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The Evolution of Leadership Paradigms in the Age of Artificial Intelligence: A Grounded Theory of Human–Machine Collaborative Leadership Systems

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Abstract

Objective: This study aimed to develop a grounded theory explaining how leadership paradigms evolve in organizations where artificial intelligence increasingly participates in decision-making, coordination, monitoring, learning, and strategic adaptation. Methods and Materials: This qualitative study employed a grounded theory design to explore the lived experiences of managers, senior experts, digital transformation specialists, and AI project leaders working in AI-adopting organizations in Tehran. Data were collected exclusively through semi-structured interviews. Twenty-four participants were selected through purposive and theoretical sampling, and data collection continued until theoretical saturation was achieved. Interviews focused on changes in leadership roles, human–AI interaction, decision authority, trust, accountability, ethical concerns, and emerging managerial capabilities. Interviews were transcribed verbatim and analyzed using open, axial, and selective coding with the support of NVivo software. Constant comparison, memo writing, peer checking, and participant validation were used to enhance analytical rigor. Findings: The analysis produced one core category, "human–machine collaborative leadership systems," and four main categories: algorithmic augmentation of leadership cognition, redistribution of decision authority, relational reconstruction of trust and legitimacy, and ethical-adaptive orchestration. Participants described AI not as a simple technical tool but as a quasi-organizational actor that changes how leaders interpret information, justify decisions, communicate with employees, and govern uncertainty. The findings showed that effective AI-era leadership depends on balancing machine intelligence with human judgment, maintaining transparent accountability, protecting relational trust, and building continuous learning capabilities. Conclusion: The study suggests that leadership in the AI era is evolving from a primarily human-centered influence process toward a collaborative sociotechnical system in which leadership is distributed across human actors, algorithmic systems, organizational routines, and ethical governance mechanisms. The proposed grounded theory contributes to leadership studies by explaining how leaders preserve meaning, responsibility, and legitimacy while integrating AI into organizational decision systems.

Keywords: Artificial intelligence; collaborative leadership; grounded theory; human–AI collaboration; leadership paradigms; machine intelligence; organizational decision-making.

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1. Introduction

Leadership studies have historically evolved in response to changing assumptions about organizations, authority, technology, and human agency. Classical leadership models emphasized traits, behaviors, charisma, and hierarchical influence, while later paradigms expanded the field toward transformational, distributed, adaptive, relational, and complexity-oriented perspectives. Transformational leadership, for example, shifted attention from command and control to vision, motivation, intellectual stimulation, and individualized

consideration, suggesting that leaders shape collective meaning rather than merely supervise performance (Bass, 1985; Burns, 1978). Later reviews of leadership theory emphasized that leadership cannot be reduced to the characteristics of individual leaders because it is embedded in dynamic social, cultural, technological, and organizational contexts (Avolio et al., 2009). Complexity leadership theory further argued that contemporary organizations operate as adaptive systems in which leadership emerges through interaction, learning, and distributed problem-solving rather than only through formal authority (Uhl-Bien et al., 2007). These theoretical developments are especially relevant in the age of artificial intelligence because AI does not merely add a new managerial tool; it changes the conditions under which authority, knowledge, coordination, responsibility, and organizational learning are produced.

Artificial intelligence has become a central force in organizational transformation because it enables prediction, classification, recommendation, automation, simulation, personalization, and real-time decision support across multiple managerial domains. In management research, AI is frequently framed through the tension between automation and augmentation. Automation refers to the replacement or delegation of tasks previously performed by humans, whereas augmentation refers to the enhancement of human cognition, judgment, and action through machine-generated outputs (Raisch & Krakowski, 2021). This distinction is important for leadership because the adoption of AI may either reduce human discretion or expand the leader's interpretive and strategic capacity. When AI is treated only as an automation mechanism, leadership may become increasingly procedural, metrics-driven, and algorithmically constrained. When AI is treated as an augmentation mechanism, leadership may become more analytical, anticipatory, and adaptive, while still relying on human sensemaking, ethical judgment, and relational influence. Therefore, the AI era requires a more nuanced theory of leadership that moves beyond the binary opposition between human control and machine substitution.

The literature on human–AI collaboration suggests that the most productive organizational uses of AI often arise not from replacing humans but from designing complementary relationships between human and machine intelligence. Jarrahi (2018) argued that AI can support organizational decision-making by strengthening analytical processing, while humans remain crucial in contexts marked by ambiguity, uncertainty, tacit knowledge, moral evaluation, and political judgment. Similarly, Wilson and Daugherty (2018) described collaborative intelligence as a model in which humans and AI systems actively enhance each other's strengths. In this view, human actors contribute empathy, creativity, contextual awareness, and ethical reasoning, whereas AI systems contribute computational scale, pattern recognition, consistency, and rapid data processing. This complementarity has significant implications for leadership. The leader is no longer only a decision-maker who receives reports from subordinates; the leader increasingly becomes an orchestrator of human and machine contributions, deciding when to trust AI outputs, when to override them, when to explain them to employees, and how to embed them in organizational routines.

At the same time, AI complicates traditional assumptions about managerial authority and accountability. Algorithmic systems can allocate tasks, evaluate performance, recommend strategic priorities, forecast risks, identify talent, and influence resource distribution. These functions overlap with activities historically associated with managers and leaders. Kellogg et al. (2020) showed that algorithmic technologies reshape the terrain of organizational control because they can monitor, evaluate, and direct work in ways that are highly pervasive, opaque, and difficult to contest. This creates a leadership paradox: AI may increase organizational efficiency and decision accuracy, but it may also weaken employee voice, reduce transparency, and create ambiguity about who

is responsible for decisions. If an AI system recommends a hiring decision, a risk classification, or a performance intervention, the organization must still determine whether responsibility belongs to the human leader, the technical designer, the data governance team, the vendor, or the institutional process that authorized the system. Leadership in AI-mediated organizations therefore requires not only technical literacy but also accountability design.

Decision-making structures are also changing as AI becomes embedded in organizational processes. Shrestha et al. (2019) argued that AI affects organizational decision-making by changing the relationship between human judgment and machine-based decision outputs. Depending on the specificity of the decision domain, the availability of data, and the consequences of error, organizations may choose structures in which humans decide with AI support, AI decides with human oversight, or decisions are distributed between human and algorithmic agents. Such structures influence leadership paradigms because leaders must determine appropriate decision rights, escalation rules, explanation procedures, and boundaries of machine autonomy. In traditional bureaucratic leadership, authority is tied to formal position. In AI-enabled leadership systems, authority becomes partially embedded in data infrastructures, predictive models, platform rules, dashboards, and automated workflows. This does not eliminate human leadership, but it changes its locus from direct command to sociotechnical governance.

The growing literature on AI-driven leadership capabilities reinforces this shift. Recent research suggests that leaders in AI-intensive environments require technical, adaptive, and transformational capabilities to guide responsible organizational performance (Hossain et al., 2025). Technical capability does not mean that leaders must become software engineers, but it does require sufficient AI literacy to understand data quality, model limitations, algorithmic bias, explainability, and the conditions under which AI outputs should be challenged. Adaptive capability refers to the ability to reconfigure routines, roles, and organizational learning processes as AI changes work practices. Transformational capability refers to the ability to create meaning, legitimacy, and commitment around technological change. These dimensions indicate that AI-era leadership is not merely digital leadership with more advanced tools; it is a hybrid leadership paradigm in which strategic foresight, ethical responsibility, technological interpretation, and relational trust must be integrated.

Organizational culture is another critical dimension of AI-era leadership. AI adoption can trigger changes in work identity, communication patterns, status relations, professional expertise, and employee perceptions of fairness. Murire (2024) emphasized that AI reshapes organizational work practices and culture by influencing automation, decision-making, employee roles, innovation, resistance, and ethical concerns. Leaders therefore need to manage AI implementation as a cultural transformation rather than as a purely technical project. Employees may resist AI not because they oppose innovation but because they fear surveillance, deskilling, unfair evaluation, job insecurity, or loss of professional autonomy. These concerns become especially important in contexts where AI systems are introduced without sufficient explanation or participatory design. Leadership legitimacy in AI-mediated organizations thus depends on whether employees perceive AI as a tool for empowerment or as an instrument of opaque control.

Trust is central to this transformation. Trust in AI is not equivalent to trust in human leaders, but the two are increasingly interconnected. Employees may trust or distrust AI outputs based on perceived accuracy, transparency, fairness, explainability, and alignment with human values. They may also judge leaders based on how responsibly they deploy AI systems. If leaders use AI to justify unpopular decisions while avoiding personal accountability, trust may deteriorate. Conversely, if leaders openly communicate the limits of AI, invite human

review, protect employee dignity, and ensure ethical safeguards, AI may strengthen collective confidence in decision processes. Siau and Wang (2020) emphasized the importance of ethical AI, including fairness, accountability, transparency, and trust. These ethical considerations are not external to leadership; they are now part of the leader's core role in governing human–machine collaboration.

Despite these emerging insights, the literature still lacks sufficient grounded theory explaining how leaders themselves experience and interpret the evolution of leadership paradigms in AI-adopting organizations. Much existing research is conceptual, review-based, or focused on technical implementation, decision-making, or AI capabilities. Less is known about how leaders in real organizational contexts construct meaning around AI, renegotiate authority, maintain legitimacy, and develop collaborative routines with machine intelligence. This gap is particularly important in emerging-market and non-Western organizational contexts, where AI adoption may occur under distinctive institutional, cultural, economic, and infrastructural conditions. Tehran-based organizations, for example, operate in a context shaped by digital transformation pressures, resource constraints, sanctions-related technology challenges, local managerial traditions, and growing interest in data-driven decision-making. Studying leadership evolution in this context can enrich the global literature by showing how human–machine collaborative leadership is interpreted in a specific organizational environment.

Grounded theory is appropriate for this study because the phenomenon is complex, emerging, and insufficiently theorized. Rather than testing a predetermined leadership model, grounded theory allows categories to emerge from participants' experiences and enables the development of a process-oriented theoretical explanation (Charmaz, 2014; Corbin & Strauss, 2015). The present study therefore examines how leaders, managers, AI specialists, and organizational experts in Tehran understand the transformation of leadership in AI-enabled environments. The study focuses on how AI changes leadership cognition, authority, trust, accountability, ethics, and organizational learning. Accordingly, the aim of this study is to develop a grounded theory of human–machine collaborative leadership systems by explaining how leadership paradigms evolve in organizations adopting artificial intelligence.

2. Methods and Materials

This study employed a qualitative grounded theory design to explore the evolution of leadership paradigms in the age of artificial intelligence. Grounded theory was selected because the study sought to generate a theoretical explanation of an emerging organizational phenomenon rather than test an existing model. The research focused on how leaders and organizational actors interpret the integration of AI into managerial decision-making, coordination, communication, monitoring, and strategic adaptation. The study was conducted among participants working in Tehran-based organizations that had implemented or were actively experimenting with AI-enabled tools in areas such as customer analytics, human resource management, financial forecasting, operational optimization, digital marketing, risk assessment, and knowledge management.

Participants were selected using purposive and theoretical sampling. The initial inclusion criteria were direct experience with leadership, management, digital transformation, AI adoption, or AI-supported decision-making in an organizational setting; at least three years of professional experience; employment or consulting engagement with an organization located in Tehran; and willingness to participate in a recorded semi-structured interview. As analysis progressed, theoretical sampling was used to recruit participants who could elaborate emerging

categories, especially issues related to accountability, employee trust, algorithmic decision authority, and ethical governance. The final sample consisted of 24 participants. Theoretical saturation was reached after the twenty-first interview, when no substantially new conceptual properties emerged, and three additional interviews were conducted to confirm category stability and refine the relationships among categories.

Data were collected exclusively through semi-structured interviews. The interview protocol included open-ended questions about participants' experiences of AI in leadership and management, perceived changes in leadership roles, the distribution of decision authority between humans and AI, trust in machine-generated recommendations, employee reactions to AI-supported leadership, ethical challenges, and required competencies for future leaders. Sample questions included: "How has AI changed the way leaders make decisions in your organization?", "In what situations do managers trust or reject AI recommendations?", "How does AI affect employees' perception of leadership fairness?", and "What new capabilities do leaders need in human–AI collaborative environments?" Interviews lasted between 55 and 95 minutes, with an average duration of approximately 72 minutes. All interviews were conducted in a private setting or secure online environment, recorded with participant consent, and transcribed verbatim.

Data analysis followed the grounded theory procedures of open coding, axial coding, and selective coding. NVivo software was used to organize transcripts, assign codes, write analytical memos, compare cases, and develop category structures. In the open coding phase, the transcripts were examined line by line to identify meaning units related to leadership cognition, AI-supported decision-making, trust, control, resistance, accountability, ethics, and learning. In the axial coding phase, conceptually related codes were grouped into categories and subcategories, and relationships among conditions, actions/interactions, and consequences were explored. In the selective coding phase, the core category was identified and integrated with the main categories to construct the grounded theory. Constant comparison was used throughout the analysis by comparing participant statements within and across interviews, comparing early and later codes, and examining similarities and differences among managerial, technical, and strategic perspectives.

Trustworthiness was enhanced through several strategies. Credibility was supported by prolonged engagement with the data, participant validation of selected interpretations, and peer review of the coding structure. Dependability was strengthened through an audit trail documenting sampling decisions, coding revisions, memo development, and category integration. Confirmability was supported by reflexive memo writing to reduce the influence of researcher assumptions about AI and leadership. Transferability was addressed through thick description of the research context, participants, and category properties. Ethical considerations included informed consent, voluntary participation, confidentiality, anonymization of participant identifiers, and secure storage of transcripts and recordings. Participants were informed that they could withdraw at any stage without consequence.

3. Findings and Results

The demographic characteristics of the participants showed that the study included 24 organizational actors from Tehran with direct experience in AI adoption or AI-supported managerial processes. Thirteen participants were men (54.2%) and 11 were women (45.8%). Participants' ages ranged from 31 to 56 years. In terms of organizational role, seven participants were senior managers (29.2%), six were middle managers (25.0%), four were digital transformation specialists (16.7%), three were human resource managers (12.5%), two were AI

project managers (8.3%), and two were organizational consultants (8.3%). Regarding education, five participants held bachelor's degrees (20.8%), 14 held master's degrees (58.3%), and five held doctoral degrees (20.8%). Participants' professional experience ranged from 6 to 28 years. Ten participants worked in technology or software companies (41.7%), five in financial and banking organizations (20.8%), four in manufacturing and industrial firms (16.7%), three in service organizations (12.5%), and two in consulting firms (8.3%). This diversity allowed the analysis to capture multiple perspectives on how AI reshapes leadership across organizational contexts.

The first main category was **algorithmic augmentation of leadership cognition**. Participants repeatedly described AI as a system that expands the leader's capacity to perceive patterns, anticipate risks, compare scenarios, and reduce dependence on intuition alone. However, they did not interpret AI as a complete substitute for leadership judgment. Instead, they described a new cognitive partnership in which AI accelerates analytical work while leaders retain responsibility for interpretation, prioritization, and contextual meaning. One senior manager stated, "Before using AI dashboards, I made many decisions based on experience and scattered reports. Now I see patterns earlier, but I still have to ask whether the pattern makes sense for our people and our market." Another participant explained, "AI gives us probability, not wisdom. It can show that a customer segment may leave, but deciding how to respond is still a leadership issue." This category included three subcategories: data-expanded perception, predictive sensemaking, and judgmental filtering. Data-expanded perception referred to leaders' ability to access broader and more integrated information. Predictive sensemaking referred to using AI to anticipate future conditions rather than only react to past performance. Judgmental filtering referred to the leader's role in evaluating whether AI outputs were valid, relevant, ethical, and contextually appropriate. The analysis showed that leadership cognition is evolving from individual intuition toward hybrid sensemaking, where human experience and machine analytics are combined.

The second main category was **redistribution of decision authority**. Participants indicated that AI changes who or what is perceived as having influence over organizational decisions. In some organizations, AI tools only supported human decision-making; in others, AI recommendations strongly shaped managerial choices even when formal authority remained with human leaders. A digital transformation specialist said, "Officially, the manager decides, but when the AI score is visible to everyone, ignoring it becomes difficult. The system does not have a title, but it has power." This finding suggests that decision authority in AI-enabled organizations becomes partially embedded in algorithms, dashboards, scoring systems, and automated recommendations. Participants described a tension between efficiency and accountability. AI made decisions faster and more consistent, but it also created uncertainty about who should be answerable when outcomes were contested. One HR manager noted, "If an AI-based performance system marks someone as low potential, employees do not blame the software; they blame management for accepting it." This category included algorithmic influence, human override boundaries, and accountability ambiguity. The findings suggest that leaders must design clear decision protocols that define when AI recommendations are advisory, when they are mandatory, when human review is required, and how employees can challenge AI-supported decisions.

The third main category was **relational reconstruction of trust and legitimacy**. Participants emphasized that AI adoption affects not only decisions but also relationships between leaders and employees. Employees' acceptance of AI-mediated leadership depended on whether they believed leaders were using AI transparently, fairly, and respectfully. Participants reported that employees often became suspicious when AI systems were introduced without explanation, especially in performance evaluation, attendance monitoring, recruitment, and

productivity tracking. One middle manager stated, “The first reaction was fear. Employees asked whether the system was helping them or watching them.” Another participant observed, “Trust increased only when we explained what the AI could see, what it could not see, and who would review the results.” This category included transparency work, emotional reassurance, participatory implementation, and fairness communication. Transparency work referred to leaders’ efforts to explain AI processes in accessible language. Emotional reassurance referred to addressing fear, uncertainty, and perceived threats to dignity. Participatory implementation referred to involving employees in testing, feedback, and adjustment of AI systems. Fairness communication referred to clarifying how bias, errors, and appeals would be handled. The findings showed that AI-era leadership legitimacy depends on relational practices that humanize technological change and prevent AI from being perceived as an impersonal mechanism of control.

The fourth main category was **ethical-adaptive orchestration**. Participants described effective AI-era leaders as orchestrators who coordinate technology, people, ethics, learning, and strategy. They argued that leadership in AI environments requires continuous adaptation because AI systems evolve, organizational data change, employee capabilities vary, and ethical risks emerge over time. One AI project manager stated, “The most important leader is not the one who buys the best AI tool, but the one who creates the rules for using it responsibly.” Another participant said, “AI projects fail when leaders think implementation is the end. Actually, implementation is the beginning of learning.” This category included ethical boundary-setting, AI literacy development, cross-functional coordination, and continuous learning loops. Ethical boundary-setting referred to defining unacceptable uses of AI, especially in surveillance, discrimination, and fully automated high-stakes decisions. AI literacy development referred to helping managers and employees understand the strengths and limitations of AI. Cross-functional coordination referred to integrating technical teams, business units, legal advisors, HR professionals, and senior leadership. Continuous learning loops referred to monitoring AI performance, revising rules, and updating human skills. This category showed that AI-era leadership is less about one-time technological adoption and more about ongoing governance of a changing sociotechnical system.

The core category that integrated all findings was **human–machine collaborative leadership systems**. This core category explains the movement from leader-centered paradigms toward collaborative sociotechnical leadership, where leadership is enacted through interactions among human judgment, machine intelligence, organizational routines, ethical rules, and relational trust. The grounded theory suggests that AI does not simply support existing leadership practices; it reorganizes the architecture of leadership. Leaders become interpreters of algorithmic insight, designers of decision boundaries, guardians of trust, and orchestrators of adaptive learning. The process begins when AI expands the leader’s cognitive field, continues as decision authority becomes redistributed, generates relational challenges around trust and legitimacy, and requires ethical-adaptive orchestration to stabilize the system. When these elements are balanced, AI strengthens leadership by improving foresight, consistency, and responsiveness. When they are mismanaged, AI may produce opacity, resistance, accountability gaps, and weakened organizational trust.

4. Discussion and Conclusion

The purpose of this study was to develop a grounded theory explaining how leadership paradigms evolve in organizations adopting artificial intelligence. The findings showed that AI-era leadership is best understood as a

human–machine collaborative leadership system rather than as a simple extension of digital leadership or a replacement of human leaders by intelligent machines. The core category, human–machine collaborative leadership systems, indicates that leadership is increasingly enacted through the interaction of human judgment, algorithmic analysis, decision protocols, ethical governance, and relational trust. This finding aligns with the automation–augmentation perspective, which suggests that AI creates both substitution and enhancement effects in management (Raisch & Krakowski, 2021). In the present study, participants did not describe AI as eliminating leadership. Rather, they described AI as transforming the cognitive, relational, and ethical conditions under which leadership occurs. This supports Jarrahi's (2018) argument that human and machine intelligence are complementary in organizational decision-making, especially when decisions involve ambiguity, tacit knowledge, and contextual interpretation.

The first major finding concerned algorithmic augmentation of leadership cognition. Participants indicated that AI expands leaders' ability to identify patterns, anticipate risks, and compare alternatives. This result is consistent with studies suggesting that AI supports decision-making by enabling large-scale data analysis, prediction, and insight generation (Davenport & Ronanki, 2018; Shrestha et al., 2019). However, the participants also emphasized that AI outputs require human interpretation. This confirms the argument that human judgment remains essential in uncertain and equivocal environments where data alone cannot determine appropriate action (Jarrahi, 2018). Theoretically, this finding extends transformational and cognitive approaches to leadership by showing that leadership cognition is no longer located only in the individual leader's expertise, intuition, or vision. Instead, cognition becomes distributed across human and artificial agents. Leaders must therefore develop what can be called interpretive AI literacy: the ability to understand AI outputs without becoming passive recipients of algorithmic recommendations.

The second major finding concerned redistribution of decision authority. Participants reported that even when formal decision rights remained with human managers, AI systems gained practical influence over decisions through dashboards, scores, rankings, and recommendations. This finding is strongly aligned with the literature on algorithmic control. Kellogg et al. (2020) argued that algorithmic technologies transform organizational control by making monitoring, evaluation, and direction more pervasive and less transparent. The present study adds that algorithmic control also affects leadership authority. AI systems may not formally occupy managerial positions, but their outputs can become difficult to ignore, especially when they are presented as objective, data-driven, or scientifically superior. This produces a new leadership challenge: leaders must decide not only what to do but also how much authority to grant to machine-generated outputs. This finding supports Shrestha et al.'s (2019) view that AI changes organizational decision structures by altering the relationship between human and machine decision inputs.

The third major finding concerned trust and legitimacy. Participants emphasized that employees' acceptance of AI-supported leadership depended on transparency, fairness, participation, and emotional reassurance. This result is consistent with ethical AI literature, which identifies transparency, accountability, fairness, and trust as central principles for responsible AI use (Siau & Wang, 2020). It also aligns with organizational culture research showing that AI adoption produces cultural transformation and may generate resistance when employees experience uncertainty, fear, or exclusion (Murire, 2024). The present study extends these insights by showing that trust in AI and trust in leadership become interdependent. Employees do not evaluate AI systems separately from the leaders who implement and legitimize them. If leaders use AI as a shield for avoiding accountability,

trust declines. If leaders explain AI limitations, provide appeal mechanisms, and preserve human dignity, trust can be strengthened. Therefore, AI-era leadership requires relational transparency, not merely technical explainability.

The fourth major finding concerned ethical-adaptive orchestration. Participants viewed effective AI-era leaders as actors who coordinate technological capability, ethical boundaries, employee learning, and strategic adaptation. This result supports recent work on AI-driven leadership capabilities, which argues that leaders require technical, adaptive, and transformational capabilities to lead responsibly in AI-enabled organizations (Hossain et al., 2025). The present study provides a grounded explanation of how these capabilities operate in practice. Technical capability appears in leaders' ability to understand AI limitations. Adaptive capability appears in their ability to redesign workflows and decision rules. Transformational capability appears in their ability to create meaning, reduce fear, and align AI adoption with organizational values. Ethical-adaptive orchestration also reflects complexity leadership theory because leadership is enacted through adaptive interactions among multiple actors rather than through linear top-down control (Uhl-Bien et al., 2007).

Overall, the findings suggest that leadership paradigms are evolving through four interrelated shifts. The first shift is from intuition-centered leadership to augmented sensemaking. Leaders still rely on experience, but experience is increasingly combined with AI-generated analysis. The second shift is from hierarchical authority to hybrid decision governance. Formal authority remains human, but practical influence is distributed across algorithms, data infrastructures, and managerial interpretation. The third shift is from interpersonal trust alone to sociotechnical trust. Employees must trust not only the leader's intention but also the fairness and transparency of the systems leaders use. The fourth shift is from change leadership to continuous AI governance. Leaders are no longer responsible only for motivating people during technological adoption; they must continuously monitor AI performance, revise ethical boundaries, and support organizational learning.

These findings contribute to leadership theory in several ways. First, they suggest that AI-era leadership cannot be fully explained by traditional leader-centered theories. Although transformational, ethical, and adaptive leadership remain relevant, they must be reconceptualized in relation to machine intelligence. Second, the study contributes to human–AI collaboration literature by showing that collaboration is not only a task-level phenomenon but also a leadership-level phenomenon. Human–AI collaboration changes how leaders know, decide, influence, and justify action. Third, the study contributes to algorithmic management literature by showing that algorithmic control affects not only workers but also leaders, who must negotiate their own authority in relation to machine-generated recommendations. Fourth, the grounded theory offers a process model linking AI-supported cognition, redistributed authority, trust reconstruction, and ethical-adaptive orchestration.

The findings also have practical implications. Organizations should avoid implementing AI as a purely technical project detached from leadership development. AI adoption should be accompanied by leadership training in AI literacy, ethical reasoning, decision governance, communication, and change facilitation. Leaders should define clear boundaries for AI use, especially in high-stakes decisions involving people's careers, compensation, evaluation, and privacy. Organizations should also establish transparent appeal mechanisms so employees can question or challenge AI-supported decisions. Furthermore, cross-functional AI governance committees can help prevent the concentration of AI responsibility in either technical teams or senior managers alone. Effective AI-era leadership requires cooperation among leaders, data scientists, HR professionals, legal advisors, ethicists, and employees.

The Tehran-based context of this study adds another layer of interpretation. Participants worked in organizations facing both global AI pressures and local constraints related to infrastructure, access to advanced technologies, managerial traditions, and regulatory uncertainty. In such contexts, leadership may play an especially important role in translating AI from an imported technological ideal into a locally meaningful organizational practice. Leaders must adapt AI tools to available data quality, employee readiness, cultural expectations, and institutional limitations. This suggests that human–machine collaborative leadership systems may differ across contexts, and global AI leadership models should be sensitive to local organizational realities.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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