A Systematic Review: The Role of Leader with Innovation and Sustainability in The Digital Era

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A B S T R A C T

The extreme challenge ever encountered by leaders of any organization is to make their digital transformation flourish. In recent years, leadership has shifted from old style leadership to digital leadership due to the choiceless change of digital transformation at the workplace because technological progress provides the opening to work from home instead of having a temporary shutdown. Digital leadership has evolved a substantial advantage in reducing costs from the offline workplace and acting as a mediator between the employees and the management, developing new objectives and representative duties, and embarking on challenges. The study uses systematic reviews, delivering a complete overview of available evidence clearly in Digital Leadership roles. Moreover, it helps identify research gaps in understanding the Digital Leader's role. It helps highlight gaps and proof in several studies that can be utilized to improve future research on Digital Leadership roles. It helps to identify the available evidence, which provides clarity in justification of what is specified.

Keywords: Digital Leadership, Sustainability, Digital Innovation, Digital Transformation

1. Introduction

The rapid advancement of digital technologies has fundamentally transformed the business landscape, ushering in the age of technology. In this era, organizations face unprecedented challenges and opportunities, requiring leaders to adapt their roles and responsibilities to effectively navigate the complexities of a digital-driven environment. One of the critical aspects of leadership in the age of technology is the leader's role in fostering innovation and sustainability.

Innovation has become a strategic imperative for organizations aiming to stay competitive in the digital age. Leaders play a crucial role in creating a culture of innovation, where creativity, experimentation, and continuous improvement are valued and encouraged. They must foster an environment that supports the exploration of new ideas, the harnessing of emerging technologies, and the adoption of innovative business models. Additionally, leaders must champion a mindset that embraces change and risk-taking, while providing the necessary resources and support to drive innovation initiatives.

However, innovation alone is not sufficient for long-term success in the age of technology. Sustainability has emerged as another critical dimension of leadership. As organizations grapple with environmental, social, and ethical challenges, leaders are expected to integrate sustainability principles into their decision-making processes. They must consider the long-term impacts of their actions on the environment, society, and stakeholders. By promoting sustainable practices, such as resource efficiency, responsible supply chain management, and social responsibility, leaders can contribute to the organization's long-term viability and positive societal impact.

In this context, the role of leaders in driving innovation and sustainability in the age of technology is of paramount importance. Leaders must possess a unique set of skills, competencies, and mindsets to effectively address the challenges and leverage the opportunities presented by digital technologies. They must be forward-thinking, adaptable, and agile, capable of envisioning and executing digital strategies that foster innovation and sustainability.

Furthermore, leaders must also navigate the complex interplay between innovation and sustainability. They must strike a balance between driving innovation to stay ahead in a rapidly evolving digital landscape and ensuring that these innovations align with sustainability goals. Leaders who can successfully integrate innovation and sustainability can create a competitive advantage for their organizations, fostering long-term growth, resilience, and positive societal impact.

Therefore, the age of technology presents leaders with a unique set of challenges and opportunities related to innovation and sustainability. By assuming an active role in driving innovation and integrating sustainability principles into their organizations, leaders can position their organizations for success in the digital age. The following sections of this paper will explore in depth the various dimensions of the leader's role in fostering innovation and sustainability, highlighting strategies, best practices, and case studies that demonstrate effective leadership in the age of technology.

Therefore, based on a Systematic Literature Review, the research aims to study the Leader's role in Innovation and sustainability in the age of technology. Scopus-indexed advanced search options were used for Online Databases in the study. The number of articles was found to be 409 initially for review. The words used for the review search, which were searched from title, abstract and keywords, were Leader's role, Leadership role, Innovation, Sustainability and Digital*(words having digital have their prefix). Then the articles were filtered from the last ten years, from 2013 to 2023, along with articles published only in English. Therefore, the number of articles became 241. Additionally, further filtering based on the keywords Social Science, Business, Management and Accounting, and Computer Science were taken for review. In the end, the number of articles was 62 for the systematic literature review. The articles in the databases were found to be from Elsevier, Emerald, WSB University, University of Tehran, Springer, Sciendo, MDPI, John Wiley and Sons and SAGE Publications. This paper outlines the Leader's role in Innovation and sustainability in the age of technology.

The study's findings stated that leaders gather social interaction connections in different ways, such as self-identity, knowledge contribution, and reciprocity (Cheng Z., Liang E. et al., 2018). The senior management leader should strengthen digital leadership capability and develop business model innovation and customer experience orientation. (Mihardjo L.W.W., Sasmoko S., Alamsjah F., Elidjen E.,2019). Leaders must demonstrate task-oriented behaviors, especially if short-term results are mandatory. More mature leaders should continue developing relations-oriented behaviors (Tortorella G., van Dun D.H., de Almeida A.G.,2020). To realize digital transformation, leaders must initially demonstrate their digital leadership skills and support establishing a digital learning culture (Karakose T., Polat H., Papadakis S.,2021). Leaders having better digital skills were perceived positively by the employees and helped the employees tend to adopt innovative behaviors. (Erhan T., Uzunbacak H.H., Aydin E.,2022). Digital leadership in a company improves organizational performance. As leadership continues to extend alongside the verification of the resource-based view theory, the essential role of digital leadership is transforming, and the role of employees' digital abilities in organizational performance (Shin J., Mollah M.A., Choi J., 2023).

2. Research Methodology

A systematic review of leader's role in innovation and sustainability in the age of technology had to meet three pre-defined criteria. First, the title or the abstracts or the keywords should have the following terms; digital transformation AND leader* (any word which has suffix as leader) AND sustainabl* (any word which has suffix as sustainabl) had to be present. Secondly, the papers were taken from 2013 to 2023. Thirdly it should a published paper and an article with only English as the medium.

Although the search of the electronic databases from Scopus advance document search engine, retrieved 409 papers, 168 papers were excluded in the screening of the abstracts as they were not related to digital transformation. The remaining 241 papers were evaluated in more detail on the basis of their full texts. Of these, 179 papers were rejected as they did not meet the appropriate conditions. Then, 40 papers were excluded on the basis of the not with broader review. In total, 22 papers were included in this systematic review. The study selection process is shown in the Fig. 1.

Every article was carefully read and the information on the research theme, methods, and author/s was recorded on an Excel sheet.
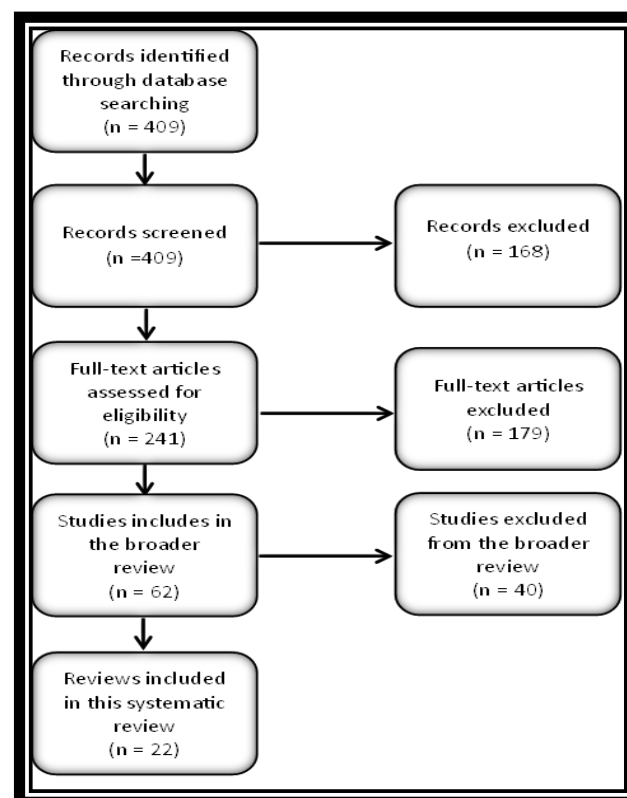

Fig. 1 - Flow chart of study selection process.

3. Review of Literature

The Upper Echelon Theory is highlighted as relevant in the industry 4.0 era, emphasizing the role of digital leadership in driving digital transformation and business model innovation (Mihardjo, L., et al., 2019). It emphasizes the need for global, creative, and challenging characteristics in digital leadership and the importance of a global mindset to support an innovation culture. Customer experience is stressed as crucial for developing business model innovation in the age of technology. Regarding the education sector, research emphasizes the importance of school principals' digital technology usage, particularly during the COVID pandemic (Karakose, T., et al., 2021). The study emphasizes the need for principals to possess digital leadership skills and participate in training programs to integrate appropriate technologies into education. Teachers generally agree that principals support digital transformation and technology-based professional development, but some note a lack of support due to workload, resource limitations, and insufficient training. At a macroeconomic level, the G20 countries possess high digital capabilities in terms of digital readiness, innovation, and competitiveness 4.0 (Cahyadi, A., et al., 2021). The G20 countries demonstrate strong digital readiness, innovation, and competitiveness in various areas, highlighting their role as technology producers and drivers of digitization on an international scale. In the banking sector, there is a positive relationship between transformational leadership climate and employee engagement during the Industrial 4.0 era (Winasis, S., et al., 2021). Leaders must exhibit transformational leadership behaviors that inspire and motivate their followers, stimulate intellectual growth, provide individual attention, and treat employees on a personal basis. Employees' perception of digital leadership significantly predicts their innovative work behavior (Erhan, T., et al., 2022). The study highlights the importance of leaders who can navigate digital advancements and embrace organizational changes, as innovation is crucial for driving organizations forward.

In the context of industry 4.0, digital leadership significantly influences customer orientation, which in turn positively impacts business model innovation (Yopan, M., Kasali, et al., 2022). Digital leadership drives business transformation within organizations, and business model innovation plays a key role in firm performance. In the Philippines, school heads' digital leadership during the COVID pandemic has a significant impact on teachers' job satisfaction (Tanucan, J. C. M., et al., 2022). The study emphasizes the need for school heads to enhance their digital leadership and create a digital culture to facilitate efficient educational operations. In the context of educational organizations, effective digital leadership is characterized by attributes such as digital competence, digital culture, digital differentiation, digital governance, and digital advocacy (Ghamrawi, N., & M Tamim, R., 2022). These attributes are crucial for successfully implementing and nurturing digital initiatives in educational organizations.

In the manufacturing sector, investing in the right technologies and tools is identified as the most critical stage of digital transformation implementation (Abdallah, Y. O., et al., 2022). Other important stages include staff training, budget planning, strategy development, pilot projects, internal and customer communication, and sponsorship. A researcher (Karakose, T., et al., 2022) conducted a bibliometric and science mapping analysis of the digital leadership field. The study revealed increasing research interest in digital leadership over time, with different thematic focuses in three periods. Noteworthy research themes included virtual leadership, virtual teams, e-leadership, technology leadership, and digital leadership. The study (Sarfraz, M., et al., 2022) aimed to improve the sustainable performance of manufacturing firms in Pakistan. The study found positive associations between innovation capabilities, green process innovation, and sustainable performance. Green product innovation was identified as a mediator, while digital leadership was found to moderate the relationship between green product innovation and sustainable performance. Research (Zulu, S. L., & Khosrowshahi, F., 2021) explored leadership approaches in the construction industry's digital transformation. The study identified six themes characterizing digital leadership in the industry, aligning them with existing leadership typologies. The findings underscored the importance of leadership in driving digital innovation.

A study conducted a qualitative study on digital transformation in universities. The research emphasized the significance of leaders with digital skills and a digital leadership style (Msila, V., 2022). The study highlighted the importance of a clear vision, collective decision-making, technical skills, and emotional intelligence in driving successful digital transformation. Research conducted a systematic review of digital leadership in universities. The analysis revealed that the field is growing rapidly but underexplored (Ratajczak, S., 2022, December). The study identified key behaviors associated with digital leadership and recommended future research directions to fill existing research gaps. A study conducted a bibliometric and network analysis of the field of digital leadership. The study identified key capabilities for digital leadership in a digital scenario and proposed a definition for digital leadership. The research highlighted the need for further exploration of leadership theories and capabilities specific to the digital ecosystem (Tigre, F. B., et al., 2023). Research focused on the role of digital leadership in organizational performance and sustainability management in South Korean organizations. The study found a positive direct and indirect effect of digital leadership on organizational performance, with digital culture and employees' digital capabilities mediating the relationship (Shin, J., et al., 2023).

4. Discussion

The digital leadership has emerged as a critical factor in the success of organizations navigating the challenges and opportunities of the age of technology. It plays a pivotal role in driving digital transformation, fostering innovation, and enabling business model innovation. Throughout this discussion, several key points have emerged, highlighting the significance of digital leadership and its impact on various aspects of organizations.

Firstly, in the industry 4.0 era, digital leadership is essential for driving digital transformation and business model innovation. Organizations need leaders who possess a global mindset, creativity, and the ability to challenge the status quo. Digital leaders must foster an innovation culture and embrace digital technologies to stay competitive in a rapidly evolving landscape.

Furthermore, customer experience has become a central focus in the age of technology, and digital leadership is instrumental in developing business model innovation that delivers value to customers. Successful business model innovation requires a combination of structure and content innovation,

supported by value creation and future cash flow. By prioritizing customer orientation and leveraging digital advancements, organizations can adapt to market changes and drive transformation.

The COVID pandemic has further emphasized the importance of digital leadership, particularly in the education sector. School principals, equipped with digital technology skills, play a vital role in integrating appropriate technologies into education. Their digital leadership influences teachers' job satisfaction and the overall effectiveness of digital learning initiatives.

Examining G20 countries, we observe their high digital capabilities, including digital readiness, innovation, and competitiveness 4.0. These countries demonstrate strong institutional support, infrastructure, and ICT adoption, contributing to their digital leadership. By studying their practices, other nations can gain insights into fostering digital leadership and accelerating digital transformation.

The impact of digital leadership extends to employees within organizations. Leaders who exhibit transformational leadership behaviors inspire and motivate their followers, leading to increased employee engagement during digital transformation. Employees' perception of digital leadership significantly predicts their innovative work behavior, highlighting the importance of nurturing a culture that encourages creativity and experimentation.

In the manufacturing sector, digital transformation implementation involves various elements such as technology investments, staff training, strategy development, communication, and a focus on sustainability. Digital leaders in this sector must navigate these complexities to drive successful digital transformations that enhance efficiency, productivity, and environmental sustainability.

However, despite its growing importance, digital leadership remains an underexplored field. Through bibliometric analysis, we can observe the rapid growth of research in this area, emphasizing the need for more interdisciplinary research and case studies. Further exploration of digital leadership behaviors, such as team orientation, stakeholder engagement, and the combination of management with technology and digital skills, can provide valuable insights for organizations striving to develop effective digital leadership practices.

Ultimately, digital leadership influences organizational performance and sustainability management. By fostering a digital culture and enhancing employees' digital capabilities, organizations can improve their ability to adapt to digital disruptions, innovate, and achieve long-term success.

5. Managerial Implications

The managerial implications provided offer valuable guidance for organizations looking to enhance their digital leadership capabilities. However, it is important to note that the field of digital leadership is continuously evolving, and there are several areas where future research and exploration could further enhance the understanding and application of these implications:

- Deepening the understanding of digital leadership: Future research can delve deeper into the specific competencies and traits that characterize effective digital leaders. By identifying and studying the behaviors, mindsets, and skills that are most critical in the age of technology, organizations can better develop and nurture digital leadership capabilities.

- Ethical considerations in digital leadership: As digital technologies become more pervasive, ethical implications become increasingly important. Future research can focus on exploring the ethical challenges and dilemmas that arise in digital leadership, such as data privacy, algorithmic bias, and responsible AI use. Understanding and addressing these ethical concerns will be crucial for effective digital leadership.

- Examining the impact of digital leadership on organizational performance: While the managerial implications highlight the importance of digital leadership, future research can investigate the direct impact of digital leadership on organizational performance outcomes, such as innovation, productivity, and financial success. This empirical evidence would provide further insights into the value and benefits of effective digital leadership.

- Exploring the role of digital leadership in change management: Digital transformations often involve significant organizational change. Future studies can focus on understanding how digital leaders can effectively manage change processes, overcome resistance, and create a supportive environment for digital initiatives. This research would provide practical strategies and frameworks for navigating digital transformations successfully.

- Long-term sustainability and resilience in digital leadership: Sustainable digital leadership involves not only immediate success but also long-term resilience. Future research can investigate how digital leaders can foster a culture of sustainability, balance short-term results with long-term viability, and effectively respond to disruptive events. This research would help organizations build resilience in the face of digital disruptions.

Overall, there is a wealth of opportunities for future research and exploration in the field of digital leadership. By addressing these areas of future scope, organizations can continue to refine their understanding and practice of digital leadership, ensuring their ability to thrive in the digital age.

6. Conclusion

In conclusion, digital leadership is a critical driver of digital transformation, innovation, and business model evolution. Its impact spans across different sectors, influencing customer experience, education, employee engagement, customer orientation, and organizational performance. Organizations must recognize the importance of developing digital leadership capabilities and invest in nurturing a digital culture to thrive in the age of technology. By embracing digital leadership, organizations can seize the opportunities presented by the digital revolution and shape a successful future.

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