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Systematic Review

Artificial Intelligence and Leadership in Organizations: A PRISMA Systematic Review of Challenges, Risks, and Governance Dynamics

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Abstract

As artificial intelligence (AI) becomes increasingly embedded in organizational processes, questions about its implications for leadership have gained growing relevance. However, the existing literature remains fragmented, often addressing strategy, leadership capabilities, governance structures, or ethical concerns in isolation, without explaining how these dimensions interact to shape leadership effectiveness in AI-driven environments. This study conducts a PRISMA-guided systematic review of 33 peer-reviewed articles to examine how AI-embedded leadership is conceptualized across contexts. By synthesizing findings across strategic, human, and governance domains, the analysis identifies recurring patterns and structural relationships in the literature. The results indicate that effective leadership in AI-intensive settings is not determined solely by technological adoption or digital competencies, but by the alignment between the depth of AI integration in decision-making processes, leaders' capacity to interpret and oversee algorithmic outputs, and the presence of governance mechanisms that ensure transparency, accountability, and trust. While some studies highlight potential opportunities associated with AI, these remain less systematically developed compared to the extensive focus on challenges and emerging risks. On this basis, the study introduces the AI-Leadership Configurational Framework (ALCF), a multi-level model that conceptualizes leadership effectiveness as the outcome of systemic alignment. The framework integrates previously disconnected debates and provides a coherent foundation for future empirical research on leadership in the algorithmic age.

Keywords: artificial intelligence; leadership; organizational governance; decision making; sociotechnical systems

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1. Introduction

Artificial intelligence (AI) has transitioned from a peripheral technological support tool to a structurally embedded force that reconfigures how organizations decide, coordinate, and govern. Early scholarship anticipated that AI would influence managerial judgment and leadership roles [1,2]. However, contemporary research demonstrates a far deeper transformation: AI is increasingly integrated into core decision architectures, resource allocation systems, and competitive positioning logics [3–5]. Rather than functioning as a neutral analytical instrument, AI actively shapes how information is produced, interpreted, and legitimized, thereby redistributing authority, expertise, and accountability within organizations [6]. From a sustainability perspective, this transformation raises critical questions regarding the long-term viability of organizational decision systems, the preservation of human-centered value creation, and the capacity of institutions to maintain legitimacy under conditions of algorithmic mediation. AI is therefore not only a driver of efficiency and innovation, but also a factor that reshapes the conditions for sustainable organizational functioning.

This structural embedding unfolds across diverse sectors. In healthcare and professional services, AI influences diagnostic reasoning, risk assessment, and executive oversight [7,8]. In education, it challenges instructional leadership, governance design, and pedagogical autonomy [9,10]. In strategic management and digital transformation domains, AI reshapes decision-making architectures, capability development trajectories, and competitive dynamics [11–13]. Across contexts, a shared conclusion emerges: AI does not simply support leadership; it alters the structural conditions under which leadership is enacted.

To avoid conceptual ambiguity and ensure analytical clarity, this study explicitly defines its core constructs. Leadership effectiveness is understood as the capacity to achieve sustained organizational outcomes through aligned decision-making, adaptive coordination, and legitimacy preservation within complex environments. Emerging risks refer to novel or amplified sources of uncertainty and vulnerability derived from AI integration, including algorithmic opacity, bias propagation, and accountability diffusion. Opportunities denote the potential for AI to enhance decision quality, innovation, and strategic responsiveness, although these remain unevenly developed in the current literature. Challenges are conceptualized as the operational, cognitive, and organizational difficulties associated with integrating AI into leadership practice, particularly under conditions of technological uncertainty. Governance refers to the set of formal and informal mechanisms that ensure transparency, accountability, ethical compliance, and trust in AI-mediated decision processes. Finally, AI-embedded leadership is defined as a form of leadership enacted within hybrid human–AI systems, where authority, judgment, and sensemaking are partially distributed across sociotechnical configurations. This conceptual clarification is particularly relevant for sustainability-oriented research, as it establishes the basis for analyzing how AI-embedded leadership can simultaneously support performance outcomes, governance integrity, and human well-being within complex organizational systems.

Parallel to this structural transformation, a growing body of research has examined the leadership capabilities required in AI-intensive environments. Scholars emphasize data literacy, algorithmic interpretability, reflexive judgment, and ethical governance competence as central requirements [14–17]. From a dynamic managerial capabilities perspective, leadership is increasingly framed as the ability to sense technological opportunities, seize digital innovation potential, and reconfigure organizational resources under conditions of technological turbulence [18].

Despite these advances, existing research remains theoretically fragmented. Strategic AI integration is frequently analyzed independently from leadership capability development. Ethical and governance risks—such as opacity, accountability diffusion, and bias amplification—are examined in isolation from structural transformation processes [19–22]. Simultaneously, performance-oriented studies highlight analytical precision and innovation gains associated with AI [23–25], often without integrating governance contingencies.

A central tension therefore characterizes the field: AI is portrayed both as an enhancer of decision quality and as a source of systemic vulnerability. Moreover, emerging research conceptualizes leadership as operating within hybrid human–AI ecosystems where epistemic authority is partially distributed across sociotechnical constellations [26,27]. This shift unsettles traditional leadership constructs grounded in centralized authority and interpersonal influence, suggesting instead that leaders orchestrate networks of human and machine intelligence [6]. Yet these contributions remain dispersed across disciplinary silos and rarely converge into a unified explanatory structure capable of capturing cross-level interdependencies.

What remains insufficiently theorized is how strategic AI embedding, leadership capability reconfiguration, hybrid human–AI collaboration, and governance–legitimacy safeguards interact to shape leadership effectiveness. The literature lacks a multi-level conceptual architecture that integrates structural transformation, human interpretive capacity, and institutional regulation within a single configurational logic. In the absence of such integration, AI-embedded leadership is alternately framed as a competence-upgrading challenge, a digital transformation initiative, or an ethical compliance problem—without explaining how these dimensions condition one another.

This theoretical gap carries significant implications. For general management theory, AI challenges assumptions about resource orchestration, competitive advantage, and strategic control. For leadership research, it destabilizes established constructs of authority, legitimacy, and influence. For digital transformation scholarship, it underscores the need to conceptualize leadership as a higher-order orchestration capability embedded within evolving sociotechnical infrastructures. From a sustainability standpoint, this gap also limits the ability to understand how AI-driven transformations can be aligned with long-term organizational resilience, stakeholder trust, and the protection of human well-being in increasingly algorithmic environments.

To address this fragmentation, the present study conducts a systematic PRISMA-guided review of 33 peer-reviewed studies at the intersection of artificial intelligence and leadership. Moving beyond descriptive aggregation, the analysis develops a theory-driven cross-thematic synthesis designed to identify structural patterns, interdependencies, and boundary conditions across sectors.

Specifically, the study pursues four interconnected objectives:

1. To clarify the strategic domains in which AI restructures leadership practice and decision architectures.
2. To identify the dynamic capabilities required to govern AI-embedded organizational systems.
3. To explicate the ethical and governance tensions inherent in hybrid human–AI collaboration.
4. To theorize the configurational boundary conditions under which AI enhances or destabilizes leadership effectiveness.

Conceptually anchored in the dynamic capabilities perspective [4,17,18], the study advances an integrative explanatory architecture: the AI-Leadership Configurational Framework (ALCF). Rather than treating AI as purely augmentative or substitutive, the ALCF conceptualizes leadership effectiveness as an emergent property of vertical alignment between strategic orchestration, capability reconfiguration, and governance–legitimacy safeguards within hybrid human–AI systems. By articulating this multi-level and system-moderated logic, the article seeks to transform a fragmented body of research into a theoretically coherent and empirically testable foundation for leadership scholarship in the algorithmic age. In doing so, the framework also provides a basis for examining how AI-embedded leadership can contribute to organizational sustainability by aligning technological integration with governance robustness, adaptive capability development, and the preservation of human and institutional stability over time.

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2. Materials and Methods

2.1. Research Design

This study employs a systematic literature review structured according to the PRISMA 2020 framework (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), which provides internationally recognized guidance for conducting and reporting evidence syntheses in a transparent and methodologically rigorous manner [28,29]. PRISMA 2020 strengthens earlier reporting standards by clarifying the procedures for study identification, screening, eligibility assessment, and final inclusion, thereby facilitating replicability and improving the overall transparency of the review process [30].

The adoption of PRISMA 2020 responds to the need for a structured and traceable review strategy in a field characterized by conceptual dispersion. Research addressing the intersection between artificial intelligence (AI) and leadership is distributed across several disciplinary domains—including management, education, healthcare, information systems, and strategic management—each employing distinct conceptual frameworks and terminologies. In contexts where knowledge develops across fragmented academic traditions, systematic review procedures are essential to reduce interpretive selectivity and ensure that the synthesis of evidence follows explicit and replicable criteria. PRISMA contributes to this objective by promoting clear documentation of inclusion and exclusion decisions, thereby limiting implicit selection bias and reinforcing methodological transparency [31,32].

Recent methodological discussions emphasize that PRISMA 2020 should not be understood merely as a reporting checklist but as a framework that encourages researchers to justify key procedural decisions and provide a transparent account of how the evidence base was assembled and evaluated [33,34]. Following these recommendations, the present review was designed with predefined eligibility criteria, a structured screening procedure, and a documented record of each stage of study selection. This approach allows readers to clearly understand how the final body of literature was constructed and strengthens the methodological credibility of the review.

Because the literature on AI and leadership includes empirical studies, conceptual analyses, and prior reviews employing diverse methodological approaches, the synthesis follows a qualitative systematic review strategy. Rather than aggregating results statistically, the review focuses on organizing and interpreting the existing body of evidence in a coherent analytical structure, while maintaining the procedural rigor required in systematic evidence synthesis. The purpose is therefore to consolidate and critically examine the scholarly debate surrounding AI and organizational leadership, identifying dominant themes, emerging perspectives, and conceptual gaps within the field.

By grounding the research design in the principles of PRISMA 2020 and clearly documenting the procedures used to identify, screen, and synthesize the literature, this study aims to provide a transparent, replicable, and analytically robust review capable of supporting future research and contributing to the consolidation of knowledge on artificial intelligence and leadership in organizational contexts. The review protocol was retrospectively registered in the Open Science Framework (OSF) to enhance transparency and methodological traceability (OSF registration: https://osf.io/re8n4).

2.2. Search Strategy

The literature search was designed to capture the expanding body of scholarship examining the relationship between artificial intelligence (AI) and organizational leadership while maintaining conceptual clarity and methodological transparency. The search process was conducted between January and February 2026 across three major multidisciplinary academic databases: Web of Science Core Collection, Scopus, and ABI/INFORM

(ProQuest). These databases were selected because of their extensive coverage of peer-reviewed journals in management, leadership studies, strategy, education, and information systems, which together represent the principal disciplinary arenas in which AI–leadership research is currently developing.

The search procedure followed a structured and iterative development process aimed at balancing comprehensiveness and thematic precision. Initial exploratory searches were carried out in order to identify the most frequently used descriptors within the emerging literature. This preliminary stage allowed the identification of dominant conceptual expressions used by scholars when referring to AI-enabled decision processes and leadership dynamics in organizational settings. Based on this calibration phase, the search string was progressively refined to ensure that the final query captured both technological and leadership-related dimensions of the phenomenon.

The final Boolean search expression was defined as follows: ("artificial intelligence" OR "AI" OR "algorithmic decision-making" OR "generative AI").

AND ("leadership" OR "digital leadership" OR "strategic leadership" OR "executive decision-making"). Search fields were limited to title, abstract, and keywords in order to ensure that retrieved articles addressed the AI–leadership relationship as a central analytical focus rather than as a peripheral or incidental reference. This restriction helped increase conceptual relevance while maintaining a sufficiently broad retrieval scope.

No initial temporal restriction was applied. This decision was made to capture both early conceptual discussions and the most recent empirical developments in the field, thereby enabling a longitudinal understanding of how the scholarly conversation on AI and leadership has evolved over time. Only peer-reviewed journal articles published in English were considered eligible at this stage of the search process.

Following database retrieval, all records were exported to a reference management system for organization and preliminary cleaning. Duplicate entries identified across the three databases were systematically removed prior to the screening phase. The resulting dataset constituted the initial pool of studies for the subsequent title and abstract screening procedures conducted according to the predefined eligibility criteria described in Section 2.3.

To enhance transparency and replicability, the complete database queries and search configurations used in each platform are provided in Appendix B. This Supplementary Material documents the exact search syntax applied in Web of Science, Scopus, and ABI/INFORM, allowing future researchers to replicate or extend the search strategy.

Overall, this structured search configuration was designed to minimize omission bias while preserving analytical focus on studies in which artificial intelligence and leadership are substantively interconnected. By combining iterative keyword calibration, database triangulation, and transparent documentation of search procedures, the strategy aimed to provide a reliable and reproducible foundation for the systematic review.

2.3. Eligibility Criteria

Eligibility criteria were defined a priori to ensure transparency and to prevent retrospective adjustments during the screening process, in accordance with the reporting principles recommended by the PRISMA 2020 statement [28,29]. The criteria were designed to delimit the review to studies that explicitly examined the intersection between artificial intelligence (AI) and leadership within organizational contexts.

Studies were considered eligible when artificial intelligence constituted a substantive analytical component rather than a peripheral contextual reference. This included investigations addressing AI systems, algorithmic decision-making, or generative AI within managerial, institutional, or organizational environments. Publications that mentioned AI only as a general technological trend without analyzing its implications for organizational processes were excluded.

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Leadership was required to function as a central theoretical or empirical construct. This condition was satisfied when leadership formed part of the study's primary research objective, conceptual framework, or analytical focus. Eligible contributions therefore included research examining leadership roles, competencies, authority structures, strategic decision-making, or leader–follower dynamics in relation to AI adoption. Studies in which leadership appeared only in passing—for example within brief managerial implications—were excluded to preserve conceptual coherence.

To maintain organizational relevance, studies had to be situated within formal institutional settings, including private firms, public organizations, healthcare systems, educational institutions, or entrepreneurial ventures. Purely technical or engineering-oriented research lacking an organizational or managerial perspective was excluded.

Only peer-reviewed journal articles published in English were considered eligible. Editorials, practitioner commentaries, conference abstracts, and opinion pieces were excluded due to insufficient methodological transparency. Full-text availability was also required to allow reliable eligibility assessment and data extraction.

Importantly, no scientometric or author-level visibility criteria (e.g., journal ranking, impact factor thresholds, or authors' H-index) were applied as inclusion or exclusion conditions. This decision was made to preserve the methodological integrity and reproducibility of the review, ensuring that study selection was guided exclusively by thematic relevance and conceptual contribution rather than by proxy indicators of academic visibility. Consistent with PRISMA principles [28,29], the objective was to avoid introducing selection bias linked to publication prestige and to capture a comprehensive and conceptually coherent body of literature at the intersection of AI and leadership.

These criteria ensured that the final corpus captured studies in which artificial intelligence and leadership were analytically intertwined, thereby strengthening the conceptual focus and methodological defensibility of the review.

2.4. Screening and Selection Procedure

The study selection process followed the sequential stages recommended by the PRISMA 2020 framework: identification, screening, eligibility, and inclusion [28,29]. This structured procedure was designed to ensure transparency in the reduction in the initial search results and to document each decision leading to the final corpus of studies included in the review. The database search produced 521 records across the three selected databases. All references were exported to Zotero, where automatic and manual duplicate detection procedures were applied. After removing 32 duplicate records, 489 unique studies remained and proceeded to the screening phase.

During the first screening stage, titles and abstracts were independently examined by two reviewers (C.S.-T. and J.-A.C.-M.) in order to assess their relevance to the intersection of artificial intelligence and organizational leadership. Screening decisions were guided by the predefined eligibility criteria described in Section 2.3. When uncertainties arose regarding thematic relevance, records were provisionally retained for further evaluation to avoid premature exclusion. Disagreements between reviewers were resolved through discussion and re-examination of the eligibility criteria until consensus was reached. This stage resulted in the exclusion of 426 records that either addressed artificial intelligence exclusively from a technical or engineering perspective or did not treat leadership as a substantive analytical construct.

Following title and abstract screening, 63 articles were retained for full-text retrieval. Despite institutional database access and additional cross-referencing efforts, 17 reports could not be obtained in full-text format and were therefore excluded at this stage. Consequently, 46 full-text articles were assessed for eligibility.

The eligibility assessment was conducted independently by the same two reviewers through full-text examination of each study. In cases of persistent interpretative disagreement, a third reviewer (E.T.-P.) was consulted to facilitate resolution and ensure consistency in the application of the inclusion criteria. During this stage, 13 studies were excluded because artificial intelligence was not substantively integrated into the organizational analysis, leadership was addressed only peripherally, or the article did not provide a clear theoretical, empirical, or review-based contribution aligned with the objectives of this review. A summary of the primary reasons for full-text exclusion ($n = 13$) is provided in Appendix D to enhance methodological transparency. Given the focus on thematic alignment and configurational relevance, exclusion decisions were based on the dominant reason identified for each study.

Given the relatively limited number of exclusions at the full-text stage and the concentration of exclusion reasons within a small set of clearly defined categories, a detailed item-by-item exclusion table was not considered necessary. Instead, reporting aggregated exclusion criteria ensures transparency and replicability while preserving the readability and structural coherence of the manuscript.

Ultimately, 33 studies met all eligibility criteria and constitute the final corpus included in the qualitative synthesis. The complete trajectory of the selection process is illustrated in Figure 1, which presents the PRISMA 2020 flow diagram adapted for this review.

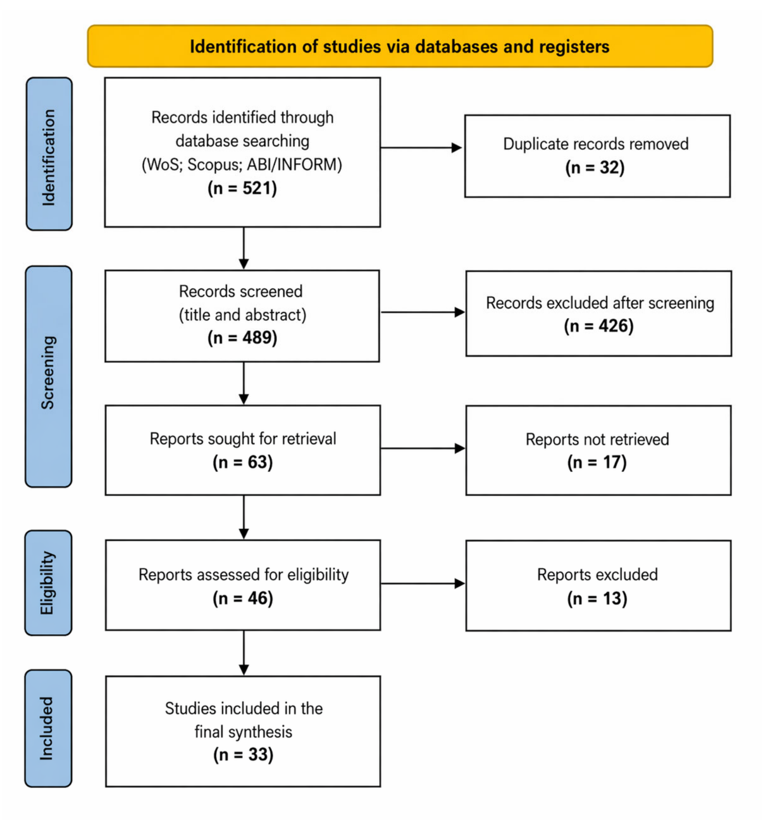

Figure 1. Flow diagram.

2.5. Data Extraction

Once the final corpus of 33 studies had been established, a structured data extraction procedure was implemented to ensure analytical consistency and transparency across heterogeneous research designs. To standardize the information collected from each article, a predefined coding matrix was developed prior to the detailed analysis stage. Establishing this extraction structure in advance reduced the risk of selective interpretation and facilitated systematic comparison between studies.

The extraction matrix captured several core elements from each article: bibliographic information (authors, year of publication, and journal), research design, methodological approach, organizational or sectoral context, conceptualization of artificial intelligence, operationalization or theoretical framing of leadership, principal findings, and reported implications for leadership theory or managerial practice.

Each article was examined in full text and coded iteratively rather than relying solely on abstract-level information. This approach allowed a more precise identification of how leadership constructs were positioned within the analytical architecture of each study. In empirical contributions, particular attention was given to whether leadership functioned as an independent, dependent, mediating, or moderating variable. In conceptual and review-based studies, the coding process focused on how authors theorized transformations in leadership roles, competencies, authority configurations, and decision-making processes within AI-integrated organizational environments.

To enhance procedural transparency and analytical reliability, the extracted information was reviewed multiple times to verify alignment with the predefined eligibility criteria and to ensure internal consistency in thematic classification. A descriptive overview of the included studies and their principal characteristics is provided in Appendix A, allowing traceability between the primary studies and the interpretive synthesis developed in the Section 3 (Results) and Section 4 (Discussion).

In addition to descriptive extraction, a structured quality appraisal of the included studies was conducted. Given the methodological diversity of the corpus, different evaluation criteria were applied depending on the type of research design. Empirical studies were assessed using the Mixed Methods Appraisal Tool (MMAT 2018), which enables the systematic evaluation of qualitative, quantitative, and mixed-methods research designs [35]. Conceptual or review-based articles were evaluated using a structured appraisal rubric focusing on the clarity of research objectives, theoretical coherence, transparency of argumentation, and adequacy of supporting evidence.

Quality assessments were conducted independently by two reviewers, and disagreements were resolved through discussion and consensus in order to maintain consistency in the appraisal process. Importantly, the purpose of the quality assessment was not to exclude studies, but rather to support a more informed interpretation of the evidence and to identify potential sources of methodological limitation within the literature.

Given that the quality appraisal was used as an interpretive support mechanism rather than as an exclusion threshold, and considering the moderate size of the final corpus, a concise summary of the quality assessment has now been included in Appendix C. This matrix provides an overview of the appraisal criteria applied across empirical, conceptual, and review-based studies, along with an overall qualitative assessment of their robustness. Rather than relying on rigid numerical scoring, this approach ensures transparency while preserving the readability and structural balance of the manuscript. The inclusion of Appendix C enhances methodological traceability and allows readers to better assess the evidentiary foundation underpinning the interpretive synthesis.

2.6. Data Analysis and Thematic Synthesis

The analytical phase aimed to move beyond descriptive aggregation toward an interpretive synthesis of the evidence. Given the conceptual heterogeneity of the AI–leadership literature, the review employed a qualitative thematic synthesis approach, consistent with systematic review methodologies used in management and organizational research.

The 33 included studies were analyzed through an iterative coding process. In the first analytical stage, each article was read in full to extract key arguments, theoretical positioning, methodological orientation, and principal findings. Open coding was then applied to textual segments referring to the organizational implications of artificial intelligence for leadership practices, decision-making processes, leader–follower relations, and governance structures.

In the second analytical cycle, codes were compared across studies using a constant comparative approach in order to identify conceptual convergence and thematic overlap. Through this iterative process, individual codes were progressively clustered into broader analytical categories.

The synthesis ultimately converged into three interrelated domains: opportunities, challenges, and emerging risks associated with the integration of artificial intelligence into leadership practices. These categories were not predefined but emerged inductively through repeated engagement with the corpus. Opportunities refer to contributions emphasizing decision-support improvements, efficiency gains, and the augmentation of leadership capabilities. Challenges capture organizational, structural, and competence-related constraints affecting AI integration. Emerging risks include ethical dilemmas, algorithmic opacity, accountability diffusion, and potential erosion of relational trust in AI-mediated decision environments.

Rather than privileging frequency counts, the synthesis prioritized conceptual relevance and theoretical contribution, particularly in studies proposing integrative frameworks or novel constructs. Through this interpretive process, the review identifies both converging insights and areas of conceptual fragmentation, thereby clarifying how artificial intelligence is progressively reshaping leadership research and organizational governance debates.

3. Results

3.1. Study Selection

The study selection process followed the PRISMA 2020 guidelines and is summarized in Table 1.

Table 1. PRISMA study selection process.

Stage of the Review Process	Number of Records
Records identified through database searching	521
Duplicate records removed	32
Records screened (title and abstract)	489
Records excluded after screening	426
Reports sought for retrieval	63
Reports not retrieved	17
Reports assessed for eligibility	46
Reports excluded	13
Studies included in the final synthesis	33

The initial database search yielded 521 records. After removing 32 duplicates, 489 records were screened based on title and abstract. A total of 426 records were excluded at this stage for not meeting the predefined eligibility criteria. Subsequently, 63 reports were sought for retrieval, of which 17 could not be retrieved. The remaining 46 reports were assessed for eligibility at the full-text stage, resulting in the exclusion of 13 reports due to insufficient alignment with the review objectives. The reasons for full-text exclusions are summarized in Appendix D. Ultimately; 33 studies met all inclusion criteria and were included in the qualitative synthesis; a detailed overview of their characteristics is provided in Appendix A.

3.2. Characteristics of Included Studies

The main characteristics of the studies included in the final corpus (n = 33) are presented in Table 2.

The included literature spans multiple organizational contexts, including corporate, educational, and healthcare settings, and encompasses a variety of study designs, such as conceptual analyses, empirical quantitative and qualitative studies, and prior reviews. This diversity reflects the interdisciplinary nature of research at the intersection of artificial intelligence and leadership and provides the empirical and theoretical foundation for the subsequent thematic synthesis. A more detailed descriptive overview of the included studies is provided in Appendix A.

Table 2. Characteristics of the studies included in the review (n = 33).

Authors (Year)	Sector/Context	Study Design	AI Focus	Leadership Focus
[2]	Cross-sector	Conceptual	AI as decision-support technology	Redefinition of leadership roles
[36]	Cross-sector	Conceptual	Algorithmic decision-making	Cognitive impact on leadership
[37]	Corporate	Quantitative empirical	AI in talent assessment and HR systems	Leadership competency development
[14]	Corporate	Structured review	AI-driven competency transformation	Future leadership skills
[4]	Strategic management	Conceptual	AI in strategic decision architectures	Strategic leadership reconfiguration
[38]	Higher education	Conceptual	Generative AI and ethical governance	Ethical leadership
[39]	Organizational	Empirical	AI-mediated communication systems	Performance-oriented leadership
[25]	Corporate	Quantitative empirical	AI and employee performance analytics	Change leadership as moderating factor
[23]	Corporate	Quantitative empirical	AI-enabled innovation systems	Transformational leadership
[40]	Education	Conceptual	Data-driven AI decision systems	Limits of leader interpretive autonomy
[6]	Cross-sector	Conceptual	AI reshaping leadership ontology	Distributed and digital leadership
[7]	Healthcare	Survey-based empirical	AI-supported diagnostic systems	Executive leadership readiness
[41]	Corporate	Quantitative empirical	AI-enabled organizational systems	Leadership as mediating mechanism
[27]	Organizational	Empirical	Human–AI collaboration	Leadership facilitation of hybrid systems
[18]	Corporate	Conceptual	AI-driven dynamic managerial capabilities	Digital leadership capabilities
[42]	Education	Empirical	AI integration in school management	Leadership implementation practices
[43]	Education	Scoping review	AI challenges and opportunities	Educational leadership governance
[44]	Corporate	Conceptual	AI and organizational resilience	Digital and adaptive leadership
[45]	Education	Qualitative empirical	AI-influenced decision-making	Interpretive leadership roles
[46]	Education	Survey-based empirical	AI adoption in schools	Institutional leadership perceptions
[26]	Education	Conceptual	Human–machine symbiosis	Hybrid and co-leadership models
[47]	Strategic contexts	Conceptual	Reflexive AI-supported decision systems	Reflexive leadership
[48]	Corporate	Systematic review	AI-augmented top management	Strategic leadership enhancement
[16]	Cross-sector	Scoping review	AI-driven skill requirements	Leadership competence mapping
[49]	Entrepreneurship/ Corporate	Quantitative empirical	AI-driven organizational transformation	Leadership evolution and technopreneurial leadership
[12]	Corporate	Quantitative empirical	Predictive analytics for strategy	Digital leadership mediation
[50]	Education	Quantitative empirical	Generative AI adoption	Middle leadership integration
[13]	Corporate	Conceptual	AI as organizational transformation driver	Leadership as adaptive practice reconfiguration
[15]	Corporate	Conceptual	AI as capability-enhancement enabler	Leadership as competence-based capability system
[9]	Education	Conceptual	AI as systemic disruption in educational governance	Leadership as ethical and change-oriented orchestration
[10]	Education	Empirical	AI as organizational innovation adoption tool	Leadership as technology implementation agent
[51]	Experimental	Empirical	AI as emergent leadership actor	Leadership as perception-based construct
[52]	Management education	Conceptual	AI as transformative organizational force	Leadership as developmental and evolutionary capability

3.3. AI as Strategic Reconfiguration of Leadership

A recurrent pattern identified across the reviewed studies conceptualizes artificial intelligence not as an auxiliary technological instrument but as a structural force that redefines the strategic foundations of leadership practice. Rather than being confined to operational automation, AI progressively permeates decision-making architectures, reshapes authority configurations, and reorganizes the informational infrastructures through which strategic judgment is exercised [3–5,48,49]. Across the studies included in the review (see Appendix A), this pattern consistently appears across sectors and methodological approaches, reinforcing the view that AI becomes embedded in the governing logic of organizations, influencing how strategic priorities are constructed, validated, and implemented.

Across management contexts, AI integration systematically alters the epistemic conditions under which executive decisions are formed. In healthcare environments, AI-supported diagnostic and risk assessment systems structure interpretive inputs prior to executive deliberation, thereby reframing oversight responsibilities [7,8]. Comparable dynamics are observed in broader organizational domains, where predictive analytics and data-driven forecasting recalibrate planning cycles and strategic routines [12,13]. Divya et al. [41] further illustrate that leadership functions as a mediating mechanism translating AI deployment into employee engagement outcomes, reinforcing the proposition that strategic AI integration is inseparable from leadership structuring processes. These convergent findings across heterogeneous contexts strengthen the robustness of the identified pattern.

In educational governance, AI adoption influences resource allocation logics and strategic prioritization mechanisms [9,10,43]. Wang [40] highlights the potential constraint of interpretive autonomy when algorithmic outputs dominate deliberative processes. Similarly, Bollaert [53] and Karakose and Tülübas [54] argue that AI integration requires a redefinition of leadership roles rather than mere digital implementation. These sectoral insights converge toward a broader structural conclusion: AI modifies the architecture of leadership authority by embedding algorithmic reasoning within strategic governance processes. This convergence across domains provides cumulative support for a cross-sectoral reconfiguration of leadership structures.

Three interrelated mechanisms consistently emerge across the corpus. First, AI facilitates analytical augmentation by extending predictive capacity and enhancing strategic precision in complex environments [24,25]. Second, it contributes to the redistribution of epistemic authority, as decision legitimacy becomes partially anchored in algorithmic outputs rather than exclusively in managerial expertise [6,36]. Third, AI intensifies the need for digital resource orchestration, requiring leaders to coordinate human capabilities and technological systems within increasingly data-intensive ecosystems [18,44,52]. These mechanisms were recurrently identified across the reviewed studies (see Appendix A), indicating a stable configurational pattern rather than isolated empirical observations. Extending this perspective, Goralski and Tan [55] link AI-enabled orchestration to long-term sustainability objectives, situating strategic AI deployment within broader value-creation trajectories.

However, this strategic reconfiguration is inherently tension-laden. While AI enhances analytical sophistication and scalability [23], excessive dependence on algorithmic systems may erode reflexivity and blur accountability boundaries [21,22]. Empirical analyses indicate that insufficient governance safeguards can generate performance distortions and legitimacy risks [19,20], and implementation processes frequently expose structural vulnerabilities, particularly in highly regulated contexts [56]. Notably, these tensions are not isolated findings but recur across multiple studies, highlighting their systemic rather than incidental nature.

A structural paradox therefore becomes evident: AI simultaneously strengthens strategic capability and introduces governance fragilities. Leaders are not merely expected to leverage algorithmic intelligence but to critically interpret, contextualize, and, when necessary, override algorithmic outputs. Petrat [51] underscores that leader attitudes toward AI significantly shape the depth and trajectory of integration, suggesting that strategic transformation remains contingent upon human agency rather than technological determinism. This reinforces the interpretation that leadership remains a central conditioning factor despite increasing technological embeddedness.

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Despite widespread recognition of AI as a driver of performance enhancement and digital transformation, much of the literature stops short of theorizing the higher-order strategic function responsible for coordinating AI deployment, legitimacy management, and sustainable value creation. The cross-thematic synthesis thus reveals a conceptual lacuna: AI is acknowledged as transformative, yet its role as a configurator of leadership architecture remains insufficiently articulated. This gap becomes particularly visible when comparing the empirical richness of individual studies with the limited integrative theorization across the corpus.

Taken together, the reviewed evidence indicates that AI reconfigures leadership at the strategic level through intertwined processes of analytical augmentation, epistemic redistribution, and digital orchestration, while simultaneously generating accountability and legitimacy tensions that condition effectiveness. This interpretation is grounded in the cumulative evidence synthesized from the reviewed studies (see Appendix A), ensuring consistency between the empirical base and the theoretical abstraction. This strategic layer constitutes the structural foundation upon which subsequent capability reconfiguration and governance dynamics unfold.

3.4. AI and Leadership Capabilities in Digitally Embedded Organizations

A second structural axis emerging from the cross-analysis concerns the reconfiguration of leadership capabilities within AI-embedded organizational systems. While Section 3.3 established that AI reshapes the strategic architecture of leadership, the present dimension focuses on the capabilities that enable leaders to operate within, interpret, and govern these algorithmically mediated environments. Across the reviewed studies (see Appendix A), this dimension consistently emerges as a central explanatory layer linking technological integration to leadership effectiveness. Across the corpus, AI-related leadership is not conceptualized as mere technological proficiency but as a multidimensional capability configuration integrating digital literacy, interpretive judgment, ethical reflexivity, and systemic orchestration [14,16,17,57].

Several contributions propose updated leadership competency architectures aligned with AI integration. Bronkhorst and Becker [37] empirically demonstrate that AI itself reshapes leadership development and selection processes, altering how leadership potential is assessed and cultivated. Fernandes et al. [58] argue that global leadership competencies must be synergized with AI and expert systems to sustain long-term adaptability. Petrat [51] further emphasizes that leader attitudes toward AI significantly influence integration depth, underscoring the psychological foundations of capability formation. Taken together, these studies indicate a convergent shift from static competency models toward dynamically constructed capability systems. Collectively, these studies indicate that AI does not simply demand new skills; it transforms the developmental infrastructure through which leadership capacity is constructed.

Beyond competency mapping, an emerging dynamic capabilities perspective reframes AI-related leadership as an adaptive managerial capacity. Hossain et al. [18] conceptualize digital leadership in AI-driven contexts as a dynamic managerial capability enabling leaders to sense technological opportunities, seize innovation potential, and reconfigure organizational resources. Jaboob et al. [12] and Madanchian et al. [13] similarly highlight the necessity of continuously recalibrating strategic routines in response to predictive analytics and algorithmic feedback loops. Shatila [44] extends this adaptive logic by linking AI-enabled digital leadership to organizational resilience through agility and innovation. Across these contributions, a shared pattern can be identified in which adaptability is not treated as an isolated skill but as a system-level reconfiguration process. Across these studies, leadership capability is positioned not as static expertise but as a reconfiguration mechanism responsive to technological turbulence.

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Algorithmic literacy emerges as a foundational component within this capability architecture. Leaders are expected to understand, interrogate, and contextualize AI-generated outputs rather than accept them uncritically [14,16]. Peifer et al. [36] demonstrate that AI modifies leaders' cognitive workload and interpretive responsibilities, expanding analytical accountability. In educational contexts, Karakose and Tülübas [54], Hejres [59], and Islam et al. [60] show that leaders must integrate algorithmic insights while preserving institutional autonomy and normative judgment. This pattern is recurrent across the reviewed studies, highlighting interpretive competence as a key mechanism for maintaining human agency within AI-mediated environments. These findings converge in depicting interpretive competence as central to sustaining human agency within algorithmically structured environments.

A second recurrent capability cluster involves strategic digital orchestration. Leaders are required to align AI systems with human capital, organizational processes, and long-term objectives [18,52]. Divya et al. [41] illustrate that leadership mediates the relationship between AI adoption and employee engagement, indicating that orchestration extends beyond technological alignment to relational activation. Florea and Croitoru [39] further demonstrate that AI reshapes communication dynamics and performance configurations, reinforcing the necessity of integrative coordination across technological and interpersonal domains. Evidence across the corpus suggests that orchestration operates as a cross-level capability linking strategy, structure, and human interaction. Orchestration thus emerges as a systemic coordination function rather than a discrete technical competence.

Adaptive learning facilitation and reskilling leadership represent a third consistent dimension. Morandini et al. [61] and Sposato [62] underscore the centrality of continuous upskilling in AI-transforming organizations, positioning leaders as catalysts of organizational learning processes. Renta-Davids et al. [43] further indicate that leaders must balance innovation initiatives with institutional stability when navigating AI-induced uncertainty. Across the reviewed studies, this dimension reflects a shift from episodic training toward continuous, system-wide learning architectures. In this regard, capability reconfiguration becomes inseparable from learning system design, extending leadership responsibility into the architecture of organizational adaptation.

Ethical and reflexive governance competence constitutes an additional layer within the capability structure. Crawford et al. [38] emphasize that ethical leadership is indispensable for responsible AI deployment, particularly in generative AI contexts. Arcadi [63] and Mumtaz et al. [64] similarly argue that leaders must ensure transparency, accountability, and value alignment within AI-mediated decision systems. However, Papagiannidis et al. [21] and Rana et al. [22] caution that individual competencies cannot fully neutralize systemic opacity or structural governance fragilities embedded in AI infrastructures. Petersson et al. [56] further reveal how healthcare leaders encounter regulatory and structural constraints that exceed individual skill boundaries. These findings consistently indicate that ethical competence, while necessary, is insufficient without broader governance alignment. These findings delineate the limits of competency-centric approaches and signal the necessity of systemic alignment.

Importantly, the literature reveals fragmentation across analytical levels. Some contributions focus primarily on individual leader skills [16], others on organizational learning mechanisms [61], and still others on strategic digital capabilities [18,49]. This fragmentation is explicitly observable across the reviewed corpus (see Appendix A), where multi-level integration remains limited. Rarely are these levels integrated into a unified explanatory configuration. The cross-thematic synthesis therefore suggests that AI-driven leadership capability should not be conceptualized as an aggregation of discrete competencies. Rather, it constitutes a higher-order orchestration capacity linking individual cognition, relational coordination, organizational learning, and systemic adaptation.

In alignment with the structural reconfiguration identified in Section 3.3, capability transformation operates as the enabling mechanism through which strategic AI integration becomes actionable. Leadership in AI-embedded organizations thus emerges as an adaptive orchestration function that integrates algorithmic interpretive competence, strategic digital coordination, learning facilitation, and ethical reflexivity within dynamically evolving sociotechnical systems. This interpretation is grounded in the cumulative evidence synthesized across the reviewed studies, ensuring consistency between empirical observations and theoretical abstraction. At the same time, the evidence indicates that capability reconfiguration cannot compensate for unresolved governance misalignments, revealing the interdependence between individual capacity and structural conditions.

3.5. Human–AI Collaboration and Hybrid Governance

A third structural axis emerging from the cross-analysis situates leadership within hybrid human–AI systems, where epistemic agency is partially distributed between human actors and algorithmic infrastructures. While Sections 3.3 and 3.4 established that AI reconfigures strategic architectures and leadership capabilities, this dimension clarifies the governance environment within which such transformation unfolds. Across the reviewed studies (see Appendix A), this dimension consistently appears as a critical condition shaping how leadership effectiveness is enacted in AI-mediated environments. AI integration is therefore not reducible to technological substitution; rather, it entails the construction of hybrid governance arrangements in which authority, judgment, and accountability are relationally negotiated [6,26,27].

Within these sociotechnical constellations, leadership no longer operates exclusively through interpersonal influence but through the orchestration of distributed intelligence networks. Arar et al. [26] demonstrate that AI-enabled systems embed algorithmic outputs into deliberative arenas, reshaping how authority is exercised in collaborative governance settings. Van Quaquebeke and Gerpott [6] further argue that AI challenges foundational premises of leadership theory by relocating analytical assessment and recommendation functions to hybrid human–machine configurations. Zárate-Torres et al. [27] reinforce this perspective by showing that algorithmic participation alters institutional coordination mechanisms rather than merely accelerating pre-existing routines. Taken together, these studies reveal a convergent pattern in which leadership authority becomes co-constituted across human and algorithmic agents rather than hierarchically centralized. Collectively, these contributions suggest that leadership authority becomes co-constituted within hybrid interaction systems.

Empirical evidence across sectors substantiates this distributed governance logic. In educational leadership, Kafa [42] and Marrone et al. [46] document how AI reshapes decision hierarchies and supervisory authority, requiring leaders to mediate between data-driven recommendations and normative institutional commitments. Cowling et al. [65] show that generative AI in research supervision generates shared cognitive spaces in which authority is co-constructed rather than hierarchically imposed. Abduljaber [45] and Berkovich and Eyal [50] similarly demonstrate that leader positioning toward AI significantly influences ethical climate, perceived legitimacy, and integration outcomes. These findings, observed across multiple institutional contexts, reinforce the centrality of leadership interpretation in stabilizing hybrid governance arrangements.

In organizational and project management contexts, AI-mediated collaboration further recalibrates relational dynamics. Ali et al. [66] reveal that AI interacts with leader–member exchange processes, influencing team-level performance through complex relational pathways rather than direct substitution. This interaction can be interpreted in light of established leadership theories such as Leader–Member Exchange (LMX), where trust, reciprocity, and relational quality become mediated—and sometimes distorted—by algorithmic inputs, thereby redefining the foundations of leader–follower relationships. Florea and Croitoru [39] show that AI reshapes communication patterns and performance expectations, thereby altering how coordination and influence are enacted. Krause and Balasescu [67] emphasize that engagement-oriented leadership becomes particularly salient when navigating "wicked problems" in AI-integrated systems, as relational trust must coexist with algorithmic rationality. Across the reviewed studies, these relational shifts are not isolated but reflect a broader reconfiguration of interactional leadership processes.

Across this body of research, three governance dynamics consistently recur. First, decision authority becomes distributed across human and algorithmic actors, generating hybrid accountability configurations [6,26]. Second, interpersonal influence processes are recalibrated as algorithmic inputs mediate deliberation and leader–follower exchanges [65,66]. Third, legitimacy becomes a negotiated construct, as leaders must justify AI-informed decisions under increasing expectations of transparency and ethical responsibility [45,46]. These dynamics were recurrently identified across the corpus (see Appendix A), indicating a stable governance pattern rather than context-specific variation.

However, hybrid governance also introduces structural ambiguity. The redistribution of epistemic authority complicates responsibility boundaries and intensifies moral accountability dilemmas. Matli [47] argues that reflexive leadership becomes indispensable in AI-enhanced contexts, as leaders must interrogate the normative assumptions embedded in algorithmic systems. Wang [40] illustrates how algorithmic dominance may constrain interpretive autonomy in educational decision-making, thereby narrowing deliberative space. These tensions reflect what can be conceptualized as the "dark side" of AI-embedded leadership, where opacity, bias, and diminished human agency disrupt traditional assumptions of accountability, autonomy, and ethical oversight. From the perspective of transformational leadership, for instance, the erosion of human-centered sensemaking challenges leaders' capacity to inspire, guide, and morally align followers within algorithmically mediated environments. Importantly, these risks recur across multiple studies, suggesting that they constitute systemic features rather than isolated anomalies. These findings indicate that hybrid systems are not self-regulating; they require continuous calibration between analytical efficiency and normative safeguards.

Crucially, the literature rarely integrates distributed governance dynamics with the strategic reconfiguration processes identified in Section 3.3 or the capability transformation mechanisms discussed in Section 3.4. This fragmentation is explicitly observable across the reviewed studies (see Appendix A), where cross-level integration remains limited. As a result, hybrid human–AI collaboration is often treated as a contextual phenomenon rather than as a structural condition of leadership effectiveness. The cross-thematic synthesis suggests, however, that governance design constitutes a boundary condition for AI-augmented leadership. Strategic transformation (Section 3.3) and capability reconfiguration (Section 3.4) achieve effectiveness only when embedded within governance architectures capable of stabilizing distributed authority, clarifying accountability boundaries, and sustaining relational legitimacy.

This third axis therefore reframes hybrid human–AI collaboration as a configurational determinant rather than a peripheral dimension. AI-driven leadership unfolds within sociotechnical systems characterized by distributed epistemic authority, relational mediation, and negotiated legitimacy. Effective leadership in such environments depends not solely on strategic integration or individual capability, but on the deliberate design and continuous recalibration of hybrid governance architectures that align algorithmic intelligence with ethical accountability and institutional trust. This interpretation is grounded in the cumulative evidence synthesized across the reviewed corpus, ensuring alignment between empirical findings and theoretical integration.

3.6. Ethical Tensions and the Dark Side of AI-Embedded Leadership

A fourth structural axis emerging from the cross-analysis foregrounds the ethical tensions, systemic vulnerabilities, and unintended consequences associated with AI-embedded leadership. While previous sections addressed strategic reconfiguration, capability transformation, and hybrid governance dynamics, this dimension introduces a critical configurational layer that conditions the stability and legitimacy of AI-augmented leadership systems. Across the reviewed studies (see Appendix A), these tensions are consistently identified as structural rather than incidental phenomena. Rather than representing peripheral risks, these tensions operate as structural constraints embedded within algorithmic architectures and organizational adoption processes.

Across organizational contexts, research consistently identifies algorithmic opacity, accountability diffusion, and legitimacy fragility as recurrent structural risks [19,20,22]. Papagiannidis et al. [21] demonstrate that machine-learning systems frequently rely on non-transparent modeling processes that limit leaders' capacity to interpret, explain, or justify AI-generated recommendations. Such opacity destabilizes traditional assumptions of managerial oversight and informed judgment. In parallel, Barari et al. [19] and Mahmoud et al. [20] argue that AI-driven optimization logics may privilege efficiency metrics over relational and ethical considerations, thereby reshaping organizational value hierarchies and narrowing deliberative space. These patterns recur across multiple studies in the corpus, reinforcing their systemic character.

Ethical tensions become particularly salient in high-stakes professional environments. Arcadi [63] contends that AI integration in nursing leadership may erode relational trust when transparency mechanisms and ethical safeguards remain underdeveloped [68,69]. Mumtaz et al. [64] question whether emerging business leaders possess the normative preparedness required to govern increasingly autonomous AI tools responsibly. Gligor et al. [70] extend these concerns to interorganizational settings, suggesting that digital technologies amplify latent trust asymmetries and relational vulnerabilities. Abduljaber [45] further shows that leaders' perceptions of AI shape both performance outcomes and ethical climate, reinforcing the interpretive dimension of technological legitimacy. Taken together, these findings indicate that ethical tensions are deeply embedded across diverse sectors and not confined to isolated domains.

Three structural risk configurations recur across this body of literature. First, algorithmic opacity constrains explainability and weakens leaders' ability to provide coherent justificatory narratives for AI-informed decisions [21,22]. Second, accountability becomes distributed across designers, data scientists, organizational leaders, and automated systems, generating ambiguity in responsibility allocation [19,20]. Third, performance distortions and legitimacy erosion may emerge through biased data inputs, flawed modeling assumptions, or stakeholder distrust [22,70]. Crawford et al. [38] reinforce this pattern in generative AI contexts, emphasizing that ethical leadership is indispensable to prevent uncritical algorithmic reliance. These three configurations were recurrently identified across the reviewed studies (see Appendix A), suggesting a stable and cross-contextual risk structure.

Crucially, these vulnerabilities do not operate independently from the dynamics identified in Sections 3.3–3.5. Algorithmic augmentation may enhance analytical precision and predictive capability [24], yet insufficient governance safeguards can undermine legitimacy and destabilize stakeholder trust [21,63]. Wang [40] illustrates how data-driven systems may inadvertently narrow interpretive autonomy, revealing the tension between efficiency gains and deliberative integrity. Petersson et al. [56] similarly document implementation barriers that expose structural constraints exceeding individual leader competence. This interdependence across dimensions is consistently observed in the corpus, reinforcing the configurational nature of AI-embedded leadership.

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A key cross-cutting insight concerns the limits of competency-based mitigation. While Section 3.4 highlighted algorithmic literacy and reflexive governance capabilities, dark-side research indicates that individual skill development alone cannot neutralize systemic risks embedded within AI infrastructures [21,22]. Ethical risk thus emerges not merely as a leadership deficit but as a configurational property of sociotechnical systems shaped by governance design, institutional culture, and regulatory frameworks. From the perspective of established leadership theories, these findings introduce important theoretical tensions. In approaches such as transformational leadership, leaders are assumed to shape values, align followers, and foster trust through vision and interpersonal influence. However, in AI-mediated environments, algorithmic opacity and distributed decision authority constrain leaders' capacity to fully enact these functions, limiting their ability to provide meaning, justification, and relational coherence. Similarly, Leader–Member Exchange (LMX) theory, which emphasizes the development of high-quality dyadic relationships based on trust, reciprocity, and mutual understanding, is challenged by the increasing mediation of interactions through algorithmic systems that may reduce transparency and relational depth. These dynamics suggest that classical leadership theories, while still relevant, require reinterpretation under conditions where authority, judgment, and accountability are partially distributed across sociotechnical infrastructures rather than concentrated in human actors.

The cross-analysis of this fourth axis therefore positions opacity, accountability diffusion, and legitimacy fragility as moderating conditions within AI-embedded leadership systems. This interpretation is grounded in the cumulative evidence synthesized across the reviewed studies, ensuring alignment between empirical findings and theoretical abstraction. Importantly, this perspective advances the literature by reframing the "dark side" of AI not as a set of isolated ethical concerns, but as a structurally embedded dimension that redefines the boundary conditions of leadership effectiveness in algorithmic environments. These ethical tensions influence whether strategic AI integration (Section 3.3), capability orchestration (Section 3.4), and hybrid governance design (Section 3.5) translate into enhanced effectiveness or systemic destabilization. AI-augmented leadership does not operate in a normative vacuum; its performance consequences remain contingent upon alignment between technological integration, interpretive capacity, distributed governance architecture, and robust ethical safeguards.

3.7. Cross-Thematic Integration: Toward a Multi-Level Configuration of AI-Augmented Leadership

The cross-thematic synthesis of the four analytical axes indicates that AI-embedded leadership cannot be sufficiently explained through additive or isolated perspectives. Strategic integration, capability reconfiguration, hybrid governance dynamics, and ethical tensions do not operate as independent streams; rather, they form a configurational system of interdependent mechanisms that jointly shape leadership effectiveness in AI-intensive contexts. This integrative pattern is consistently observable across the reviewed studies (see Appendix A), where multiple dimensions co-occur rather than operate in isolation. AI-augmented leadership therefore emerges as a multi-level sociotechnical configuration in which structural, cognitive, relational, and normative dimensions are reciprocally conditioned.

A first integrative mechanism concerns the reciprocal coupling between strategic AI orchestration and leadership capability reconfiguration. Research positioning AI as a driver of structural transformation and competitive renewal [3–5] implicitly assumes leaders capable of supervising algorithmic infrastructures, interpreting predictive outputs, and recalibrating decision architectures. However, capability-centered research demonstrates that such orchestration presupposes advanced digital literacy, adaptive learning capacity, and reflexive governance competence [14,16,18]. Across the corpus, these two dimensions are repeatedly co-articulated, indicating a mutually reinforcing relationship rather than independent development paths. Strategic AI integration therefore generates endogenous capability demands, while leadership capabilities acquire functional meaning only within decision systems already transformed by algorithmic augmentation. This relationship is reciprocal and co-evolutionary rather than sequential.

A second configurational dynamic links leadership capability reconfiguration to hybrid human–AI governance architectures. Studies on distributed epistemic agency and relational recalibration [6,26,27] highlight that AI integration redistributes analytical authority across human and algorithmic actors. Yet such redistribution becomes effective only when leaders possess interpretive judgment, algorithmic literacy, and ethical reflexivity [15,17]. Simultaneously, hybrid governance structures reshape the situational activation of these competencies by redefining accountability boundaries, deliberative processes, and relational expectations. Evidence across the reviewed studies suggests that capability expression is contingent upon governance design, reinforcing the interdependence between individual and structural dimensions. Leadership capabilities are thus not static traits but contextually enacted capacities embedded within evolving sociotechnical arrangements. Governance architectures both demand and redefine capability expression.

A third cross-level dynamic concerns the structural conditioning role of ethical tensions and dark-side dynamics. Algorithmic opacity, accountability diffusion, and legitimacy vulnerabilities [19,21,22] operate as boundary conditions moderating the impact of AI integration on leadership outcomes. While algorithmic augmentation may enhance analytical precision and decision quality [24], insufficient governance safeguards may undermine stakeholder trust and destabilize legitimacy [20,63]. Ethical governance therefore functions not as an external corrective mechanism but as a constitutive dimension embedded within the leadership configuration itself. This moderating role of ethical tensions is recurrently identified across the corpus, confirming its configurational relevance. From a theoretical standpoint, this finding challenges linear models of leadership effectiveness by demonstrating that technological enhancement and ethical stability may evolve in tension rather than alignment, thereby redefining the boundary conditions under which leadership theories operate in AI-mediated environments.

Across the four analytical axes, three higher-order configurational dimensions become theoretically salient. First, a strategic-orchestration dimension captures the embedding of AI into core decision architectures and resource allocation processes [3,4]. Second, a capability-reconfiguration dimension reflects the development of digital literacy, adaptive learning capacity, and reflexive oversight competencies necessary for supervising algorithmic infrastructures [14,16,17]. Third, a governance–legitimacy dimension encompasses hybrid accountability arrangements, ethical safeguards, and stakeholder trust dynamics shaping the normative stability of AI integration [21,26,63]. These dimensions were inductively derived from recurring patterns across the reviewed studies (see Appendix A), rather than imposed a priori. Together, they form a multi-level configurational architecture that extends existing leadership frameworks by explicitly incorporating sociotechnical interdependencies and governance constraints. These dimensions do not operate hierarchically or independently; rather, they form a configurational triad whose internal alignment determines the sustainability of AI-embedded leadership systems.

Configurational misalignment produces distinct systemic vulnerabilities. Strategic orchestration without parallel capability reconfiguration results in superficial or technocratic AI adoption. Capability development without governance integrity increases the probability of efficiency-driven overreach and ethical blind spots. Governance mechanisms lacking strategic clarity may inhibit innovation and dilute competitive advantage. These misalignment patterns are implicitly evidenced across multiple studies in the corpus, where partial integration leads to suboptimal outcomes. Leadership effectiveness in AI-intensive contexts therefore emerges from systemic coherence rather than from the isolated presence of any single dimension.

The literature further suggests recursive feedback mechanisms across levels. Strategic AI deployment reshapes competency requirements; enhanced capabilities enable more sophisticated governance design; governance outcomes subsequently influence future strategic integration trajectories. Such recursive dynamics are consistently reflected across the reviewed studies, supporting the interpretation of AI-augmented leadership as a dynamic and evolving system. This recursive perspective aligns with and extends dynamic capabilities theory by embedding feedback loops within sociotechnical leadership configurations rather than treating them as purely organizational processes. These feedback loops reinforce the view of AI-augmented leadership as a dynamic orchestration process embedded within continuously evolving sociotechnical infrastructures.

Taken together, the cross-thematic integration demonstrates that AI-augmented leadership effectiveness is contingent upon configurational alignment among technological integration, leadership capability reconfiguration, and governance–legitimacy safeguards. This conclusion is grounded in the cumulative synthesis of the reviewed corpus, ensuring consistency between empirical evidence and theoretical abstraction. AI ceases to function as an exogenous technological variable and becomes structurally embedded within leadership processes, reshaping their cognitive, relational, and normative foundations. By advancing this configurational synthesis, the study contributes to leadership theory by reframing effectiveness as an emergent property of multi-level alignment within hybrid human–AI systems. This configurational synthesis provides the theoretical foundation for a multi-level model of AI-augmented leadership in which effectiveness arises from the co-evolution and alignment of strategic, capability, and governance dimensions.

3.8. The ALCF Model: A Configurational Architecture of AI-Embedded Leadership

The cross-thematic synthesis developed in Sections 3.3–3.7 culminates in the formal articulation of the AI-Leadership Configurational Framework (ALCF). The accumulated evidence indicates that AI-embedded leadership effectiveness does not arise from the additive presence of strategic integration, capability development, and governance safeguards. Instead, it emerges from a vertically structured and system-moderated architecture in which these dimensions operate through ordered, interdependent mechanisms.

The ALCF conceptualizes AI-embedded leadership as a layered configuration composed of three analytically distinct but dynamically coupled dimensions: (1) strategic orchestration, (2) capability reconfiguration, and (3) governance–legitimacy regulation. These dimensions operate sequentially in activation logic but configurationally in outcome realization.

3.8.1. Strategic Orchestration as Foundational Structural Activation

The foundational layer of the ALCF is strategic orchestration, defined as the extent to which AI is embedded within core decision architectures, resource allocation systems, and organizational design [3–5,24]. The literature consistently demonstrates that AI integration restructures informational flows, redistributes analytical authority, and redefines decision hierarchies. Strategic orchestration therefore functions as the initiating structural mechanism that transforms the context within which leadership is enacted. However, AI integration simultaneously intensifies interpretive ambiguity and cognitive complexity. As decision architectures become algorithmically mediated, leaders confront expanded epistemic demands.

Proposition 1 (Structural Activation). *Higher levels of strategic AI orchestration increase the cognitive and interpretive complexity of leadership decision environments [3,4].*

This structural activation generates endogenous pressures for leadership adaptation.

3.8.2. Capability Reconfiguration as Operational Mediation

In response to structural transformation, leaders must engage in capability reconfiguration, conceptualized as the development of algorithmic literacy, reflexive judgment, adaptive learning capacity, and ethical reasoning competencies [14–18]. Capability reconfiguration constitutes the operational layer of the framework. It translates structural AI embedding into calibrated human–AI interaction, supervisory oversight, and informed interpretive mediation. Without such reconfiguration, strategic AI integration risks degenerating into technocratic reliance or superficial adoption.

Proposition 2 (Capability Mediation). *Leadership capability reconfiguration mediates the relationship between strategic AI orchestration and leadership decision quality [15,18].*

Proposition 3 (Adaptive Alignment). *The positive effect of strategic AI orchestration on leadership effectiveness increases when leadership capability reconfiguration is high [11,41].*

This establishes a first-order mediated relationship within the ALCF: structural activation requires operational adaptation.

3.8.3. Governance–Legitimacy as System-Level Regulation

The literature further indicates that even highly developed leadership capabilities cannot ensure positive outcomes in the absence of robust governance safeguards. Research on algorithmic opacity, accountability diffusion, and legitimacy vulnerabilities [19,21,22] demonstrates that AI systems embed structural risks that exceed individual competence. Consequently, the ALCF conceptualizes governance–legitimacy safeguards as a system-level regulatory layer encompassing explainability infrastructures, distributed accountability mechanisms, ethical oversight arrangements, and stakeholder trust calibration processes [20,26,63]. Governance–legitimacy does not function as a parallel dimension but as a regulatory filter conditioning outcome realization.

Proposition 4 (Governance Moderation). *Governance–legitimacy safeguards positively moderate the relationship between leadership capability reconfiguration and leadership effectiveness [21,63].*

Proposition 5 (Risk Amplification). *In contexts characterized by algorithmic opacity and accountability diffusion, the relationship between AI integration and stakeholder legitimacy weakens, regardless of leadership capability levels [19,22].*

Thus, identical levels of strategic orchestration and capability development may produce divergent outcomes depending on governance robustness.

3.8.4. Configurational Alignment and Systemic Coherence

The ALCF posits that AI-embedded leadership effectiveness arises from configurational alignment across the three layers rather than from isolated dimensional strength.

Strategic orchestration without capability adaptation produces technocratic fragility.

Capability development without governance integrity increases the likelihood of efficiency-driven overreach. Governance safeguards without strategic clarity may inhibit innovation and dilute competitive advantage.

Proposition 6 (Configurational Coherence). *AI-embedded leadership effectiveness is highest when strategic orchestration, capability reconfiguration, and governance–legitimacy safeguards are simultaneously aligned [18,55].*

Proposition 7 (Configurational Misalignment). *Misalignment among the three ALCF dimensions increases the probability of legitimacy erosion, decision distortion, or innovation stagnation [20,70].*

This proposition formalizes the central configurational claim emerging from Sections 3.3–3.7.

3.8.5. Recursive Feedback Dynamics

Finally, the ALCF incorporates a recursive adaptation mechanism. Leadership outcomes feed back into strategic confidence and governance recalibration processes. Positive legitimacy outcomes reinforce AI integration trajectories, while trust breakdowns trigger governance redesign and strategic moderation.

Proposition 8 (Recursive Adaptation). *Leadership effectiveness outcomes dynamically influence subsequent levels of strategic AI integration and governance redesign [18,44].*

The ALCF therefore advances a layered, mediated, moderated, and recursively adaptive architecture of AI-embedded leadership grounded in the configurational patterns identified across the reviewed literature. AI does not function as an exogenous technological variable. It becomes structurally embedded within leadership processes, reshaping their cognitive demands, relational dynamics, and normative foundations. Leadership effectiveness in AI-intensive contexts thus emerges from the coherent alignment of structural orchestration, adaptive capability development, and governance–legitimacy regulation within an evolving sociotechnical system.

Figure 2 visually consolidates this architecture by illustrating the vertical activation logic, the mediating role of capability reconfiguration, the moderating function of governance–legitimacy safeguards, and the recursive feedback dynamics that collectively determine leadership effectiveness in AI-intensive environments.

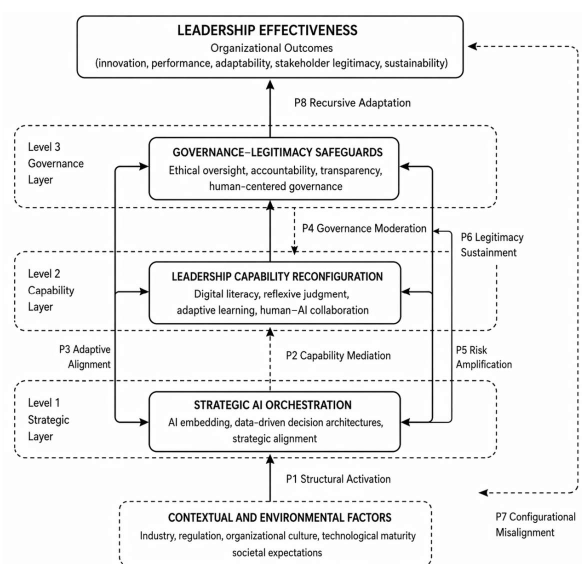

Figure 2. AI-Leadership Configurational Framework (ALCF). The model illustrates the multi-level relationships between strategic AI orchestration, leadership capability reconfiguration, and

governance–legitimacy safeguards in shaping leadership effectiveness. Arrows represent different types of relationships formalized in Propositions P1–P8, including structural activation (P1), capability mediation (P2), adaptive alignment (P3), governance moderation (P4), risk amplification (P5), configurational coherence (P6), misalignment effects (P7), and recursive feedback dynamics (P8). Dashed lines indicate contextual and moderating influences, whereas solid arrows represent primary directional relationships.

4. Discussion

The purpose of this study was to respond to a central fragmentation identified in the introduction: the absence of an integrative, multi-level architecture capable of explaining how strategic AI embedding, leadership capability reconfiguration, hybrid human–AI governance, and ethical–legitimacy safeguards jointly shape leadership effectiveness. Moving beyond descriptive aggregation, this systematic review clarified how AI-embedded leadership has been conceptualized across a rapidly expanding yet theoretically dispersed body of literature. From a sustainability perspective, this fragmentation is particularly problematic, as it limits the ability to understand how AI-embedded leadership contributes not only to short-term performance gains but also to long-term organizational viability and human-centered value creation. Addressing this gap requires moving beyond isolated dimensions toward a systemic understanding of how technological, human, and governance elements co-evolve to sustain organizational effectiveness over time.

The findings demonstrate that existing research frequently isolates strategic integration, leadership competencies, governance mechanisms, or ethical tensions without articulating their cross-level interdependencies. This fragmentation obscures a deeper structural logic. AI-augmented leadership does not emerge from incremental or isolated adjustments, nor from competence upgrading alone. Rather, it unfolds through the vertical alignment of interdependent layers embedded within a sociotechnical configuration.

The AI-Leadership Configurational Framework (ALCF) is advanced precisely to resolve this theoretical dispersion. By integrating structural transformation, capability mediation, and governance–legitimacy moderation into a coherent architecture, the framework translates the four objectives articulated in the introduction into a unified explanatory model. In doing so, it reframes AI-embedded leadership effectiveness as an emergent property of systemic alignment rather than as the outcome of isolated technological adoption or individual skill enhancement.

A first contribution of the review lies in reframing AI as a structural reconfigurator of leadership architecture rather than as a tool that merely modifies leadership style or skill sets. While recent scholarship has emphasized the redefinition of leadership competencies in the AI era [57,58], such approaches frequently imply that adaptation is primarily a matter of upgrading individual capacities. The cross-thematic synthesis challenges this assumption. Propositions P1 and P2 clarify that strategic orchestration of AI reshapes decision architectures, redistributes epistemic authority, and alters the informational conditions under which leadership judgment is exercised. In higher education and academic governance, for instance, debates regarding whether AI constitutes a strategic objective or an instrumental resource [53,71] reflect deeper architectural tensions. Similarly, instructional and school leadership studies [54,59] illustrate that AI integration modifies institutional decision logics rather than simply enhancing administrative efficiency. The ALCF captures this transformation by positioning strategic orchestration as the initiating layer of structural change, thereby shifting the analytical focus from leadership adaptation to leadership reconfiguration.

At the same time, structural embedding alone does not generate effectiveness. A second gap addressed by this study concerns the predominance of competence-centric interpretations that overlook how capabilities operate within transformed decision environments. Propositions P3 and P4 reposition capability reconfiguration as a mediating mechanism rather than a foundational driver. Digital literacy, reflexive judgment, and adaptive learning do not independently guarantee positive outcomes; they translate structural AI integration into calibrated oversight and contextualized decision-making. Sector-specific implementation research, such as AI adoption models in dental education [60] and qualitative evidence from healthcare leadership [56], reveals that capability deficits often surface as implementation barriers. However, the ALCF demonstrates that such deficits are symptoms of misalignment across layers rather than isolated shortcomings. Leadership capability acquires meaning only within decision architectures already transformed by AI, reinforcing the view that competencies function as operational mediators embedded in structural conditions.

A further dimension emerging from the synthesis concerns governance–legitimacy safeguards. Prior work has extensively discussed accountability, transparency, and trust-related risks, particularly in high-stakes contexts [56], yet these concerns are frequently treated as compliance issues external to leadership configuration. Propositions P5 and P6 reconceptualize governance as a structural moderator. Governance–legitimacy safeguards condition the translation of capability deployment into leadership effectiveness; they do not merely constrain technological use but regulate outcome realization. This insight also connects with sustainability-oriented discussions that frame AI as both an enabler and a risk factor for long-term organizational development [55]. In this sense, the ALCF contributes to understanding organizational sustainability as a configurational outcome, where long-term viability depends on the alignment between technological integration, governance robustness, and the preservation of human and institutional legitimacy. By embedding governance within the configurational core of the model, the framework clarifies how sustainability is not an external objective but an emergent property of sociotechnical alignment.

The eight propositions collectively converge toward a central configurational claim: AI-embedded leadership effectiveness emerges from vertical alignment across strategic orchestration, capability reconfiguration, and governance–legitimacy safeguards. This triadic structure resolves the persistent dichotomy in the literature between AI as augmentative infrastructure and AI as substitutive threat. Outcomes are not determined by the intrinsic nature of AI, but by the coherence of the sociotechnical configuration in which it is embedded. When strategic orchestration advances without corresponding capability reconfiguration, technocratic overreach becomes likely. When capabilities are developed without governance alignment, legitimacy erosion may follow. Conversely, governance rigidity without strategic clarity risks innovation paralysis. These instability patterns represent a theoretical contribution insofar as they specify predictable misalignment trajectories rather than merely describing abstract tensions. Importantly, these misalignment trajectories also have direct implications for organizational sustainability. Configurations characterized by technocratic overreach, legitimacy erosion, or governance rigidity are unlikely to be sustainable over time, as they undermine either adaptive capacity, stakeholder trust, or innovation potential. The ALCF therefore provides not only an explanatory model of leadership effectiveness but also a diagnostic lens for identifying structurally unsustainable AI integration pathways.

An additional advancement concerns the recursive dynamic incorporated through Propositions P7 and P8. Much of the current literature treats AI adoption as a linear implementation process. The ALCF reframes it as an adaptive cycle in which governance outcomes and legitimacy perceptions feed back into future strategic integration decisions. Successful alignment reinforces strategic confidence and deepens integration, whereas legitimacy breakdowns trigger recalibration. This process-oriented perspective directly addresses the static treatment of AI integration identified in the introduction and situates leadership within an evolving sociotechnical system.

Taken together, the findings demonstrate that AI-augmented leadership cannot be reduced to technological sophistication, leadership style revision, or ethical compliance in isolation. It is a configurational phenomenon grounded in systemic coherence. By integrating structural transformation, mediating capabilities, moderating governance mechanisms, and recursive adaptation within a vertically structured architecture, the ALCF provides a theoretically grounded response to the fragmentation that currently characterizes the field. AI-embedded leadership is therefore neither purely technological nor purely human; it is a dynamic orchestration capacity operating within hybrid infrastructures whose effectiveness depends upon the alignment of strategic, cognitive, and normative layers.

Beyond the studies included in this review, emerging scholarship has begun to examine the psychosocial consequences of AI-mediated organizational environments. Recent analyses suggest that algorithmic acceleration may reshape emotional experience and intensify risks of digital burnout when efficiency imperatives dominate relational and recovery structures [72,73]. These developments reinforce the argument that leadership effectiveness in AI-intensive systems is not solely a matter of strategic alignment and governance design, but also of sustaining human well-being within technologically embedded work architectures. From a sustainability standpoint, this implies that AI-embedded leadership must actively balance performance optimization with psychosocial stability, ensuring that efficiency gains do not come at the expense of long-term human functioning, resilience, and organizational health.

4.1. Theoretical Implications

The configurational patterns identified in Sections 3.3–3.8 yield a set of theoretical implications that extend beyond descriptive synthesis and directly advance leadership theory in AI-intensive environments. These implications derive from the structural logic of the ALCF and from the eight propositions that formalize the relationships among strategic orchestration, capability reconfiguration, governance–legitimacy safeguards, and recursive adaptation.

A first implication concerns the ontological repositioning of leadership in algorithmically mediated contexts. The findings indicate that AI integration alters decision architectures, redistributes epistemic authority, and restructures informational flows at the organizational core. Propositions P1 and P2 therefore challenge individual-centered theories of leadership by demonstrating that leadership effectiveness cannot be theorized independently from the sociotechnical infrastructures within which it is enacted. The ALCF advances a structural-embeddedness thesis: leadership outcomes emerge from the alignment between AI-embedded decision architectures and governance integrity. This shifts the theoretical locus from leader traits or styles toward configurational alignment between human agency and algorithmic systems.

Second, the model problematizes competence-dominant narratives in digital leadership research. While Propositions P3 and P4 confirm that algorithmic literacy, reflexive judgment, and adaptive learning constitute necessary mediating mechanisms, the dark-side evidence synthesized in Section 3.6 demonstrates that capability accumulation alone cannot neutralize structural opacity, accountability diffusion, or legitimacy instability. By formalizing governance–legitimacy safeguards as a moderating layer (Propositions P5 and P6), the ALCF integrates boundary conditions into leadership theory rather than treating them as external ethical constraints. Governance is repositioned as a constitutive explanatory variable that shapes whether capability deployment stabilizes or destabilizes organizational outcomes.

Third, the configurational architecture advances leadership scholarship beyond additive or linear explanatory models. Much of the existing literature implicitly assumes monotonic relationships—for example, that greater AI integration improves decision quality or that enhanced digital competencies strengthen oversight. The synthesis conducted here indicates that such linear assumptions are theoretically insufficient. The interaction effects specified in the ALCF reveal a contingent and non-linear structure in which misalignment across layers produces predictable instability patterns. Leadership effectiveness in AI contexts is therefore an emergent property of vertical coherence rather than the cumulative presence of isolated strengths. This moves AI-related leadership theory toward a complexity-informed yet analytically specified framework.

Fourth, the recursive dynamic embedded in Propositions P7 and P8 introduces a process-based dimension to leadership theorizing under technological turbulence. Governance outcomes and legitimacy perceptions influence subsequent strategic integration depth, generating adaptive cycles rather than static equilibria. This reconceptualizes AI adoption as a dynamic recalibration process in which strategic ambition, capability development, and governance safeguards continuously co-evolve. Theoretically, this insight calls for longitudinal and multi-level research designs capable of capturing feedback effects across time.

Finally, the ALCF contributes to cross-sector theoretical integration. The corpus reviewed spans healthcare, education, interorganizational collaboration, and corporate strategy, yet prior theorization has largely remained domain-specific. By abstracting common structural regularities—strategic embedding, capability mediation, and governance moderation—the framework provides a transferable analytical architecture without erasing contextual nuance. This enhances cumulative theory-building in a field currently characterized by conceptual dispersion.

In sum, the theoretical contribution of this study lies in articulating a configurational, multi-layered, and dynamically moderated theory of AI-embedded leadership. Rather than proposing new competencies or normative prescriptions, the ALCF reframes leadership effectiveness as an emergent outcome of sociotechnical alignment under algorithmic conditions. In doing so, it advances leadership theory from adaptation-based narratives toward a structurally integrated and process-sensitive paradigm suited to the realities of the AI era.

4.2. Managerial Implications

The configurational architecture formalized in the ALCF implies that AI-augmented leadership cannot be operationalized through isolated interventions. Instead, managerial effectiveness depends on disciplined alignment across three structurally interdependent layers: strategic orchestration (P1–P2), capability reconfiguration (P3–P4), and governance–legitimacy safeguards (P5–P6), dynamically recalibrated through recursive feedback mechanisms (P7–P8). From a sustainability perspective, this alignment is critical because it determines whether AI adoption supports durable organizational performance or generates short-term gains accompanied by long-term structural and human costs. Managers must therefore approach AI integration not only as a technological or strategic initiative, but as a sustainability-oriented transformation affecting organizational resilience, stakeholder trust, and employee well-being.

A first implication concerns sequencing and depth of integration (P1–P2). Managers should diagnose whether AI is embedded in core decision architectures—resource allocation, performance evaluation, risk modeling, and strategic planning—before scaling adoption initiatives. AI deployed at the periphery (e.g., isolated analytics pilots) without redesigning decision rights and information hierarchies generates symbolic digitalization rather than structural transformation. The ALCF therefore suggests a "decision-system audit" as a preliminary managerial action: mapping where algorithmic outputs intervene in judgment processes, who retains override authority, and how epistemic weight is distributed between human and AI agents. Without this structural anchoring, subsequent capability investments risk misalignment.

Second, capability development must be interactional, not declarative (P3–P4). The evidence indicates that algorithmic literacy becomes operational only through repeated engagement with AI-generated outputs under conditions of uncertainty. Managers should therefore institutionalize interpretive simulation environments—structured decision labs in which leaders confront conflicting AI recommendations, ambiguous outputs, and explainability constraints. Training programs focused solely on technical awareness or ethical principles lack translational depth. Capability reconfiguration requires routinized exposure to sociotechnical friction points where human judgment and algorithmic prediction intersect.

Third, governance must be architected ex ante rather than appended ex post (P5–P6). The dark-side configurations identified in Section 3.6 show that opacity and accountability diffusion emerge predictably when AI integration outpaces governance design. Managers should establish explicit human–AI responsibility matrices, defining override thresholds, escalation procedures, and traceability standards for high-stakes decisions. Explainability protocols should be differentiated by decision criticality rather than uniformly applied. Treating governance as a compliance overlay introduces temporal lag; the ALCF instead recommends parallel co-design of integration and safeguard structures.

Fourth, legitimacy signals should be monitored as leading indicators of systemic misalignment (P7–P8). Stakeholder resistance, interpretive confusion, or declining trust are not peripheral communication issues; they reflect imbalance across the configurational layers. Managers should incorporate legitimacy diagnostics—trust surveys, stakeholder perception audits, and decision transparency evaluations—into strategic performance dashboards. When legitimacy erosion is detected, recalibration may involve moderating integration depth, intensifying capability recalibration, or reinforcing governance clarity. Delay in responding to legitimacy signals increases the probability of structural instability.

Fifth, the ALCF implies that ownership of AI transformation must be vertically integrated. Strategic orchestration (senior executives), capability development (HR and learning units), and governance oversight (legal/compliance/ethics functions) are often administratively separated. The model demonstrates that fragmentation across these domains produces predictable incoherence. Managers should therefore institutionalize cross-functional AI governance councils with decision authority rather than advisory status. Such councils enhance vertical coherence and reduce the risk of capability–integration or governance–strategy asymmetries.

Sixth, performance metrics must expand beyond efficiency indicators. Decision speed, predictive accuracy, or cost reduction are incomplete measures of AI-augmented leadership effectiveness. The configurational model indicates that sustainable performance requires parallel assessment of explainability quality, accountability clarity, and stakeholder trust stability. Managers should therefore adopt dual performance dashboards combining operational metrics with legitimacy and governance indicators. Efficiency gains achieved under legitimacy erosion represent unstable equilibria.

The configurational model indicates that sustainable performance requires parallel assessment of explainability quality, accountability clarity, stakeholder trust stability, and employee well-being indicators. Managers should therefore adopt dual performance dashboards combining operational metrics with legitimacy, governance, and human sustainability indicators. Efficiency gains achieved under conditions of legitimacy erosion or psychosocial strain represent structurally unstable equilibria that are unlikely to be sustained over time.

In practical terms, the ALCF does not prescribe universal best practices but provides a diagnostic logic for sustainable AI integration. Misalignment across layers generates predictable instability patterns, whereas vertical coherence fosters adaptive resilience and long-term organizational sustainability. Effective AI-augmented leadership, therefore, is not the outcome of technological sophistication alone, but of disciplined sociotechnical orchestration capable of sustaining performance, legitimacy, and human well-being over time.

Illustrative application of the ALCF. Consider a large healthcare organization implementing AI-supported diagnostic systems to enhance clinical decision-making. At the strategic level (P1–P2), AI is embedded into core diagnostic workflows, influencing how medical decisions are structured and how clinical data are prioritized. However, this integration requires parallel capability reconfiguration (P3–P4), as physicians and managers must develop the ability to interpret probabilistic outputs, manage uncertainty, and exercise reflexive judgment when algorithmic recommendations conflict with clinical expertise. Simultaneously, governance–legitimacy safeguards (P5–P6) become critical: the organization establishes clear accountability protocols, defines human override conditions, and ensures transparency in high-stakes decisions to maintain patient trust. If these three layers remain aligned, AI enhances both diagnostic accuracy and organizational legitimacy. However, if integration advances without capability development or governance clarity, risks such as over-reliance on opaque systems or erosion of professional trust may emerge. This example illustrates how leadership effectiveness depends on the configurational alignment proposed by the ALCF rather than on technological adoption alone.

From a sustainability perspective, these findings underscore that AI-embedded leadership cannot be evaluated solely in terms of efficiency or innovation outcomes. Rather, its long-term viability depends on the ability to maintain alignment between technological integration, governance robustness, and human-centered organizational conditions, ensuring that performance gains remain compatible with durable institutional stability and stakeholder trust.

4.3. Limitations and Future Research

Despite its integrative and configurational contribution, the present study is subject to structural and methodological limitations that delimit the scope of its conclusions while informing a structured future research agenda. Although the AI-Leadership Configurational Framework (ALCF) is grounded in a systematic PRISMA-guided synthesis of quality-assessed studies, it remains at a theory-building stage requiring empirical validation across multiple levels of analysis.

From a methodological standpoint, it is important to acknowledge that no formal assessment of reporting bias (e.g., publication bias) was conducted, as the review did not involve quantitative meta-analysis or effect size aggregation. However, the inclusion of multiple databases and the application of a rigorous and transparent screening procedure were designed to minimize potential selection and reporting biases. Similarly, the certainty of evidence was not formally assessed using frameworks such as GRADE, given the qualitative and theory-building nature of the synthesis. Instead, methodological rigor was addressed through structured quality appraisal (MMAT for empirical studies and a conceptual rubric), which informed the interpretation and weighting of findings across the reviewed literature.

Because the ALCF derives from convergent cross-sectoral evidence, its propositions (P1–P8) represent theoretically structured relationships rather than speculative claims. However, the layered architecture (P1–P6) and the recursive dynamic (P7–P8) require empirical testing capable of capturing interdependencies rather than isolated effects. Future research should therefore adopt multi-level designs that simultaneously assess: (a) the structural depth of AI orchestration, (b) the maturity of leadership capability reconfiguration, and (c) the robustness of governance–legitimacy safeguards. Approaches such as Hierarchical Linear Modeling (HLM) and cross-level Structural Equation Modeling (SEM) would allow testing whether vertical alignment predicts leadership effectiveness more robustly than additive models.

The configurational logic of the ALCF also implies non-linearity and equifinality. While P1–P3 specify mediating mechanisms, P4–P6 introduce moderating effects through governance robustness. Future research could therefore apply fuzzy-set Qualitative Comparative Analysis (fsQCA) to identify alternative pathways to effectiveness and to detect misalignment configurations such as technocratic overreach or symbolic AI adoption.

A further limitation concerns temporality. The recursive mechanism proposed in P7–P8 suggests that governance outcomes and legitimacy perceptions shape subsequent integration trajectories. However, the predominance of cross-sectional studies limits empirical observation of these dynamics. Longitudinal designs, time-lagged SEM, and process-tracing approaches are needed to capture adaptive recalibration cycles over time.

Governance–legitimacy safeguards also remain operationally under-specified. Future studies should develop validated measures of transparency, accountability, explainability, and trust, and examine their causal effects through experimental or quasi-experimental designs.

Contextual heterogeneity represents both a strength and a boundary condition. While the framework abstracts common structural patterns across sectors, differences in institutional environments may moderate the relative weight of each layer. Multi-group SEM and invariance testing could determine whether the ALCF operates as a universal architecture or a context-contingent model.

At the micro-level, further research is needed to understand the cognitive and affective mechanisms through which leaders interpret algorithmic outputs under conditions of uncertainty. Integrating cognitive leadership theory and human–AI interaction research may refine the explanatory depth of capability reconfiguration (P3–P4).

The sequencing assumption embedded in the ALCF—that strategic orchestration precedes capability reconfiguration—also requires empirical validation. Alternative causal orderings may emerge in digitally native organizations, which could be tested through longitudinal and cross-lagged models.

Finally, the long-term sustainability implications of AI-embedded leadership remain theoretically grounded but empirically underexplored. Future research should integrate sustainability performance indicators, stakeholder trust metrics, and longitudinal legitimacy measures to assess whether configurational alignment contributes to sustained organizational outcomes.

In sum, the ALCF constitutes a configurational and multi-layered theoretical architecture derived from systematic evidence synthesis, yet requiring rigorous empirical validation. Advancing this agenda will enable the consolidation of AI-embedded leadership as a structurally coherent and methodologically robust domain within contemporary leadership research.

5. Conclusions

This study originated from a structural fragmentation identified in the introduction and revisited in the discussion: the absence of an integrative, multi-level architecture capable of explaining how strategic AI embedding, leadership capability reconfiguration, hybrid human–AI governance, and governance–legitimacy safeguards interact across organizational levels to shape leadership effectiveness. While prior research has generated valuable insights within each of these domains, it has largely treated them as analytically separable. Through a PRISMA-guided systematic synthesis of the available evidence, this review addressed that dispersion by identifying cross-thematic structural patterns and advancing a configurational explanation of AI-embedded leadership.

The analysis demonstrates that AI-augmented leadership cannot be reduced to technological sophistication, leadership style adaptation, or ethical compliance considered independently. Instead, effectiveness emerges from vertical coherence across three interdependent layers: strategic orchestration, capability reconfiguration, and governance–legitimacy safeguards operating within hybrid human–AI systems. By articulating this layered and moderated architecture, the AI-Leadership Configurational Framework (ALCF) repositions leadership effectiveness as an emergent property of sociotechnical alignment rather than as the outcome of isolated competencies or deterministic technological forces. The central explanatory principle introduced by the framework is not AI adoption per se, but configurational coherence under algorithmic conditions. From a sustainability perspective, this implies that leadership effectiveness in AI-intensive environments cannot be evaluated solely through short-term performance indicators. Instead, it must be understood in terms of its capacity to sustain organizational resilience, legitimacy, and human well-being over time. The ALCF therefore contributes to framing sustainability not as an external objective, but as an emergent outcome of sociotechnical alignment.

Importantly, the ALCF does not constitute a descriptive aggregation of themes, nor a context-bound typology. It represents a theory-building synthesis grounded in systematic evidence integration. Its eight propositions formalize mediating, moderating, and recursive dynamics that structure the relationship between AI integration and leadership outcomes. In doing so, the study advances leadership theory beyond additive or competence-dominant narratives and introduces a non-linear, multi-level logic consistent with complexity-informed organizational analysis. The configurational contribution lies precisely in demonstrating that misalignment across layers generates predictable instability patterns, whereas sustained effectiveness depends on synchronized structural embedding, human recalibration, and institutional regulation.

More broadly, the findings suggest that AI does not merely enhance leadership tasks; it restructures the cognitive, relational, and normative foundations of organizational authority. As AI becomes embedded in decision architectures, leadership shifts from discretionary individual action toward systemic calibration within sociotechnical infrastructures. Authority is increasingly co-constituted by human judgment and algorithmic mediation. In this context, leadership effectiveness depends not on how advanced the technology is, nor solely on how skilled the leader is, but on whether strategic integration depth, interpretive capability maturity, and governance robustness evolve in concert.

The challenge ahead is not simply to refine AI systems or redefine leadership styles, but to understand and govern the configurational architectures within which human and algorithmic agency co-evolve. In that sense, this study contributes not only conceptual integration, but also a structural lens through which AI-embedded leadership can be examined with greater theoretical precision and methodological rigor. Moreover, it highlights that sustainable leadership in the algorithmic era depends on the capacity to align technological advancement with governance integrity and human-centered outcomes, ensuring that organizational transformation remains viable, legitimate, and resilient over time.

In this sense, the ALCF not only contributes to leadership theory but also provides a sustainability-oriented lens for understanding AI integration. By framing leadership effectiveness as a function of configurational alignment, the model highlights that long-term organizational sustainability depends on balancing technological advancement with governance integrity and the preservation of human well-being within AI-mediated systems.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su18084085/s1, PRISMA 2020 Checklist.

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Abbreviations

The following abbreviations are used in this manuscript:

AI	Artificial Intelligence
ALCF	AI-Leadership Configurational Framework
fsQCA	fuzzy-set Qualitative Comparative Analysis
HLM	Hierarchical Linear Modeling
HR	Human Resources
LMX	Leader–Member Exchange
PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses
SEM	Structural Equation Modeling

Appendix A. Descriptive Overview of the Final Nuclear Corpus (*n* = 33)

Authors	Article Title	Source	Design	Context	AI–Leadership Focus	Core Contribution
[2]	Artificial intelligence and the role of leadership	Journal of Leadership Studies	Conceptual	Cross-sector	AI redefining leadership role	Early conceptual framing of AI–leadership interface
[36]	Artificial intelligence and its impact on leaders and leadership	Procedia Computer Science	Conceptual	Cross-sector	Leadership transformation	AI reshapes decision authority
[37]	Use of artificial intelligence in leadership competency development and selection: An empirical study	Consulting Psychology Journal	Empirical (quant.)	Corporate	Competency development	AI enhances leadership assessment
[14]	Leadership competences in the era of artificial intelligence—a structured review	Strategy & Leadership	Structured review	Corporate	Competency shift	Identifies future AI-driven leadership skills
[52]	The transformative role of artificial intelligence in leadership and management development	Development and Learning in Organizations	Conceptual	Management education	Leadership development	AI as catalyst of managerial evolution
[4]	The impact of artificial intelligence on strategic leadership	Edward Elgar Handbook	Conceptual	Strategic management	Strategic leadership	AI in high-level strategic decision-making
[38]	Leadership is needed for ethical ChatGPT	JUTLP	Conceptual	Higher education	Ethical AI governance	Character-driven AI leadership
[39]	The impact of artificial intelligence on communication dynamics and performance in organizational leadership	Administrative Sciences	Empirical	Organizational	Communication leadership	AI-mediated communication performance
[25]	Artificial intelligence on employee performance and work engagement: the moderating role of change leadership	Int. Journal of Manpower	Empirical	Corporate	Change leadership	Leadership moderates AI performance effects

[23]	Green talent management... artificial intelligence and transformational leadership	Journal of Knowledge Management	Empirical	Corporate	Transformational leadership	AI-enabled innovation leadership
[40]	When artificial intelligence meets educational leaders' data-informed decision-making	Studies in Educational Evaluation	Conceptual	Education	Decision-making	AI caution in leader judgment
[6]	The now, new, and next of digital leadership	JLOS	Conceptual	Cross-sector	AI takeover thesis	AI reshapes leadership ontology
[9]	Artificial intelligence and school leadership	School Leadership & Management	Conceptual	Education	Leadership implications	Governance and opportunity framing
[51]	Attitude towards artificial intelligence in a leadership role	IEA Congress	Empirical	Experimental	AI as leader	Acceptance attitudes
[7]	Artificial intelligence in radiology: a leadership survey	JACR	Empirical	Healthcare	Leadership adoption	Executive AI readiness
[13]	Transforming leadership practices through artificial intelligence	Procedia CS	Conceptual	Corporate	Practice transformation	AI-enabled leadership evolution
[16]	Leaders' competencies and skills in the era of artificial intelligence	Applied Sciences	Scoping review	Cross-sector	Competencies	Skill mapping
[48]	Enhancing top managers' leadership with artificial intelligence	Review of Managerial Science	Systematic review	Corporate	Top management	AI-augmented leadership
[49]	How will artificial intelligence evolve organizational leadership?	Global Business & Organizational Excellence	Empirical	Entrepreneurship	Leadership evolution	Technopreneur perspectives
[41]	The mediating effect of leadership in artificial intelligence success	Management Decision	Empirical	Corporate	Leadership mediation	AI success mechanisms
[27]	Influence of Leadership on Human–Artificial Intelligence Collaboration	Behavioral Sciences	Empirical	Organizational	Human-AI collaboration	Leadership facilitation role
[18]	Digital leadership: AI-driven leader capabilities	JLOS	Conceptual	Corporate	Dynamic capabilities	AI managerial capability model
[42]	Exploring integration aspects of school leadership in AI context	IJEM	Empirical	Education	Integration practices	AI adoption leadership
[10]	School leaders' adoption and implementation of artificial intelligence	JEA	Empirical	Education	Implementation	Adoption pathways
[47]	Integration of AI and leadership reflexivity to enhance decision-making	Applied Artificial Intelligence	Conceptual	Strategic	Reflexive leadership	Cognitive augmentation
[46]	Perceptions of school leaders on AI integration	School Leadership & Management	Empirical	Education	Perceptions	Institutional readiness
[26]	Human-Machine symbiosis in educational leadership	EMAL	Conceptual	Education	Symbiosis	Co-leadership model
[45]	Perceived influence of AI on educational leadership decision-making	Interactive Learning Environments	Qualitative	Education	Decision impact	Phenomenological insight
[43]	Navigating the challenges and opportunities of AI in educational leadership	Review of Education	Scoping review	Education	Challenges/opportunities	Integrated framework
[50]	Support for generative AI as predictor of leadership integration	EMAL	Empirical	Education	AI self-efficacy	Predictive leadership factors
[15]	The impact of artificial intelligence on organizations and managers	Springer	Conceptual	Corporate	Skills & leadership	Competency transformation
[12]	Harnessing AI for strategic decision-making: digital leadership catalyst	APJBA	Empirical	Corporate	Strategic leadership	Digital leadership mediation
[44]	Artificial intelligence and organizational resilience	Strategy & Leadership	Conceptual	Corporate	Digital leadership	AI-enabled resilience

Appendix B. Detailed Search Strings Used in Each Database

To ensure transparency and reproducibility of the literature identification process, this appendix provides the exact search queries used in each database included in the review. The search strategy was implemented between January and February 2026 and applied to three multidisciplinary academic databases widely used in management and organizational research: Web of Science Core Collection, Scopus, and ABI/INFORM (ProQuest). The search strings were designed to capture studies addressing the intersection between artificial intelligence technologies and organizational leadership processes. Boolean operators and quotation marks were employed to ensure conceptual precision while maintaining adequate sensitivity in the retrieval process. The searches were restricted to Title, Abstract, and Keywords fields in order to ensure that the retrieved publications addressed the AI–leadership relationship as a central research topic rather than as a peripheral mention.

Only peer-reviewed journal articles written in English were considered eligible during the search stage.

Appendix B.1. Web of Science Core Collection

Search conducted using the Topic (TS) field, which includes Title, Abstract, Author Keywords, and Keywords Plus. Search string: TS = ((“artificial intelligence” OR “AI” OR “algorithmic decision-making” OR “generative AI”) AND (“leadership” OR “digital leadership” OR “strategic leadership” OR “executive decision-making”)) Filters applied: Document type: Article; Language: English; Indexes searched: SCI-EXPANDED, SSCI, ESCI.

Appendix B.2. Scopus

Search conducted in TITLE-ABS-KEY fields. Search string: TITLE-ABS-KEY ((“artificial intelligence” OR “AI” OR “algorithmic decision-making” OR “generative AI”) AND (“leadership” OR “digital leadership” OR “strategic leadership” OR “executive decision-making”)). Filters applied: Document type: Article; Source type: Journal; Language: English.

Appendix B.3. ABI/INFORM (ProQuest)

Search conducted across Title, Abstract, and Keywords fields. Search string: (“artificial intelligence” OR “AI” OR “algorithmic decision-making” OR “generative AI”) AND (“leadership” OR “digital leadership” OR “strategic leadership” OR “executive decision-making”) Filters applied: Source type: Scholarly journals; Document type: Article; Language: English; Peer-reviewed: Yes.

Appendix B.4. Search Management and Deduplication

All records retrieved from the three databases were exported to a reference management system for organization and preliminary screening. Duplicate records identified across databases were systematically removed prior to the eligibility assessment phase. The cleaned dataset constituted the initial pool of studies subjected to the screening procedures described in Section 2.3 (Eligibility Criteria and Study Selection Process).

Appendix B.5. Replicability and Transparency

Providing the full database queries used in this review allows future researchers to replicate the search process or extend it to additional databases or time periods. The structured documentation of the search strategy follows the transparency and reporting recommendations outlined in the PRISMA 2020 statement [28–30].

Appendix C. Quality Appraisal Summary of Included Studies (*n* = 33)

Study	Design Type	Appraisal Criteria Applied	Quality Level	Notes
[2]	Conceptual	Clarity, coherence, theoretical contribution	High	Foundational framing
[36]	Conceptual	Clarity, coherence, argumentation	High	Strong synthesis
[37]	Empirical (quant.)	MMAT-informed (sampling, measures, validity)	High	Robust design

[14]	Structured review	Methodological transparency, synthesis rigor	High	Systematic approach
[52]	Conceptual	Theoretical clarity, relevance	Moderate	Emerging perspective
[4]	Conceptual	Coherence, strategic relevance	High	Strong theoretical grounding
[38]	Conceptual	Ethical reasoning, clarity	High	Normative contribution
[39]	Empirical	MMAT-informed (design, consistency)	High	Clear methodology
[25]	Empirical	MMAT-informed (moderation analysis)	High	Strong statistical model
[23]	Empirical	MMAT-informed (validity, design)	High	Solid empirical base
[40]	Conceptual	Clarity, argumentation	Moderate	Cautionary stance
[6]	Conceptual	Conceptual depth, coherence	High	Strong theoretical lens
[9]	Conceptual	Clarity, applicability	High	Policy relevance
[51]	Empirical (experimental)	MMAT-informed (design, control)	Moderate	Limited generalizability
[7]	Empirical	MMAT-informed (sampling, analysis)	High	Sector-specific strength
[13]	Conceptual	Clarity, synthesis	Moderate	Broad overview
[16]	Scoping review	Transparency, mapping rigor	High	Structured mapping
[48]	Systematic review	Methodological rigor, synthesis	High	Strong review design
[49]	Empirical	MMAT-informed (design, validity)	Moderate	Context-bound
[41]	Empirical	MMAT-informed (mediation model)	High	Strong analytical clarity
[27]	Empirical	MMAT-informed (collaboration model)	High	Clear contribution
[18]	Conceptual	Theoretical coherence	High	Capability-based model
[42]	Empirical	MMAT-informed (implementation)	Moderate	Context-specific
[10]	Empirical	MMAT-informed (adoption analysis)	High	Strong empirical support
[47]	Conceptual	Clarity, cognitive framing	High	Innovative perspective
[46]	Empirical	MMAT-informed (perception analysis)	High	Consistent design
[26]	Conceptual	Coherence, originality	High	Strong conceptualization
[45]	Qualitative	MMAT-informed (depth, credibility)	High	Rich insights
[43]	Scoping review	Mapping clarity, synthesis	High	Integrated framework
[50]	Empirical	MMAT-informed (predictive model)	High	Strong model
[15]	Conceptual	Clarity, synthesis	Moderate	General overview
[12]	Empirical	MMAT-informed (strategy analysis)	High	Strong linkage
[44]	Conceptual	Clarity, resilience framing	High	Relevant integration

Appendix D. Summary of Full-Text Exclusions (*n* = 13)

Reason for Exclusion	Number of Studies	Description
Lack of direct focus on leadership	4	Studies addressing artificial intelligence applications without explicit linkage to leadership constructs, roles, or decision-making responsibilities
Absence of AI as a central variable	3	Leadership-focused studies in which artificial intelligence was not a core analytical dimension but only tangentially mentioned
Conceptual misalignment	3	Studies not aligned with the configurational, multi-level, or organizational perspective adopted in this review
Insufficient analytical contribution	3	Papers lacking sufficient theoretical depth or empirical rigor to contribute meaningfully to the review objectives

References

1. Jones, W.A. Artificial intelligence and leadership: A few thoughts, a few questions. *J. Leadersh. Stud.* **2018**, *12*, 60–62. https://doi.org/10.1002/jls.21597.
2. Smith, A.M.; Green, M. Artificial intelligence and the role of leadership. *J. Leadersh. Stud.* **2018**, *12*, 85–87. https://doi.org/10.1002/jls.21605.
3. Brock, J.K.U.; Von Wangenheim, F. Demystifying AI: What digital transformation leaders can teach you about realistic artificial intelligence. *Calif. Manag. Rev.* **2019**, *61*, 110–134. https://doi.org/10.1177/1536504219865226.
4. Huber, D.M.; Alexy, O. The impact of artificial intelligence on strategic leadership. In *Handbook of Research on Strategic Leadership in the Fourth Industrial Revolution*; Edward Elgar Publishing: Cheltenham, UK, 2024; pp. 108–136. https://doi.org/10.4337/9781802208818.00012.

5. Sadiku-Dushi, N. Artificial Intelligence in Strategic Management: Shaping the Future of Business Leadership. In *Navigating AI in Business: Strategies and Insights Across Disciplines*; Springer Nature: Cham, Switzerland, 2026; pp. 45–63. https://doi.org/10.1007/978-3-032-02526-5_3.
6. Quaquebeke, N.V.; Gerpott, F.H. The now, new, and next of digital leadership: How Artificial Intelligence (AI) will take over and change leadership as we know it. *J. Leadersh. Organ. Stud.* **2023**, *30*, 265–275. https://doi.org/10.1177/15480518231181731
7. Burnside, E.S.; Grist, T.M.; Lasarev, M.R.; Garrett, J.W.; Morris, E.A. Artificial intelligence in radiology: A leadership survey. *J. Am. Coll. Radiol.* **2025**, *22*, 577–585. https://doi.org/10.1016/j.jacr.2025.01.006.
8. Chen, M.; Decary, M. Artificial intelligence in healthcare: An essential guide for health leaders. In *Healthcare Management Forum*; Sage Publications: Los Angeles, CA, USA, 2020; Volume 33, pp. 10–18. https://doi.org/10.1177/0840470419873123.
9. Fullan, M.; Azorín, C.; Harris, A.; Jones, M. Artificial intelligence and school leadership: Challenges, opportunities and implications. *Sch. Leadersh. Manag.* **2024**, *44*, 339–346. https://doi.org/10.1080/13632434.2023.2246856.
10. Tyson, M.M.; Sauers, N.J. School leaders' adoption and implementation of artificial intelligence. *J. Educ. Adm.* **2021**, *59*, 271–285. https://doi.org/10.1108/JEA-10-2020-0221.
11. Abositta, A.; Adedokun, M.W.; Berberoğlu, A. Influence of Artificial Intelligence on Engineering Management Decision-Making with Mediating Role of Transformational Leadership. *Systems* **2024**, *12*, 570. https://doi.org/10.3390/systems12120570.
12. Jaboob, M.; Al-Ansi, A.M.; Al-Okaily, M.; Ferasso, M. Harnessing artificial intelligence for strategic decision-making: The catalyst impact of digital leadership. *Asia-Pac. J. Bus. Adm.* 2025, *ahead-of-print*. https://doi.org/10.1108/APJBA-12-2024-0706.
13. Madanchian, M.; Taherdoost, H.; Vincenti, M.; Mohamed, N. Transforming leadership practices through artificial intelligence. *Procedia Comput. Sci.* **2024**, *235*, 2101–2111. https://doi.org/10.1016/j.procs.2024.04.199.
14. Bock, T.; von der Oelsnitz, D. Leadership-competences in the era of artificial intelligence–a structured review. *Strategy Leadersh.* **2025**, *53*, 235–255. https://doi.org/10.1108/SL-09-2024-0100.
15. Di Prima, C.; Bevilacqua, S.; Bresciani, S.; Ferraris, A. The impact of artificial intelligence on organizations and managers: The skills needed for an effective leadership. In *Artificial Intelligence and Business Transformation: Impact in HR Management, Innovation and Technology Challenges*; Springer Nature: Cham, Switzerland, 2024; pp. 163–176. https://doi.org/10.1007/978-3-031-58704-7_10.
16. Myszak, J.M.; Filina-Dawidowicz, L. Leaders' competencies and skills in the era of artificial intelligence: A scoping review. *Appl. Sci.* **2025**, *15*, 10271. https://doi.org/10.3390/app151810271.
17. Santana, M.; Díaz-Fernández, M. Competencies for the artificial intelligence age: Visualisation of the state of the art and future perspectives. *Rev. Manag. Sci.* **2023**, *17*, 1971–2004. https://doi.org/10.1007/s11846-022-00613-w.
18. Hossain, S.; Fernando, M.; Akter, S. Digital leadership: Towards a dynamic managerial capability perspective of artificial intelligence-driven leader capabilities. *J. Leadersh. Organ. Stud.* **2025**, *32*, 189–208. https://doi.org/10.1177/15480518251319624.
19. Barari, M.; Casper Ferm, L.E.; Quach, S.; Thaichon, P.; Ngo, L. The dark side of artificial intelligence in marketing: Meta-analytics review. *Mark. Intell. Plan.* **2024**, *42*, 1234–1256. https://doi.org/10.1108/MIP-09-2023-0494.
20. Mahmoud, A.B.; Tehseen, S.; Fuxman, L. The dark side of artificial intelligence in retail innovation. In *Retail Futures*; Emerald Publishing Limited: Manchester, UK, 2020; pp. 165–180. https://doi.org/10.1108/978-1-83867-663-620201019.
21. Papagiannidis, E.; Mikalef, P.; Conboy, K.; Van de Wetering, R. Uncovering the dark side of AI-based decision-making: A case study in a B2B context. *Ind. Mark. Manag.* **2023**, *115*, 253–265. https://doi.org/10.1016/j.indmarman.2023.10.003.
22. Rana, N.P.; Chatterjee, S.; Dwivedi, Y.K.; Akter, S. Understanding dark side of artificial intelligence (AI) integrated business analytics: Assessing firm's operational inefficiency and competitiveness. *Eur. J. Inf. Syst.* **2022**, *31*, 364–387. https://doi.org/10.1080/0960085X.2021.1955628.
23. Odugbesan, J.A.; Aghazadeh, S.; Al Qaralleh, R.E.; Sogeke, O.S. Green talent management and employees' innovative work behavior: The roles of artificial intelligence and transformational leadership. *J. Knowl. Manag.* **2023**, *27*, 696–716. https://doi.org/10.1108/JKM-08-2021-0601.
24. Plastino, E.; Purdy, M. Game changing value from Artificial Intelligence: Eight strategies. *Strategy Leadersh.* **2018**, *46*, 16–22. https://doi.org/10.1108/SL-11-2017-0106.
25. Wijayati, D.T.; Rahman, Z.; Fahrullah, A.R.; Rahman, M.F.W.; Arifah, I.D.C.; Kautsar, A. A study of artificial intelligence on employee performance and work engagement: The moderating role of change leadership. *Int. J. Manpow.* **2022**, *43*, 486–512. https://doi.org/10.1108/IJM-07-2021-0423.
26. Arar, K.; Tlili, A.; Salha, S. Human-Machine symbiosis in educational leadership in the era of artificial intelligence (AI): Where are we heading? *Educ. Manag. Adm. Leadersh.* **2024**, *0*, 1–24. https://doi.org/10.1177/17411432241292295.
27. Zárate-Torres, R.; Rey-Sarmiento, C.F.; Acosta-Prado, J.C.; Gómez-Cruz, N.A.; Rodríguez Castro, D.Y.; Camargo, J. Influence of Leadership on Human–Artificial Intelligence Collaboration. *Behav. Sci.* **2025**, *15*, 873. https://doi.org/10.3390/bs15070873.

28. Page, M.J.; McKenzie, J.E.; Bossuyt, P.M.; Boutron, I.; Hoffmann, T.C.; Mulrow, C.D.; Shamseer, L.; Tetzlaff, J.M.; Akl, E.A.; Brennan, S.E.; et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ* **2021**, *372*, 71. https://doi.org/10.1136/bmj.n71.
29. Page, M.J.; McKenzie, J.E.; Bossuyt, P.M.; Boutron, I.; Hoffmann, T.C.; Mulrow, C.D.; Shamseer, L.; Tetzlaff, J.M.; Moher, D. Updating guidance for reporting systematic reviews: Development of the PRISMA 2020 statement. *J. Clin. Epidemiol.* **2021**, *134*, 103–112. https://doi.org/10.1016/j.jclinepi.2021.02.003.
30. Page, M.J.; Moher, D.; Bossuyt, P.M.; Boutron, I.; Hoffmann, T.C.; Mulrow, C.D.; Shamseer, L.; Tetzlaff, J.M.; Akl, E.A.; Brennan, S.E.; et al. PRISMA 2020 explanation and elaboration: Updated guidance and exemplars for reporting systematic reviews. *BMJ* **2021**, *372*, n160. https://doi.org/10.1136/bmj.n160.
31. Sohrabi, C.; Franchi, T.; Mathew, G.; Kerwan, A.; Nicola, M.; Griffin, M.; Agha, M.; Agha, R. PRISMA 2020 statement: What's new and the importance of reporting guidelines. *Int. J. Surg.* **2021**, *88*, 105918. https://doi.org/10.1016/j.ijsu.2021.105918.
32. Swartz, M.K. PRISMA 2020: An update. *J. Pediatr. Health Care* **2021**, *35*, 351. https://doi.org/10.1016/j.pedhc.2021.04.011.
33. Ramasamy, A. Prisma 2020: Key changes and implementation aspects. *J. Oral Maxillofac. Surg.* **2022**, *80*, 795–797. https://doi.org/10.1016/j.joms.2021.12.018.
34. Yepes-Nuñez, J.J.; Urrútia, G.; Romero-García, M.; Alonso-Fernández, S. Declaración PRISMA 2020: Una guía actualizada para la publicación de revisiones sistemáticas. *Rev. Española Cardiol.* **2021**, *74*, 790–799. https://doi.org/10.1016/j.recesp.2021.06.016
35. Hong, Q.N.; Pluye, P.; Bujold, M.; Wassef, M. Convergent and sequential synthesis designs: Implications for conducting and reporting systematic reviews of qualitative and quantitative evidence. *Syst. Rev.* **2017**, *6*, 61. https://doi.org/10.1186/s13643-017-0454-2.
36. Peifer, Y.; Jeske, T.; Hille, S. Artificial intelligence and its impact on leaders and leadership. *Procedia Comput. Sci.* **2022**, *200*, 1024–1030. https://doi.org/10.1016/j.procs.2022.01.301.
37. Bronkhorst, P.V.; Becker, J. Use of artificial intelligence in leadership competency development and selection: An empirical study. *Consult. Psychol. J.* **2026**, *78*, 1–26. https://doi.org/10.1037/cpb0000288.
38. Crawford, J.; Cowling, M.; Allen, K.A. Leadership is needed for ethical ChatGPT: Character, assessment, and learning using artificial intelligence (AI). *J. Univ. Teach. Learn. Pract.* **2023**, *20*, 2. https://doi.org/10.53761/1.20.3.02.
39. Florea, N.V.; Croitoru, G. The impact of artificial intelligence on communication dynamics and performance in organizational leadership. *Adm. Sci.* **2025**, *15*, 33. https://doi.org/10.3390/admsci15020033.
40. Wang, Y. When artificial intelligence meets educational leaders' data-informed decision-making: A cautionary tale. *Stud. Educ. Eval.* **2021**, *69*, 100872. https://doi.org/10.1016/j.stueduc.2020.100872.
41. Divya, D.; Jain, R.; Chetty, P.; Siwach, V.; Mathur, A. The mediating effect of leadership in artificial intelligence success for employee-engagement. *Manag. Decis.* **2025**, *63*, 3676–3699. https://doi.org/10.1108/MD-01-2024-0213.
42. Kafa, A. Exploring integration aspects of school leadership in the context of digitalization and artificial intelligence. *Int. J. Educ. Manag.* **2025**, *39*, 98–115. https://doi.org/10.1108/IJEM-11-2024-0703.
43. Renta-Davids, A.I.; Camarero-Figuerola, M.; Camacho, M. Navigating the challenges and opportunities of artificial intelligence in educational leadership: A scoping review. *Rev. Educ.* **2025**, *13*, e70101. https://doi.org/10.1002/rev3.70101.
44. Shatila, K. Artificial intelligence and organizational resilience: The mediating role of agility, innovation, and digital leadership. *Strategy Leadersh.* 2025, *ahead-of-print*. https://doi.org/10.1108/SL-08-2025-0275.
45. Abduljaber, M. Perceived influence of artificial intelligence on educational leadership decision making, teaching and learning outcomes: A transcendental phenomenological study. *Interact. Learn. Environ.* **2025**, 1–15. https://doi.org/10.1080/10494820.2025.2563089.
46. Marrone, R.; Fowler, S.; Bathakur, A.; Dawson, S.; Siemens, G.; Singh, C. Perceptions and perspectives of Australian school leaders on the integration of artificial intelligence in schools. *Sch. Leadersh. Manag.* **2025**, *45*, 30–52. https://doi.org/10.1080/13632434.2024.2425019.
47. Matli, W. Integration of warrior artificial intelligence and leadership reflexivity to enhance decision-making. *Appl. Artif. Intell.* **2024**, *38*, 2411462. https://doi.org/10.1080/08839514.2024.2411462.
48. Bevilacqua, S.; Masárová, J.; Perotti, F.A.; Ferraris, A. Enhancing top managers' leadership with artificial intelligence: Insights from a systematic literature review. *Rev. Manag. Sci.* **2025**, *19*, 2899–2935. https://doi.org/10.1007/s11846-025-00836-7.
49. Zaidi, S.Y.A.; Aslam, M.F.; Mahmood, F.; Ahmad, B.; Raza, S.B. How will artificial intelligence (AI) evolve organizational leadership? Understanding the perspectives of technopreneurs. *Glob. Bus. Organ. Excell.* **2025**, *44*, 66–83. https://doi.org/10.1002/joe.22275.

50. Berkovich, I.; Eyal, O. Support for generative artificial intelligence as a predictor of middle leaders' generative artificial intelligence self-efficacy, valuing, and integration in school leadership work. *Educ. Manag. Adm. Leadersh.* **2025**, *0*, 1–19. https://doi.org/10.1177/17411432251361251.
51. Petrat, D. Attitude towards artificial intelligence in a leadership role. In *Congress of the International Ergonomics Association*; Springer International Publishing: Cham, Switzerland, 2021; pp. 811–819. https://doi.org/10.1007/978-3-030-74614-8_100.
52. Vargas Portillo, P. The transformative role of artificial intelligence in leadership and management development: An academic insight. *Dev. Learn. Organ. Int. J.* **2026**, *40*, 1–4. https://doi.org/10.1108/DLO-10-2024-0301.
53. Bollaert, L. Artificial Intelligence: Objective or Tool in the 21st-Century Higher Education Strategy and Leadership? *Educ. Sci.* **2025**, *15*, 774. https://doi.org/10.3390/educsci15060774.
54. Karakose, T.; Tülübas, T. School Leadership and Management in the Age of Artificial Intelligence (AI): Recent Developments and Future Prospects. *Educ. Process Int. J.* **2024**, *13*, 7–14. https://doi.org/10.22521/edupij.2024.131.1.
55. Goralski, M.A.; Tan, T.K. Artificial intelligence and sustainable development. *Int. J. Manag. Educ.* **2020**, *18*, 100330. https://doi.org/10.1016/j.ijme.2019.100330.
56. Petersson, L.; Larsson, I.; Nygren, J.M.; Nilsen, P.; Neher, M.; Reed, J.E.; Tyskbo, D.; Svedberg, P. Challenges to implementing artificial intelligence in healthcare: A qualitative interview study with healthcare leaders in Sweden. *BMC Health Serv. Res.* **2022**, *22*, 850. https://doi.org/10.1186/s12913-022-08215-8.
57. Baran, M. AI-augmented leadership: Redefining leaders' style and competencies. In *AI and Humanistic Management*; Routledge: Oxfordshire, UK, 2025; pp. 147–169.
58. Fernandes, S.; Sheeja, M.S.; Parivara, S. Synergizing Global Leadership Competencies with Artificial Intelligence and Expert Systems: A Multidisciplinary Approach for the Future of Management. In *International Conference on Science, Engineering Management and Information Technology*; Springer Nature: Cham, Switzerland, 2023; pp. 306–317. https://doi.org/10.1007/978-3-031-72287-5_19.
59. Hejres, S. The impact of artificial intelligence on instructional leadership. In *Technologies, Artificial Intelligence and the Future of Learning Post-COVID-19: The Crucial Role of International Accreditation*; Springer International Publishing: Cham, Switzerland, 2022; pp. 697–711. https://doi.org/10.1007/978-3-030-93921-2_36.
60. Islam, N.M.; Laughter, L.; Sadid-Zadeh, R.; Smith, C.; Dolan, T.A.; Crain, G.; Squarize, C.H. Adopting artificial intelligence in dental education: A model for academic leadership and innovation. *J. Dent. Educ.* **2022**, *86*, 1545–1551. https://doi.org/10.1002/jdd.13010.
61. Morandini, S.; Fraboni, F.; De Angelis, M.; Puzzo, G.; Giusino, D.; Pietrantoni, L. The impact of artificial intelligence on workers' skills: Upskilling and reskilling in organisations. *Inform. Sci.* **2023**, *26*, 39–68. https://doi.org/10.28945/5078.
62. Sposato, M. Leadership training and development in the age of artificial intelligence. *Dev. Learn. Organ. Int. J.* **2024**, *38*, 4–7. https://doi.org/10.1108/DLO-12-2023-0256.
63. Arcadi, P. Nursing leadership and artificial intelligence ethics: Safeguarding relationships and values. *Nurs. Ethics* **2025**, *32*, 2468–2476. https://doi.org/10.1177/09697330251366599.
64. Mumtaz, S.; Carmichael, J.; Weiss, M.; Nimon-Peters, A. Ethical use of artificial intelligence based tools in higher education: Are future business leaders ready? *Educ. Inf. Technol.* **2025**, *30*, 7293–7319. https://doi.org/10.1007/s10639-024-13099-8.
65. Cowling, M.; Crawford, J.; Allen, K.A.; Wehmeyer, M. Using leadership to leverage ChatGPT and artificial intelligence for undergraduate and postgraduate research supervision. *Australas. J. Educ. Technol.* **2023**, *39*, 89–103. https://doi.org/10.14742/ajet.8598.
66. Ali, A.; Xue, X.; Wang, N.; Yin, X.; Tariq, H. The interplay of team-level leader-member exchange and artificial intelligence on information systems development team performance: A mediated moderation perspective. *Int. J. Manag. Proj. Bus.* **2025**, *18*, 670–687. https://doi.org/10.1108/IJMPB-11-2023-0253.
67. Krause, W.; Balasescu, A. Engagement as leadership-practice for today's global wicked problems: Leadership learning for artificial intelligence. In *International Conference on Human-Computer Interaction*; Springer International Publishing: Cham, Switzerland, 2022; pp. 578–587. https://doi.org/10.1007/978-3-031-05061-9_41.
68. Clipper, B.; Batcheller, J.; Thomaz, A.L.; Rozga, A. Artificial intelligence and robotics: A nurse leader's primer. *Nurse Lead.* **2018**, *16*, 379–384. https://doi.org/10.1016/j.mnl.2018.07.015.
69. Ronquillo, C.E.; Peltonen, L.M.; Pruinelli, L.; Chu, C.H.; Bakken, S.; Beduschi, A.; Cato, K.; Hardiker, N.; Junger, A.; Michalowski, M.; et al. Artificial intelligence in nursing: Priorities and opportunities from an international invitational think-tank of the Nursing and Artificial Intelligence Leadership Collaborative. *J. Adv. Nurs.* **2021**, *77*, 3707–3717. https://doi.org/10.1111/jan.14855.

70. Gligor, D.M.; Pillai, K.G.; Golgeci, I. Theorizing the dark side of business-to-business relationships in the era of AI, big data, and blockchain. *J. Bus. Res.* **2021**, *133*, 79–88. https://doi.org/10.1016/j.jbusres.2021.04.043.
71. Cox, A.M.; Pinfield, S.; Rutter, S. The intelligent library: Thought leaders' views on the likely impact of artificial intelligence on academic libraries. *Libr. Hi Tech* **2019**, *37*, 418–435. https://doi.org/10.1108/LHT-08-2018-0105.
72. Santiago-Torner, C.; Corral-Marfil, J.-A.; Tarrats-Pons, E. Artificial Intelligence and the Reconfiguration of Emotional Well-Being (2020–2025): A Critical Reflection. *Societies* **2026**, *16*, 6. https://doi.org/10.3390/soc16010006.
73. Santiago-Torner, C.; Corral-Marfil, J.-A.; Tarrats-Pons, E. Digital Burnout and the Future of Human Sustainability at Work: A Critical Reflection from Organizational Development (2015–2025). *Organ. Dev. J.* **2025**, *43*, 108–119. https://doi.org/10.5281/zenodo.17790023.