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Digital Transformational Leadership: Integration of Technological Competence, Innovation Climate, and Employee Adaptive Performance – A Systematic Literature Review

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ABSTRACT

This article aims to develop a conceptual model that integrates Digital Transformational Leadership, Technological Competence, Innovation Climate, and Employee Adaptive Performance in the context of organizational digital transformation. The main objective is to map the relationships between variables and formulate interaction patterns as a basis for empirical research. Using a Systematic Literature Review (SLR) approach, this study identifies patterns of findings and relationships between variables in indexed literature from 2010 to 2025, analysing 82 articles thematically using PRISMA. The findings show that Digital Transformational Leadership acts as the main driver in improving Technological Competence and creating a supportive Innovation Climate. These two variables are important prerequisites for improving Employee Adaptive Performance in a digital environment. The integration of these three variables strengthens the role of digital leaders in steering organizations toward agility, innovation, and adaptive readiness. These findings confirm that digital transformational leadership not only changes work processes but also changes the psychological, cognitive, and competency structures of the workforce. This article offers a new conceptual model that links Digital Transformational Leadership with Employee Adaptive Performance through Technological Competence and Innovation Climate, providing a theoretical contribution by combining dynamic capability, innovation climate theory, and transformational leadership in a comprehensive framework, as well as providing a basis for empirical research on future organizational digital transformation.

INTRODUCTION

Digital transformation has prompted organizations to adapt their work structures, cultures, and capabilities quickly and continuously. In this context, Digital transformational leadership (DTL) has become a strategic element that can guide organizations in facing technological disruption, increasing agility, and building innovative capabilities (Özkan Alakaş, 2024). Digitally competent leaders not only encourage technology adoption but also create a transformational vision that inspires changes in employee behavior and mindset(Putra et al., 2025). Therefore, DTL plays a crucial role in creating a foundation for organizations that can survive and thrive in the face of rapid technological change.

The literature shows that the success of digital transformation is largely determined by the technological capabilities of the workforce and the innovation climate within the organization (Subariyanti et al., 2025). Technological competence is the foundation for employee readiness in responding to technological demands, while innovation climate creates an environment that encourages creativity, experimentation, and risk-taking (Purwati et al., 2025). These two factors are increasingly important because organizations need adaptive employees (Employee Adaptive Performance) to deal with technological uncertainty and digital dynamics (Rosales & (Hasyim, 2025). Therefore, it is important for organizations to not only develop technological skills but also create a culture that supports innovation.

However, previous research has mostly discussed these variables partially, not in a comprehensive integration. In addition, the theoretical relationship between DTL and Adaptive

Performance through the mechanisms of technological competence and innovation climate has not been fully developed. Therefore, this article constructs a conceptual model that integrates these four variables in response to the increasing need for leadership models relevant to the digital era.

This article makes an important contribution by synthesizing current theories and identifying research gaps, resulting in a robust conceptual model relevant to the dynamics of modern organizations. By introducing a more holistic relationship between DTL, technological competence, innovation climate, and employee adaptive performance, this article opens further research avenues that combine various dimensions in understanding leadership effectiveness in the digital era.

Overall, this article emphasizes the importance of a deeper understanding of how organizations can leverage digital transformational leadership to build the capabilities needed to face the challenges of digital transformation. Thus, this article contributes to the development of leadership theory and practice that is more relevant, adaptive, and responsive to the increasingly complex demands of the digital world.

LITERATURE REVIEW

Digital Transformational Leadership

Digital Transformational Leadership is an extension of transformational leadership theory with an emphasis on leaders' ability to use digital technology to inspire change, increase innovation capacity, and facilitate organizational transformation (Özkan Alakaş, 2024). Digital leaders encourage technology exploration, virtual collaboration, data-driven decision making, and digital talent development (Guinan et al., 2023). In this context, effective leaders rely not only on technical skills, but also on the ability to create an environment that supports technology adoption and collaboration between individuals (David et al., 2025). This is crucial, given the need for organizations to remain relevant in an ecosystem that is increasingly dependent on technology and innovation.

The literature emphasizes that leaders who are effective in digital transformation must be able to create a digital vision, promote a digital mindset, and facilitate continuous technological adaptation (David & Lahindah, 2025). DTL is also closely related to strengthening employee competencies and motivation to embrace change. Leaders who can clearly communicate a digital vision will be more successful in driving technology adoption and creating a culture of innovation (Qiao et al., 2024). Furthermore, research shows that leaders who implement a DTL approach focus not only on technology but also on developing employees' social and emotional skills to facilitate a holistic transformation process (Sacavém et al., 2025).

Technological Competence

Technological Competence refers to the ability of employees to understand, use, and utilize digital technology in performing their tasks (Zahra & Syahrizal, 2025). This competence is not only related to technical skills but also includes digital literacy, technology-based problem-solving skills, and readiness to adopt new systems (Zahra & Syahrizal, 2025). For example, in a work context that increasingly relies on automation and artificial intelligence, employees with a high level of technological competence are better able to utilize these digital tools to improve their efficiency and productivity. Therefore, developing this competence is very important for employees in facing rapid digital change.

The literature shows that digital transformational leaders play an important role in improving employee technological competencies through training, digital learning, providing access to technology, and mentoring (Guinan et al., 2023). Leaders who are effective in digital transformation not only focus on technology procurement but also ensure that employees have the ability to utilize it optimally (Guinan et al., 2023). Furthermore, research shows that employees' technological capabilities greatly influence their adaptation to the changes brought about by digital transformation (Widyastuti et al., 2025). When technological capabilities increase, employees become more responsive to change and able to adapt to the demands of digital work.

Innovation Climate

Innovation Climate is the shared perception within an organization of the extent to which the work environment supports creativity, experimentation, and innovation (Chen & Khan, 2025). The innovation climate is characterized by management support, openness to new ideas, tolerance for

failure, and cross-functional collaboration (Jiang et al., 2023). In an environment that supports innovation, employees feel empowered to think creatively, test new solutions, and collaborate with colleagues from different departments. This creates an atmosphere that motivates employees to innovate without fear of failure, which ultimately supports the creation of better work results that are relevant to digital demands.

Digital transformational leaders have been shown to create an innovative climate through digital vision communication, employee empowerment, and the creation of innovation spaces (Chen & Khan, 2025). They also empower employees to access the necessary resources and provide them with space to explore new ideas. An innovative climate serves as a catalyst for the emergence of adaptive behaviors and creative work outcomes necessary for digital transformation. A positive innovative climate allows organizations to remain flexible and responsive to rapid market and technological changes, giving them a competitive advantage in an increasingly digital world (Jiang et al., 2023).

Employee Adaptive Performance

Employee Adaptive Performance describes the ability of employees to adapt to new situations, manage technological changes, and act flexibly in unexpected work conditions (Sun & Li, 2025). Employees with high adaptive performance are able to cope with the uncertainty generated by changes in the organization or external environment, and remain productive despite facing unexpected challenges (Sun & Li, 2025). In the context of digital transformation, the ability to adapt to new technologies and dynamic changes is essential, given the speed and complexity of these changes.

Research shows that adaptive performance is important in digital environments because changes in systems, processes, and technologies are rapid and constant (Zhou et al., 2025). Employees who can adapt quickly to these changes can not only manage the transition but also play a role in accelerating the application of technology and innovation within the organization (Zhou et al., 2025). Technological competence provides employees with the basic skills needed to understand and utilize new technologies, while an innovation climate encourages them to think creatively and be open to change (Hasyim, 2025). These two factors support each other in shaping more adaptive employees, enabling them to not only survive but also thrive in uncertain situations).

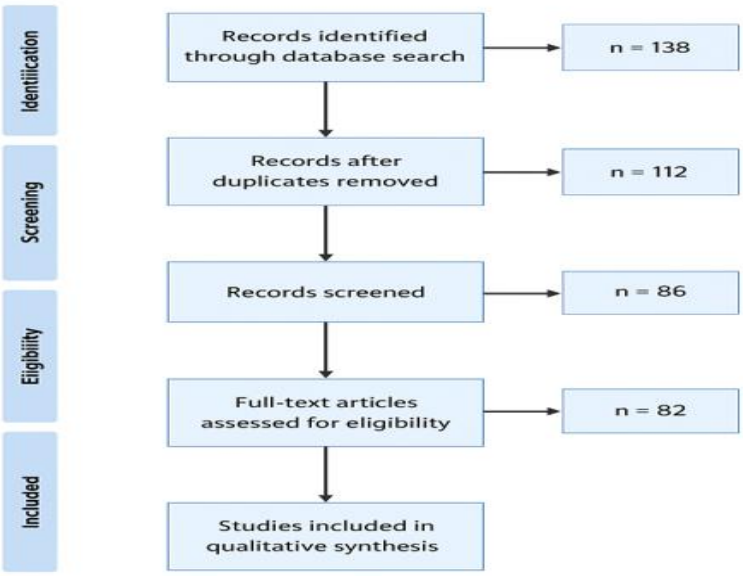
RESEARCH METHODS

This study uses a Systematic Literature Review (SLR) approach with reference to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines so that the process of searching, selecting, and synthesizing literature is structured and transparent. Articles were searched through several reputable databases, namely Scopus, Web of Science, ProQuest, ScienceDirect, and national journals indexed by SINTA. The selection of these diverse databases aimed to ensure that the literature analyzed had global coverage as well as contextual relevance at the national level.

Inclusion criteria were established to maintain the quality and focus of the review. The selected articles were publications from 2010 to 2025, discussing variables in line with the research topics, namely digital leadership, technological competence, innovation climate, and adaptive performance. The studies analyzed included empirical studies and conceptual studies, and all articles had to be published in Scopus Q1–Q4 or SINTA 1–3 indexed journals so that scientific standards were maintained.

The PRISMA stages included four main processes. In the identification stage, 138 articles were found from the entire database. After removing duplicates, the number of articles was reduced to 112. The screening process based on titles and abstracts left 86 relevant articles. Next, the full-text eligibility stage was conducted to assess the overall eligibility of the articles, and 82 articles were found to meet the criteria and were used in the final analysis.

Data synthesis was performed using a thematic approach to identify patterns of relationships, conceptual trends, and theoretical constructs that emerged from various studies related to Digital Transformational Leadership, Technological Competence, Innovation Climate, and Employee Adaptive Performance. This approach allowed researchers to integrate key findings, examine the consistency and variation of research results, and identify opportunities for developing models and theoretical frameworks in future studies.



Picture 1 PRISMA Systematic Literature Review Flowchart

RESULTS AND FINDINGS

Literature synthesis shows three main patterns of findings:

Digital Transformational Leadership improves Technological Competence

Digital leaders encourage the strengthening of technical competence through digital training, knowledge sharing, technology-based work environments, and digital empowerment. Nearly all articles found a positive correlation between DTL and technological competence. Leaders who are effective in digital transformation not only facilitate access to digital tools and platforms, but also provide continuous training and build a culture of learning within the organization (Braojos et al., 2024). In a study conducted by Qiao et al. (2024), it was found that leaders who prioritize the development of technological competence not only encourage employees to master technical skills but also strengthen their confidence in facing complex digital challenges.

Furthermore, research shows that successful digital leaders not only focus on improving individual technical skills but also create an organizational culture that integrates technology into every aspect of work (Lukman & Yune, 2025). Digital leaders who support the development of technological competencies through mentoring and project-based learning encourage employees to feel more comfortable adopting new technologies and innovating (Guinan et al., 2023). This approach not only hones technical skills but also develops a mindset that is more open to change and technology. Therefore, developing technological competencies at the organizational level is one of the main pillars for achieving success in facing dynamic digital transformation.

Digital Transformational Leadership strengthens the Innovation Climate

DTL fosters an organizational climate that is open, collaborative, and supportive of innovation. Digital leaders increase tolerance for experimentation and foster a culture of new ideas. Research shows that effective digital transformational leaders play an important role in creating space for creativity, experimentation, and cross-functional collaboration (Chen & Khan, 2025). Leaders who encourage digital initiatives and innovation can create a more flexible and responsive environment (Chen & Khan, 2025). This innovation climate encourages employees to take risks and explore new ideas, which in turn increases organizational productivity and competitiveness.

In addition, leaders who successfully develop a climate of innovation also encourage the formation of cross-functional teams that share ideas and knowledge. Teams working in an open and supportive climate of innovation have the opportunity to collaborate more intensively, increase creativity, and accelerate the development of more effective solutions (Sari et al., 2023). Employees feel empowered to take the initiative in new projects and are better prepared to face the challenges

presented by digital transformation (Sari et al., 2023). By creating a healthy climate of innovation, digital leaders help organizations remain adaptive and ready to face the ever-changing demands of the market (Chen & Khan, 2025).

Technological Competence and Innovation Climate improve Employee Adaptive Performance

Employees with high technological competence who work in an innovative climate demonstrate stronger adaptive performance in dealing with digital systems, process changes, and new tasks (Hasyim, 2025). Research shows that the combination of good technological capabilities and supportive innovation climate plays an important role in preparing employees to face the uncertainty brought about by digital transformation (Hasyim, 2025). Employees who are able to utilize technology effectively and work in an environment that supports creativity and experimentation tend to perform better in rapidly changing situations (Hasyim, 2025).

Furthermore, employees who have high technological competence and work in a supportive innovation climate are not only more adaptable to technological changes, but also more proactive in seeking new solutions to the challenges faced by the organization (David & Lahindah, 2025). They tend to identify opportunities in uncertainty and show initiative to innovate, which ultimately improves their performance in dealing with unexpected situations (David & Lahindah, 2025).

The integration of these three findings concludes that DTL influences adaptive performance through the pathways of competence and innovation climate. This literature synthesis shows that Digital Transformational Leadership not only plays a role in improving technological competence and creating an innovation climate, but is also key in shaping more adaptive employees.

DISCUSSION

These findings confirm that Digital Transformational Leadership is not merely an extension of traditional leadership styles, but a new form of leadership rooted in digital capabilities, technological vision, and innovative empowerment.

From the perspective of Dynamic Capability Theory, DTL functions as a catalyst that shapes sensing, seizing, and transforming capabilities (Ellström et al., 2021). Employee technological competence acts as an operational capability that accelerates the adaptation process, while the innovation climate becomes a contextual factor that facilitates creativity and behavioral flexibility (Rizana et al., 2025).

The literature also shows that this relationship is particularly relevant in the service, education, government, and digital-based SME sectors. The integration of these variables provides a theoretical framework for how organizations can maximize digital transformation by strengthening the roles of leaders, technology, and innovative culture.

Table 1 Systematic Literature Review Article Search and Screening Strategies

Database	Key Keywords	Operator Boolean	Initial Results	After Duplication	After Title & Abstract Screening	Article Final
Scopus	"digital transformational leadership," "technology competence," "innovation climate," "adaptive performance"	("digital transformational leadership") and ("technology competence" or "innovation climate" or "adaptive performance")	62	52	35	33
Web of Science	"digital leadership," "innovation climate," "adaptive performance"	("digital leadership") and ("innovation climate" or "adaptive performance")	31	27	20	19
ProQuest	"digital transformational leadership," "technology competence"	("digital transformational leadership") and ("technology competence")	21	18	12	12

Database	Key Keywords	Operator Boolean	Initial Results	After Duplication	After Title & Abstract Screening	Article Final
Google Scholar	"digital transformational leadership" and "innovation climate"	and	18	15	11	10
SINTA (S2–S1)	"digital leadership", "technology competence," "innovation climate"	or	6	5	8	8
Total			**138**	**112**	**86**	**82**

CONCLUSION AND RECOMMENDATIONS

Conclusion

These conceptual findings confirm that Digital Transformational Leadership (DTL) plays a strategic role in strengthening an organization's ability to cope with the dynamics of the digital era. Digital-based transformational leadership not only encourages the improvement of Technological Competence, but also shapes an Innovation Climate that is conducive to the creation of creative, adaptive, and responsive work processes. These two variables have been proven to be important determinants of Employee Adaptive Performance, especially when organizations operate in increasingly digitized work environments that demand behavioral flexibility. The proposed conceptual model shows that DTL influences employee adaptability through a combination of mechanisms: first, by equipping employees with relevant technological competencies, and second, by creating an innovation climate that supports exploration and continuous learning. Thus, the relationship between digital leadership and adaptive performance is not direct, but rather moves through integrated individual capabilities and organizational conditions.

Recommendations

Future research is recommended to empirically test this conceptual model using quantitative approaches such as SEM-AMOS or PLS-SEM, so that the strength and direction of the relationships between variables can be statistically tested. Additionally, model development could incorporate other variables, such as digital self-efficacy, organizational learning, or psychological empowerment, either as mediators or moderators, to provide a more comprehensive understanding of the dynamics of adaptive behavior in a digital context. Cross-industry or cross-country studies are also considered important to capture variations in cultural context, sector, and level of digital maturity that may influence the effectiveness of Digital Transformational Leadership. With a broader and more comparative approach, the understanding of the role of digital leadership in driving employee adaptation will become more mature and relevant to various organizations in the era of ongoing digital transformation.

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