A Critical Review of Digital Leadership in the Age of AI

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Abstract: The rapid evolution of artificial intelligence (AI) and digital technologies has disrupted traditional leadership models, *and the question of how leaders can navigate AI-driven organizational change has become increasingly critical*. This critical review analyses scholarship on digital leadership between 2014 and 2024 to illuminate the strengths and limitations of extant theories, the gaps in existing frameworks that continue to inform transformational and adaptive leadership models, and the emerging practices that can enhance the effectiveness of leaders in complex technological environments, with a particular focus on how to navigate the challenges of AI integration in a way that maintains organizational effectiveness and ethical standards. Based on these gaps and emerging practices, this study proposes a research agenda for developing multi-dimensional leadership approaches that address rapid technological change while preserving organizational integrity and societal values.

Keywords: Digital leadership, Artificial intelligence, Organizational change, Ethics, Adaptability, Governance

1. Introduction and Background

While AI has challenged conventional leadership paradigms, AI can disrupt organizational operations beyond improvements in efficiency and challenge traditional leadership competencies by seeping into decision-making, employee roles, and organizational culture (Matsunaga, 2022; Weber et al., 2022). AI has led to the development of a new field of digital leadership, which has moved beyond the focus on the use of ICT in e-leadership to a more comprehensive strategic transformation that includes AI, big data, and digital ecosystems (Li et al., 2024). However, some studies indicate that AI adoption also presents ethical risks, transparency concerns, and job security anxiety among knowledge workers (Breidbach & Maglio, 2020; Tarsuslu et al., 2024). The implications are significant: ineffective digital leadership can create resistance, ethical violations, and organizational dysfunction, whereas effective leadership can support innovation and resilience (Zaidi et al., 2024). However, transformational and adaptive frameworks are still limited in integrating technical, social, and ethical dimensions (Engelbrecht et al., 2017; Hossain et al., 2025). The proposed review outlines a multi-dimensional approach that incorporates digital literacy, ethical reasoning, and adaptive capacity to help organizations navigate AI-driven transformation.

2. Research Objectives

This critical review aims to provide comprehensive analysis of digital leadership approaches in the context of AI-driven organizational transformation. The review addresses three specific research objectives that collectively examine the current state of digital leadership theory and practice while identifying directions for future development.

Objective 1: Evaluate the adequacy of existing leadership frameworks in addressing ethical challenges and employee resistance during AI-driven organizational transformations. This objective examines how current theoretical models, including transformational, adaptive, and ethical leadership frameworks, address the human and ethical dimensions of AI implementation (Engelbrecht et al., 2017; Matsunaga, 2022; Weber et al., 2022).

Objective 2: Identify and analyse emerging practices that enable leaders to integrate technical, social, and ethical considerations for effective digital governance. This objective focuses on innovative approaches that balance technological advancement with organizational integrity and employee well-being (Schiuma et al., 2021; Yang et al., 2025; Georgieva et al., 2022).

Objective 3: Assess theoretical and practical gaps in current digital leadership models and propose directions for enhancing organizational resilience during AI adoption. This objective evaluates the limitations of existing frameworks and identifies specific areas requiring further theoretical development and empirical validation (Cortellazzo et al., 2019; Sundowo et al., 2024; Yang et al., 2025).

3. Methodology

3.1 Research Design and Approach

This study adopts a critical review methodology, which is distinct from systematic reviews in that it prioritizes conceptual evaluation and theoretical integration rather than exhaustive coverage. The purpose is to interrogate

assumptions in existing leadership theories, identify conceptual gaps, and propose an integrated framework for digital leadership in the context of AI adoption.

3.2 Literature Search Strategy

A structured search was undertaken across four databases—Francis and Taylor, Scopus, Business Source Premier, and Google Scholar—focusing on the period 2014–2024, which aligns with the decade of significant AI-driven organizational change. Search terms included combinations of *digital leadership*, *artificial intelligence and leadership*, *adaptive leadership and technology*, *transformational leadership and AI*, and *ethical AI governance*. Boolean operators (AND/OR) and truncations were applied to ensure comprehensiveness. To ensure scholarly quality, only peer-reviewed journal articles and conference proceedings were included. Opinion pieces, non-peer-reviewed reports, and purely technical AI studies without leadership relevance were excluded.

3.3 Thematic Synthesis

Following Braun and Clarke (2006), literature was coded and grouped through:

- **Descriptive mapping** of frameworks and practices,
- **Analytical comparison** of their strengths and weaknesses, and
- **Integrative synthesis** into the conceptual framework presented in Section 4.

This approach ensured that the review moved beyond descriptive reporting toward a structured, theory-informed synthesis, enabling the identification of both theoretical limitations and practical innovations in digital leadership research.

4. Conceptual Foundations and Theoretical Frameworks

4.1 Theoretical Landscape: From Digital Leadership to AI-Driven Transformation

Digital leadership has become a concept developed from the influence of technology, but the theoretical basis is problematic (Yang et al., 2025). Digital leadership is defined by Yang et al. as the "ability of leaders to use digital intelligence technologies to enhance business development and organizational performance, including digital trend insight, digital organizational change, and digital talent development" (Yang et al., 2025: 20). Other conceptualizations focus on digital leadership as the application of digital technologies into organizational strategies and the motivation and direction of employees during transformation (Wasono and Furinto, 2018; Zeike et al., 2019; Sacavém et al., 2025). The transformation from e-leadership to digital leadership indicates the understanding that today's leadership is not simply the use of technology but also requires transformation capabilities that include AI, big data, and platform ecosystems (Li et al., 2024). This definitional variation reveals some deeper theoretical issues with applying traditional leadership frameworks to the specific characteristics of AI. While transformational, adaptive, and ethical leadership theories can serve as useful starting points, they all fall short in specific ways when applied to AI contexts, from how to approach human-AI interactions to issues like algorithmic bias (Weber et al., 2022). When decision-making authority is shared with or delegated to algorithmic systems, the focus on individual charisma and vision are not sufficient for this framework Adaptive leadership promotes resilience and flexibility in the face of uncertainty but assumes adaptation is always desirable, which is problematic in the presence of AI that introduces surveillance, bias, or concerns about employee displacement (Huang et al., 2023). There are no mechanisms within the framework to ask whether some AI implementations should be resisted instead of adapted to, especially when they conflict with organizational values or employee well-being. While ethical leadership centres on trust and fairness, it is still nascent in environments in which decisions are shared with algorithms (Breidbach & Maglio, 2020), and although traditional ethical leadership addresses interpersonal trust and moral exemplar behavior, it does not offer much in the way of guidance for algorithmic transparency, bias mitigation, or the ethical considerations of human-AI collaboration.

These frameworks offer useful foundations but remain fragmented, highlighting the need for integrated approaches capable of addressing the discontinuities between traditional leadership and AI-augmented environments. *Figure 1* builds on the work of Matsunaga (2022), Weber et al. (2022), and Engelbrecht et al. (2017), illustrating how transformational, adaptive, and ethical leadership frameworks are only partially applicable in AI contexts. The top of the figure presents the core assumptions of each framework—such as charisma and vision in transformational leadership or resilience in adaptive leadership—while the arrows indicate where these assumptions fail to address AI-specific challenges, including algorithmic bias, employee displacement, and shared decision-making with machines. This visualization supports *Objective 1* by showing

that, although traditional frameworks provide useful starting points, they are insufficient for managing the ethical and socio-technical disruptions introduced by AI. The gaps identified in the figure motivate the development of a more integrated, AI-aware leadership approach.

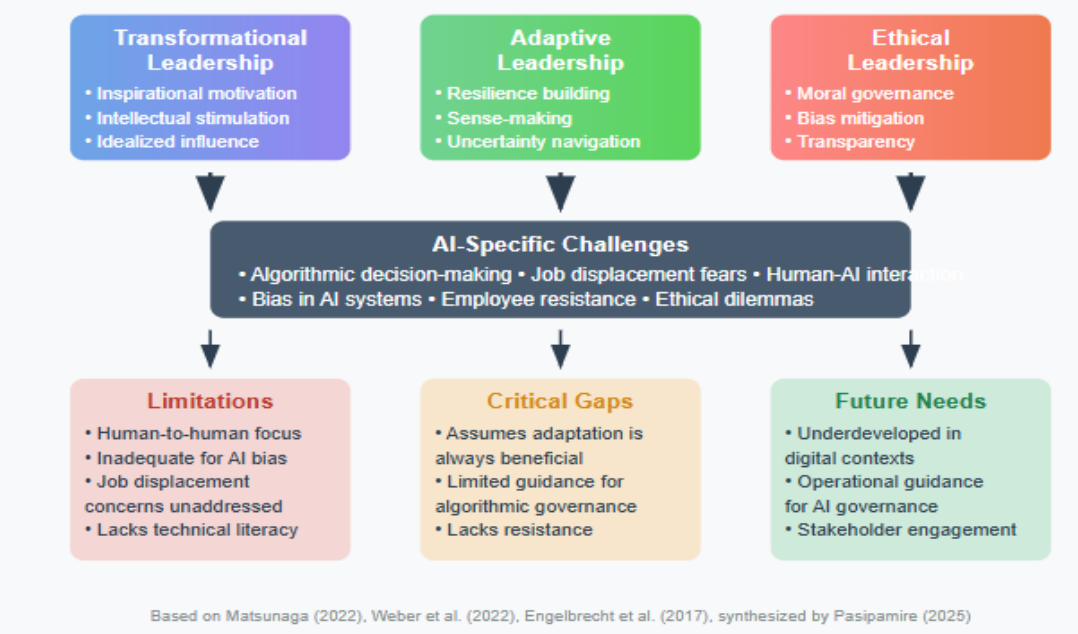


Figure 1: Traditional Leadership Frameworks in AI Context

4.2 AI as a Transformational Disruptor

AI technologies offer both enormous opportunities and unprecedented challenges for organizational leadership (Matsunaga, 2022). While previous technological changes primarily affected routine work, AI impacts white-collar professionals by being able to perform intellectual and creative work, thus making knowledge workers anxious about job loss and professional identity (Tarsuslu et al., 2024). The idea that AI is just another technological disruption that leaders can handle with current frameworks seems increasingly insufficient (Zárate-Torres, 2025). AI systems are equipped with abilities to make decisions on their own, to recognize patterns, and to predict future outcomes that fundamentally change the nature of organizational work and the leadership needed to accomplish it.

4.3 Conceptual Framework

The conceptual framework integrates insights from the literature to show how traditional leadership theories interact with AI-specific disruptions. While transformational, adaptive, and ethical leadership provide useful foundations, their application remains partial in contexts shaped by algorithmic bias, surveillance, and human–technology integration. Figure 2 illustrates this dynamic: traditional frameworks are positioned on the left, AI-driven challenges at the centre, and emerging practices—such as ethical AI governance, stakeholder engagement, and cross-disciplinary collaboration—mediating these tensions on the right (Georgieva et al., 2022; Yang et al., 2025). Contextual factors including culture, infrastructure, and regulation shape outcomes, while feedback loops highlight the bidirectional relationship between leadership practices and organizational resilience (Matsunaga, 2022; Weber et al., 2022). The framework directly reflects the study's objectives: Objective 1 identifies gaps in existing theories; Objective 2 highlights the integrative practices needed to address technical, social, and ethical concerns; and Objective 3 emphasizes contextual adaptation and continuous learning. Rather than restating individual findings, the model consolidates them into an analytic tool that demonstrates how fragmented theories evolve into integrated practices for AI-era leadership.

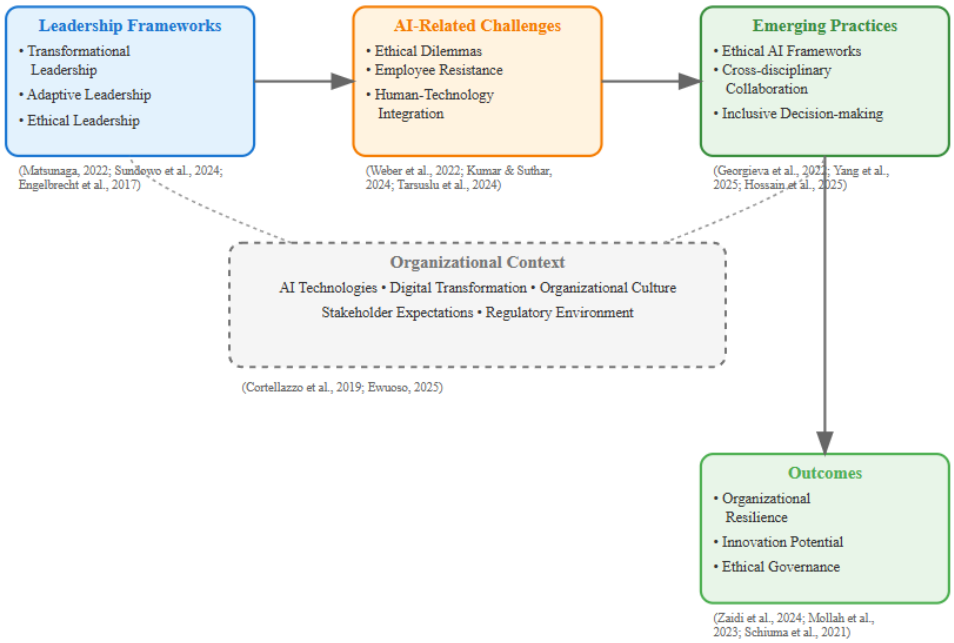


Figure 2: Conceptual Framework: Digital Leadership in the Age of AI

4.4 Empirical Anchors for the Conceptual Framework

The conceptual framework is empirically supported by multiple studies demonstrating the practical relevance of AI-adapted leadership. Matsunaga (2022) shows that traditional leadership theories—transformational, adaptive, and ethical—struggle with AI challenges such as algorithmic bias and human-technology integration, evidenced by cases like Amazon's biased recruitment tool, COMPAS in policing, and IBM Watson for Oncology, a concern also highlighted by Bannor and Baysah (2025). Weber et al. (2022) provide longitudinal and cross-national evidence linking AI adoption to workforce restructuring, showing that proactive leadership interventions yield higher recovery rates (84% vs. 67%) and mitigate displacement impacts. Cortellazzo et al. (2019) highlight that leadership-driven digital culture, collaboration, and ethical practices are critical for successful AI adoption, emphasizing organizational infrastructure and culture alongside individual traits. Georgieva et al. (2022) empirically validate the importance of ethical governance and stakeholder engagement, operationalizing principles such as explainability, bias mitigation, and diversity in AI lifecycle practices. Yang et al. (2025) identify hybrid leadership models that combine AI's analytical strengths with human qualities, supported by interventions like Ethics Impact Statements, "data dignity" audits, and AI Fact Sheets, which enhance adaptability and ethical decision-making. Zaidi et al. (2024) show that transformational leadership fosters employee engagement, resilience, and innovation in AI contexts, while Mollah et al. (2023) confirm that ethical governance and adaptive leadership are critical contingencies for achieving superior AI adoption outcomes and mitigating risks. Collectively, these studies anchor the conceptual framework in real-world evidence, demonstrating that effective AI leadership requires adaptability, ethical oversight, stakeholder engagement, and a culture conducive to responsible innovation.

5. Literature Review

5.1 Adequacy of Traditional Frameworks

Traditional leadership theories offer useful starting points but remain limited in AI contexts. Transformational leadership depends heavily on leaders' digital literacy, without which it is ineffective in reducing employee resistance to AI adoption (Matsunaga, 2022). Adaptive leadership emphasizes resilience but assumes adaptation is always positive, overlooking situations where AI worsens surveillance or job insecurity (Huang et al., 2023). Ethical leadership contributes to trust and fairness but is underdeveloped in contexts where algorithms influence decision-making (Breidbach & Maglio, 2020).

5.2 Emerging Integration Practices

Recent scholarship emphasizes integrated approaches that combine technical, social, and ethical dimensions. Ethical AI governance provides a foundation for transparency and bias auditing, though empirical evidence is

still scarce (Georgieva et al., 2022). Empowerment-based approaches acknowledge employee concerns but risk unintended inequities (Kamin et al., 2022). Cross-disciplinary collaboration and inclusive stakeholder engagement are consistently highlighted as promising strategies for responsible digital governance (Yang et al., 2025; Adie et al., 2024).

5.3 Implementation Challenges

Despite these advances, practical barriers persist. Change management models inadequately address psychological impacts such as job anxiety and identity threats (Cortellazzo et al., 2019). Leadership development programs rarely integrate technical literacy with ethical reasoning and adaptive capacity (Weber et al., 2022). Although ethical governance is increasingly recognized, mechanisms such as bias audits, transparency tools, and consent protocols remain underdeveloped (McGuire & Cremer, 2022; Ewuoso, 2025).

5.4 Critical Gaps in Current Models

Research suffers from weak measurement tools, cultural validity concerns, and limited longitudinal perspectives (Yang et al., 2025; Hossain et al., 2025). Frameworks remain largely unidimensional despite recognition of the need for integrated approaches (Cortellazzo et al., 2019). Leadership development often neglects the integration of technical, ethical, and adaptive competencies (Weber et al., 2022; Zeike et al., 2019). Implementation efforts emphasize efficiency over human factors such as psychological safety and career development (Zen et al., 2023). Ethical governance, though widely acknowledged, lacks operational guidance for transparency, bias auditing, and stakeholder engagement (McGuire & Cremer, 2022).

6. Critical Analysis

The literature on digital leadership remains fragmented and conceptually inconsistent. Definitions vary widely, with some scholars viewing digital leadership as primarily technical expertise, while others stress cultural adaptability, ethics, and inclusivity (Yang et al., 2025). This definitional ambiguity undermines theoretical coherence and raises issues of measurement validity, as most scales remain qualitative and difficult to standardize (Okunlola et al., 2024). Moreover, much of the research displays a techno-deterministic bias, assuming that organizations must adopt every technological advance without critically questioning its desirability or long-term consequences (Huang et al., 2023).

6.1 Fundamental Conceptual Problems

Digital leadership scholarship continues to suffer from conceptual fragmentation and limited theoretical coherence (Okunlola et al., 2024). Definitions range from emphasizing technical expertise to highlighting cultural sensitivity, ethics, and inclusivity (Yang et al., 2025). This inconsistency raises questions about whether digital leadership is merely an extension of established leadership theories or if it requires the development of entirely new theoretical models (Yang et al., 2025). Measurement validity is also problematic, as many existing scales are qualitative and lack standardized instruments, further weakening generalizability (Yang et al., 2025). In addition, much of the literature reflects a techno-deterministic bias, assuming organizations must adapt to every AI-driven innovation without critically assessing whether such adoption is necessary or beneficial. For example, adaptive leadership frameworks often assume that continuous adaptation is inherently valuable, overlooking potential risks and unintended consequences (Huang et al., 2023). Overall, these conceptual inconsistencies limit both the practical application and theoretical advancement of digital leadership.

6.2 Theoretical Contradictions and Unresolved Tensions

Three major tensions characterize the current discourse. First, the instrumental–humanistic divide persists: some approaches prioritize organizational performance and efficiency (Ruël et al., 2020; Nsiah & Gavurová, 2023), while others foreground employee well-being, cultural sensitivity, and ethical responsibility (Zárate-Torres, 2025). Multi-stakeholder governance models that balance these aims may offer a way forward (Georgieva et al., 2022). Second, the gap between empowerment rhetoric and technological control remains unresolved. Although AI is often presented as enabling autonomy, it can simultaneously reduce agency, increase surveillance, and threaten job security (Martínez-Peláez et al., 2023; Kamin et al., 2022). Leaders must therefore move beyond rhetoric by actively involving employees in evaluating empowerment implications before deploying new systems. Third, the pace of AI-driven change outstrips traditional leadership development cycles. While technologies evolve monthly, leadership training and organizational change processes unfold over years, leaving institutions unprepared for constant adaptation (Weber et al., 2022). Continuous learning models with real-time feedback (Sundowo et al., 2024) may better align leadership development with technological acceleration.

6.3 Integration Challenges and Practical Contradictions

Although scholars increasingly acknowledge the need for multidimensional approaches, most leadership models remain unidimensional (Cortellazzo et al., 2019). This prevents leaders from effectively integrating technical literacy, ethical reasoning, and social competencies into coherent strategies. Frameworks such as the "transformative leadership compass" (Schiuma et al., 2021), which connects capabilities, ethics, and stakeholder engagement, offer promising directions but remain underdeveloped. Overall, while the literature provides partial insights, it still lacks an empirically validated, integrated model of digital leadership capable of addressing the complex challenges posed by AI adoption. A reconceptualization is needed—one that treats technical, ethical, and adaptive capacities not as separate domains but as interdependent competencies central to sustainable digital transformation.

6.4 Implications for Theory and Practice

In summary, digital leadership theory has adequacy problems that extend beyond incremental adjustments (Mohan, 2024). Frameworks are needed for human–AI interaction, algorithmic decision-making, and technological autonomy for AI adoption. Research has supported evolutionary approaches, such as extensions of traditional theories to account for their limitations in digital contexts.

7. Implications for Practice

7.1 Reconceptualizing Leadership Development

Instead of merely incorporating AI elements into existing leadership development programs, organizations must rethink leadership development in its entirety (Weber et al., 2022). The evidence demonstrates that leaders need integrated competencies that combine technical literacy, ethical reasoning, and adaptive capacity in ways that current fragmented approaches cannot deliver (Schmidt et al., 2023). Leadership development needs to go beyond awareness of AI to deep technical literacy, which helps leaders understand algorithmic decision-making, identify bias, and evaluate AI system performance (Sposato, 2024). Scenario-based simulations should be integrated into development programs to expose leaders to the ethical and relational dilemmas presented by AI integration.

7.2 Organizational Structure and Governance Implications

Governance frameworks are essential to ensure AI implementation aligns with organizational values and societal expectations, though practical challenges are often underestimated (Georgieva et al., 2022). To address these challenges and the theoretical gaps identified in this review, a multi-dimensional digital leadership framework is needed to guide organizational transformation in the AI era (Yang et al., 2025). *Figure 3* presents this framework, comprising three interlocking, mutually reinforcing domains: technical literacy, ethical reasoning, and adaptive capacity. Feedback loops illustrate how progress in one domain (e.g., technical literacy) enhances others (e.g., ethical reasoning), reflecting the dynamic, evolving nature of AI integration. Unlike static models, this framework positions leadership as an adaptive, iterative process that evolves with technological change. By operationalizing leadership as simultaneously technical, ethical, and adaptive, Figure 3 directly supports **Objective 3** and addresses both conceptual and implementation gaps highlighted in the literature.

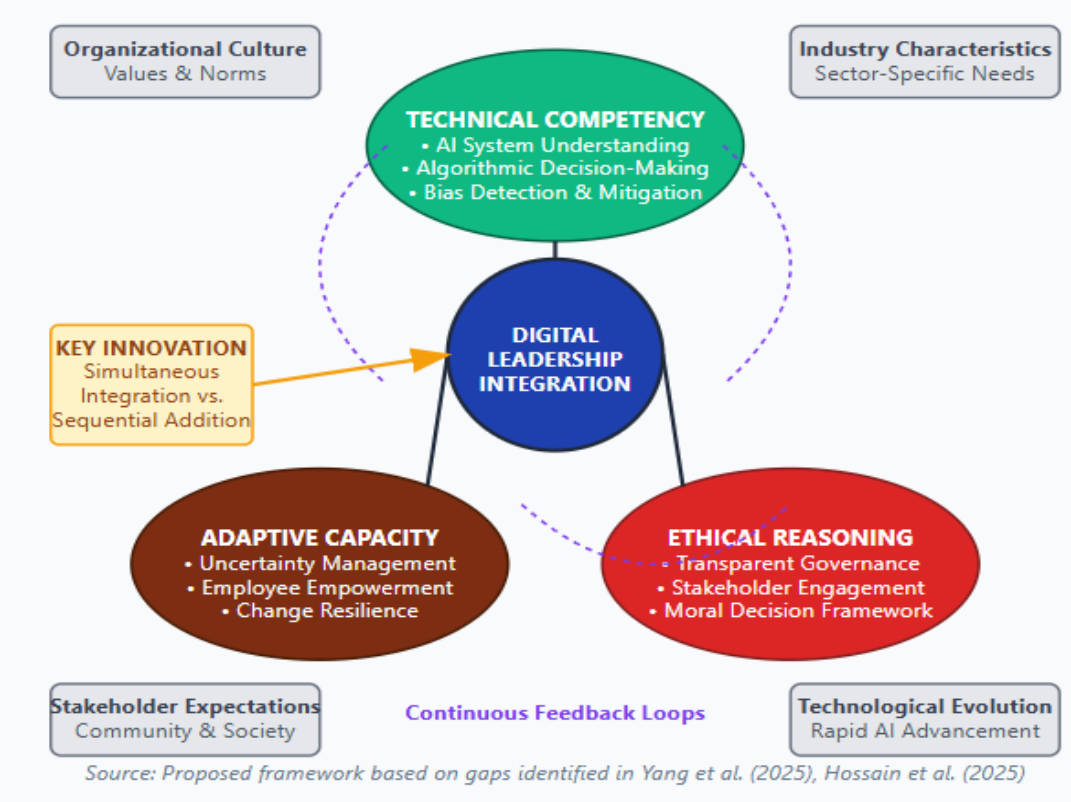


Figure 3: Multi-dimensional Digital Leadership Framework for AI Era

This model explicitly interconnects technical literacy, ethical reasoning, and adaptive capacity instead of treating them as separate domains and addresses the implementation gaps with feedback mechanisms and contextual adaptation, providing operational guidance that existing theoretical models lack (Weber et al., 2022; Zeike et al., 2019). The model differs from overly technical-efficiency approaches by focusing on psychological safety, employee identity considerations, and stakeholder engagement as key elements (Matsunaga, 2022; Tarsuslu et al., 2024). The framework also overcomes measurement limitations through concrete, observable competency indicators that address methodological weaknesses and offer practical tools for leadership development in AI-augmented environments (Shahzad, 2024; Hossain et al., 2025). These multi-directional feedback loops recognize the dynamic nature of AI-driven transformation, transitioning from static models to more adaptive frameworks that evolve as technology and organizational learning progress (Cortellazzo et al., 2019; Sundowo et al., 2024).

8. Conclusions and Recommendations

This review suggests that although transformational and adaptive leadership offer useful conceptual starting points, they fall short when applied to the complexity of AI-driven change, existing frameworks are often fragmented, especially in terms of integrating technical, social, and ethical dimensions, and emerging practices, such as ethical AI governance, inclusive decision-making, and cross-disciplinary collaboration, hold some promise but are underdeveloped and need to be the subject of longitudinal and cross-sectoral studies, going beyond a corporate focus to address more holistic organizational and societal needs.

8.1 Recommendations

- **Redesign Leadership Development Programs:** Leadership development needs to transition from merely being aware of AI to having deep digital literacy to comprehend algorithmic decision-making, recognize bias, and navigate human–AI interaction (Sposato, 2024; Weber et al., 2022).
- **Operationalize Ethical AI Governance:** Organizations should include operational mechanisms for bias audits, transparency tools to make AI decision-making accessible and accountable, and stakeholder engagement mechanisms such as advisory panels, employee feedback loops, and cross-disciplinary ethics boards (Ewuoso, 2025; Kumar and Suthar, 2024).

- **Embed Multi-Dimensional Competencies in Leadership Frameworks:** Leadership models must incorporate technical literacy, ethical reasoning, and adaptive capacity into a cohesive, multi-dimensional framework to support leaders as they navigate AI-driven change (Yang et al., 2025; Hossain et al., 2025).

As digital leadership moves toward more integrated, ethically informed methodologies, it can evolve from a fragmented body of theory to a pragmatic set of practices that enables organizations to navigate AI-driven change.

8.1.1 Limitation

A primary limitation of this review is that the proposed multi-dimensional leadership framework is conceptual and has not yet been empirically validated; while it advances theory by adding technical, ethical, and adaptive dimensions, its effectiveness in practice across organizational contexts is yet to be tested.

8.2 Future Research Directions

To address this limitation and strengthen the field, future studies should:

- Create survey instruments and measurement tools to operationalize competencies in digital literacy, ethical reasoning, and adaptive capacity (Shahzad, 2024).
- Conduct industry-specific case studies to validate the framework in various sectors like healthcare, education, and finance (Zulu & Khosrowshahi, 2021).
- Conduct longitudinal studies to explore how digital leadership evolves over time and affects organizational resilience (Yang et al., 2025; Hossain et al., 2025).

Ethics Declaration: This study did not require ethical clearance as it did not involve human participants, personal data collection, or sensitive information.

AI Declaration: AI tools were used solely for language refinement and grammatical improvements. No AIgenerated content was included in the research, analysis, or original writing of this paper.

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