4.0, Industry 5.0, transformational leadership

1. PROMINENT CURRENT APPROACHES TO LEADERSHIP IN THE CONTEXT OF CONTEMPORARY CHALLENGES OF THE DIGITAL ERA

A prominent current approach to leadership is transformational leadership, as defined by Burns. His initial work contrasted transactional leadership—based on an analysis of processes occurring between leaders and followers, managers and staff, or parents and children—with transformational leadership. Burns posited a distinction between transactional and transformational leadership as mutually exclusive styles. In the former, leaders typically operate within the existing culture, whereas in the latter, leaders endeavor to transform it. Unlike the transactional approach, transformational leadership is not predicated on a 'give and take' relationship, but rather on the leader's personality, traits, and capacity to effect change through example, vision, and challenging goals. This shift in the nature of the leader-follower relationship signifies a paradigmatic change, moving from potential exploitation and manipulation towards a foundation of trust and integrity. This, in turn, is theorized to lead to enhanced motivation and morality, and ultimately to the personal growth and development of all involved parties. Accordingly, Burns argued that transformational leaders develop followers as individuals and as future leaders by empowering them and responding to their needs. Furthermore, his perspectives on leadership were closely associated with the concept of

democratizing companies and organizations [2]. Bass translated Burns' discussion from American politics into the domain of management studies by proposing key factors characterizing transformational leadership. These factors, termed the "4 I's" by Bass, are: (1) **Idealized influence**, which relates to charisma and the identification of the team and followers with the leader's vision; the leader acts as a role model, embodying ethical and moral values that followers aspire to emulate. (2) **Inspirational motivation**, which pertains to the articulation of a stimulating vision, goals, and high standards established by the leader for followers and the organization. (3) **Intellectual stimulation**, which refers to the leader's ability to encourage followers to question and challenge assumptions, thereby fostering personal growth, innovation, and creativity. (4) **Individualized consideration**, which relates to the leader's skill in appealing to the individuality of each follower, treating them as special and important, and attending to their needs and problems by acting as a guide, mentor, and coach [3].

Other notable contributions include Bennis and Nanus, who identified four strategies employed by leaders in organizational transformation: (1) Develop a clear and understandable vision for the organization. (2) Act as social architects for the organization by reshaping the organizational culture. (3) Create trust throughout the organization by making their values and views explicit. (4) Identify their own strengths and weaknesses and encourage their followers to do the same [4].

Concurrently with the discourse on transformational leadership, other distinct yet often interrelated leadership approaches were being explored. Among these, three approaches warrant particular consideration within the scope of this paper: namely, adaptive, charismatic, and, notably, authentic leadership.

In Handy's view, in an era of constant and unpredictable change, it is imperative to transcend traditional modes of thinking and leverage change advantageously. Handy examines how dramatic changes in business, education, and the broader world of work necessitate transformations. Underpinning these processes are rapid technological developments and a growing need for cognitive and social skills. Furthermore, in response to uncertainty, Handy discusses the need for new organizational forms, novel approaches to work, innovative educational models, and revised conceptions of societal structure [5]. This necessitates a new leadership paradigm capable of consciously guiding ecosystems towards enhanced organizational maturity.

Consequently, the adaptive leadership approach emerged in this context. Adaptive leadership focuses on the ability to navigate complex challenges, foster innovation, and lead through change in uncertain environments. It emphasizes mobilizing people to address difficult problems that require learning, adaptation, and behavioral shifts rather than relying solely on technical solutions [6, 7]. However, followers of adaptive leaders may not always fully comprehend the intricacies of the surrounding ecosystems.

Therefore, to enhance follower motivation, leaders may need to exhibit a significant degree of charisma. Consequently, charismatic leadership can be instrumental in such contexts. Charismatic leadership emphasizes a leader who inspires and influences followers through personal charm, vision, and strong emotional appeal. Charismatic leaders cultivate deep connections with their followers, often inspiring devotion and commitment beyond ordinary leadership styles. They utilize persuasive communication, confidence, and a strong sense of purpose to mobilize people toward a shared vision [8, 9]. Ultimately, the authentic leadership approach appears particularly well-suited to the challenging and unpredictable contemporary environment. Authentic leadership centers on self-awareness, transparency, ethics, and genuine relationships. Authentic leaders are self-reflective, act in accordance with their values, and foster trust and engagement among their followers. Key characteristics of authentic leadership include: (1) **Self-awareness**: understanding one's strengths, weaknesses, and values. (2) **Relational transparency**: open and honest communication with followers. (3) **Balanced processing**: considering diverse perspectives before making decisions. (4) **Internalized moral perspective**: acting according to deeply held values rather than external pressures [10-15]. These three approaches share significant commonalities, and a discernible interplay exists among them. Adaptive, charismatic, and authentic leadership theories, despite variations in their specific theoretical underpinnings, exhibit several convergent elements:

- **Emphasis on interpersonal dynamics**: All three theoretical frameworks underscore the significance of the relationship between the leader and their constituents.
    - **Adaptive leadership**: the leader facilitates the adaptation of individuals and systems to evolving environmental challenges.
    - **Charismatic leadership**: the leader cultivates potent emotional bonds and provides inspiration to followers.
    - **Authentic leadership**: the leader's interactions are predicated on principles of transparency, trust, and ethical conduct.
- **The Prominent role of the leader as a catalyst for change**: each theory posits that the leader's function extends beyond mere management to actively guiding individuals and groups through transformative processes.
    - The **adaptive leader** undertakes diagnostic assessments of the prevailing situation and empowers the collective to address complex, often ill-defined, problems.
    - The **charismatic leader** mobilizes constituents towards action by articulating a compelling vision and leveraging personal magnetism.
    - The **authentic leader** inspires change through the demonstrable congruence between espoused values and enacted behaviors.
- **The conception of personal influence**: the personality and disposition of the leader are considered critical variables within each of these frameworks.
    - In **adaptive leadership**, influence stems from the capacity for systemic diagnosis and the cultivation of trust.

- In **charismatic leadership**, this is manifested primarily through the force of the leader's personality.
- In **authentic leadership**, emphasis is placed on the leader's integrity and self-awareness.
- **Orientation towards values and ethics**: albeit to varying degrees, all three theories acknowledge the centrality of values.
    - **Adaptive leaders** assist communities in the co-creation of new norms and values in response to contextual shifts and challenges.
    - **Charismatic leaders** frequently invoke superordinate goals and ideals.
    - **Authentic leaders** operate in alignment with both personal and collectively held values.

In summary, these leadership paradigms are unified by a discernible emphasis on the leader's personal influence, the quality of interpersonal relationships, the capacity to inspire and implement change, and a foundational reliance on values and ethical principles.

The contemporary context in which leaders must operate is predominantly characterized by digital transformation, a phenomenon pervading all spheres of life: personal, social, and professional. The World Economic Forum perceives digital transformation as one of the most pressing challenges for organizations [16]. A 2024 McKinsey report adds that digital transformation fundamentally reshapes an organization by continuously deploying technology at scale to create value. To thrive, or even just survive, organizations need a clear digital transformation strategy that targets specific areas and is supported by specialized capabilities [17]. Fundamentally, researchers conceptualize digital transformation as a process that leverages digital technologies to enhance efficiency, augment organizational potential, secure strategic advantages, and improve business outcomes [18-20]. While technological advancements can introduce disruptive effects for businesses and governments, digital transformation is presented as an indispensable strategy for navigating contemporary challenges [21]. Digital transformation is frequently posited as a crucial enabler of genuine and enduring sustainability. Digital transformation, powered by technologies and solutions such as digital access, 5G, cloud computing, the Internet of Things, Artificial Intelligence, extended reality, and blockchain, can scale sustainability solutions exponentially. The myriad challenges associated with global sustainability necessitate radical solutions capable of achieving appropriately scaled impacts. The application of technology in sectors such as mobility, manufacturing, agriculture, energy, and construction holds the potential to achieve a 20% reduction in CO_2 emissions by 2030. Technological solutions may contribute to a 90% reduction in the embodied materials in goods [22]. In conclusion, navigating this societal transformation, with its inherent threats and potential benefits, necessitates robust leadership characterized by authenticity, adaptability, and charisma.

2. RESEARCH RESULTS

At the individual leadership level, the research targeted a cohort exceeding 700 leaders involved in European transnational cooperation projects. While the surveyed group demonstrated strong transformational attributes concerning networking,

collaboration, empathy, communication, adaptability, and innovation, certain deficiencies in self-regulatory and communicative abilities were identified. These deficiencies suggest that challenging situations and circumstances may compromise their integrity and effectiveness. Similarly, regarding the addressing of team needs, empathy, inclusiveness, and adaptability, the surveyed leaders reported high proficiency. However, this self-assessment was not consistently corroborated by identifiable, concrete actions, or the actions undertaken demonstrated limited effectiveness. Overall, collaboration and teamwork emerged as the predominant strengths of the surveyed leaders, an unsurprising finding given their engagement in highly networked, international activities. Conversely, trust-building and effective communication constituted their most significant weaknesses, a finding potentially attributable to the challenging operational context of the COVID-19 pandemic during which their projects were executed. This suggests that the effectiveness of these leaders in communication and trust-building may be diminished under duress or in demanding circumstances. In summary, the surveyed leaders demonstrated greater proficiency in addressing the broader socio-economic context through adaptability and an innovation-oriented approach, compared to prioritizing the immediate needs of their teams [23].

At the organizational level, approximately 300 companies aspiring to become regional agents of change were investigated. These companies were typically either undergoing digital transformation or were on the verge of initiating such processes. The research indicated that, on average, these companies are situated at a lower level of the transitional phase in their progression towards organizational maturity. This phase is characterized by: the gradual streamlining of organizational processes towards intelligent management, leveraging new technologies, intelligent solutions, and autonomous systems implemented in select areas; partial implementation of data processing and analysis for optimizing existing production/service processes; provision of training programs for specific teams and/or employees; and products equipped with sensors and embedded systems for collecting and analyzing data from their usage phase, alongside services monitored by tools enabling real-time data acquisition and analysis. Nevertheless, specific instances within the surveyed group reveal companies making substantial efforts in their transformation towards Industry 4.0. However, in the majority of cases, the adopted solutions are insufficient for achieving a satisfactory level of integration across organizational, production, and service processes. Consequently, the digital, transformational, and, ultimately, organizational maturity of these companies is generally assessed as ranging from low to moderate [23].

3. CONCLUSIONS

The study indicates that individual leaders are comparatively more advanced than their organizations in the adoption of transformational leadership principles. This observation is plausible, as organizational transformational leadership, characterized by high digital and organizational maturity, represents a more complex and consequently more challenging phenomenon to realize. Nevertheless, organizational transformational leadership is fundamentally contingent upon individual transformational leadership. The quality of the latter contributes to the quality of the former. The research suggests the presence of transformational leaders within society; however, organizations, while on a positive trajectory, still require

significant development to fully embody transformational leadership.

The pursuit of enhanced digital and transformational maturity as pivotal factors for effective leadership is crucial for contemporary organizations, particularly considering the pervasive digital transformation, technological advancements, and the general findings of the Global Innovation Index. The Index states that technological advancement in 2023 remained strong, and the adoption of technology saw positive growth across all indicators in 2023, especially in 5G, robotics, and electric vehicles [24]. This implies that achieving global competitive advantage is becoming increasingly challenging. Accordingly, a key recommendation stemming from the obtained results is that organizational digital transformation initiatives must not be confined solely to technological aspects. Digital transformation should be comprehensively understood as the cultivation of digital and transformational maturity—collectively, overall organizational maturity—which intrinsically includes human capital development. Therefore, aligning the development of organizational maturity with Industry 4.0 imperatives necessitates concurrent investment in training programs, diligent attention to employee team needs, and the implementation of effective internal communication strategies.

4. REFERENCES

1. European Commission (2021) 'Industry 5.0: Towards a sustainable, human-centric and resilient European industry', Directorate-General for Research and Innovation, DOI: 10.2777/308407
2. Burns, J. M. (1978) Leadership. New York: Harper and Row
3. Bass, B. M. (2008) The Bass Handbook of Leadership: Theory, Research, and Application. 4th edition. New York: Free Press
4. Bennis, W. & Nanus, B. (2007) Leaders: Strategies for Taking Charge, 2nd edition, Collins Business
5. Handy, C. (1991) The Age of Unreason, Boston: Harvard Business Review Press
6. Heifetz, R. A. (1994) Leadership without Easy Answers, Boston, MA: Harvard University Press
7. Heifetz, R. A. & Linsky, M (2002) Leadership on the Line. Staying Alive Through the Dangers of Change, 2, Boston, MA: Harvard Business Review Press
8. House, R. J. (1976) A 1976 Theory of Charismatic Leadership. Working Paper Series 76-06, University of Toronto, Eric
9. Conger, J. A. & Kanungo, R., N. (1998) Charismatic Leadership in Organizations, Sage Publications
10. Avolio, B. J., Gardner, W. L. (2005) Authentic leadership development: Getting to the root of positive forms of leadership, The Leadership Quaterly, Vol.: 16, Issue: 3, pp.: 315-338
11. Gardner, L. W. et al. (2022) The Gaslighting of Authentic Leadership, Leadership, Sage, Vol. 18, Issue 6, https://doi.org/10.1177/17427150221111056
12. George, W. W. (2003) Authentic Leadership: Rediscovering the Secrets to Creating Lasting Value, San Francisco, CA: Jossey-Bass
13. George, W. W. & Sims, P. (2007). True north: Discovering your authentic Leadership. San Francisco, CA: Jossey-Bass
14. George, W. W., Sims, P., McLean, A. N. & Mayer, D. (2011) Discovering Your Authentic Leadership, On Leadership. Boston, MA: Harvard Business Review Press, pp.: 163-178.
15. Luthans, F., Avolio, B. J. (2003) Authentic leadership development. K. S. Cameron, J. E. Dutton, & R. E. Quinn (Ur.), Positive organizational scholarship: 241-258. Berrett-Koehler.

Retrieved
from: https://www.researchgate.net/publication/343915712_The
_Development_of_Authentic_Leadership_Theory

16. World Economic Forum (2017) Digital Transformation Initiative: in Collaboration with Accenture, https://www.weforum.org/publications/digital-transformation-of-industries/

17. McKinsey & Company (2024) What is Digital Transformation? https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-digital-transformation

18. Liu, D. Y., Chen, S. W., Chou, T. C. (2011). Resource fit in digital transformation: Lessons learned from the CBC Bank global e-banking project. Management Decision, 49(11), 1728–1742.

19. Westerman, G., Calmejane, C., & Bonnet, D. (2011). Digital Transformation: A Roadmap for Billion Dollar Organizations. MIT Sloan Management Review

20. Westerman, G., Bonnet, D. & McAfee, A. (2014) Leading Digital. Turning Technology into Business Transformation, Boston: Harvard Business Review Press

21. Siebel, T. M. (2019) Digital Transformation: Survive and Thrive in an Era of Mass Extinction, Rodin Books

22. Sforcina, K. (2023) Digitalizing Sustainability. Five Forces of Digital Transformation, London: Routledge

23. Poszytek, P. (in press 2025) Transformational Leadership and Organizational Maturity in the Digital Era: Theories, Model, and Practices, New York: Routledge

24. Dutta, S., Lanvin, B., León, L., & Wunsch-Vincent, S. (2024). Global Innovation Index 2024. Unlocking the Promise of Social Entrepreneurship, Geneva: WIPO