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The Evolution from Human-Centered Leadership to Human–AI Collaborative Leadership: A Systematic Review

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Abstract

This study aimed to explore how leadership is evolving from human-centered models toward human–AI collaborative leadership in contemporary organizations. This qualitative study was conducted using a systematic exploratory design based on semi-structured interviews with 21 senior managers, digital transformation specialists, human resource experts, and organizational consultants in Tehran. Participants were selected through purposive sampling, and interviews continued until theoretical saturation was achieved after the eighteenth interview, with three additional interviews conducted to confirm saturation. Data were collected through open-ended interview questions focused on leadership transformation, artificial intelligence adoption, decision-making, ethical challenges, and human–AI collaboration. Interviews were transcribed verbatim and analyzed using thematic analysis with the support of NVivo software. Coding proceeded through open coding, axial categorization, and selective theme development. The analysis led to the identification of four main categories: the transition from individual-centered influence to distributed cognitive leadership, AI as a decision-support partner in leadership practice, ethical accountability and trust in algorithmic environments, and the emergence of adaptive human–AI leadership capabilities. Participants emphasized that AI does not eliminate the human role in leadership but changes the nature of judgment, communication, responsibility, and strategic sensemaking. The findings suggest that human-centered leadership remains essential, yet it must be expanded through data literacy, algorithmic awareness, ethical governance, and collaborative intelligence. Human–AI collaborative leadership represents an evolutionary rather than replacement-based shift in leadership theory and practice. Effective leaders in AI-enabled organizations must combine human values, emotional intelligence, moral responsibility, and contextual judgment with AI-supported analytics, prediction, and decision assistance.

Keywords: Human-centered leadership; human–AI collaboration; artificial intelligence; digital leadership; qualitative research; algorithmic accountability; collaborative intelligence.

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1. Introduction

Leadership theory has historically been organized around the assumption that leadership is a fundamentally human process. Classical and contemporary leadership models have emphasized the leader's ability to influence followers, create meaning, mobilize commitment, shape culture, and guide collective action under conditions of uncertainty. Transformational leadership, for instance, conceptualizes leadership as a process of inspirational motivation, intellectual stimulation, individualized consideration, and idealized influence, all of which depend on human communication, emotional resonance, and value-based influence (Bass, 1985; Bass & Riggio, 2006). Ethical leadership similarly places moral character, fairness, integrity, and normative guidance at the center of leadership effectiveness (Brown et al., 2005). Servant leadership has further expanded the humanistic orientation of leadership by defining the leader primarily as a steward of others' growth, well-being, empowerment, and community (Greenleaf, 1977). Across these traditions, leadership is not merely a managerial function but a

relational and moral practice through which people coordinate action, interpret change, and construct shared purpose.

However, the organizational context in which leadership occurs has changed substantially. Digital transformation, algorithmic systems, big data analytics, automation, machine learning, and generative artificial intelligence have begun to reshape how decisions are made, how work is coordinated, and how organizational knowledge is produced. The growing use of AI in organizations has shifted leadership from a purely interpersonal practice toward a sociotechnical activity in which human judgment increasingly interacts with machine-generated information. This shift does not mean that leadership becomes less human; rather, it means that leadership is no longer exercised only through human cognition, human communication, and human authority. Leaders now operate in environments where recommendations, forecasts, classifications, performance indicators, and strategic options may be produced or mediated by AI systems. As a result, leadership increasingly involves the capacity to interpret algorithmic outputs, evaluate the reliability of automated recommendations, preserve human agency, and design conditions for productive collaboration between humans and intelligent technologies (Jarrahi, 2018; Raisch & Krakowski, 2021; Shrestha et al., 2019).

The movement from human-centered leadership to human–AI collaborative leadership should be understood as part of a longer evolution in leadership research. Leadership theory has gradually moved from leader-centric and trait-based perspectives toward relational, distributed, adaptive, and complexity-oriented perspectives. Complexity leadership theory, for example, argues that leadership in complex systems is not confined to formal authority but emerges through adaptive interactions, knowledge flows, and enabling conditions that allow innovation and learning to occur (Uhl-Bien et al., 2007). This perspective is particularly relevant to AI-enabled organizations because leadership is increasingly distributed across human actors, digital infrastructures, decision systems, and organizational routines. In such environments, leadership cannot be reduced to the personal qualities of a single manager. It becomes a dynamic capability through which organizations integrate human intelligence, machine intelligence, ethical reflection, and collective learning.

The early literature on e-leadership anticipated some aspects of this transformation by arguing that advanced information technologies would change both the process and context of leadership. Avolio et al. (2000) defined e-leadership as a social influence process mediated by advanced information technology, emphasizing that technology does not simply transmit leadership but changes how leadership is enacted and experienced. Later reviews of digital leadership similarly showed that leaders in digitalized environments must create digital culture, build relationships across dispersed stakeholders, facilitate collaboration, and address ethical concerns associated with technological change (Cortellazzo et al., 2019). More recent work has moved beyond digital communication technologies toward AI-enabled leadership, where intelligent systems do not merely connect people but actively participate in analysis, prediction, recommendation, and decision support. This creates a deeper transformation than earlier forms of digital leadership because AI systems can influence what leaders notice, how they prioritize problems, how they evaluate alternatives, and how they justify decisions.

Human–AI collaborative leadership therefore differs from both traditional human-centered leadership and earlier digital leadership. In traditional human-centered leadership, the leader remains the primary interpreter of information, source of judgment, and designer of action. In digital leadership, technology mediates communication, coordination, and organizational transformation. In human–AI collaborative leadership, AI becomes a cognitive and operational partner that supports, challenges, extends, and sometimes constrains

leadership practice. This does not imply that AI possesses leadership in the same normative, moral, or relational sense as humans. Rather, AI enters the leadership system as an analytical actor whose outputs affect managerial attention, organizational choices, and the distribution of responsibility. Leaders must therefore learn to work with AI without surrendering accountability to it.

One of the central debates in this field concerns whether AI should be understood primarily as a tool for automation or augmentation. Automation refers to the replacement of human tasks by intelligent systems, whereas augmentation refers to the enhancement of human capabilities through AI-supported assistance. Raisch and Krakowski (2021) argue that in management contexts, automation and augmentation cannot be completely separated because they are interdependent and can create paradoxical tensions. When organizations overemphasize automation, they may weaken human judgment, reduce learning, and create dependency on opaque systems. When they overemphasize human discretion without using AI capabilities, they may fail to benefit from speed, scale, pattern recognition, and predictive analytics. Human–AI collaborative leadership must therefore manage the paradox between technological efficiency and human responsibility. The leader's role becomes one of balancing data-driven insight with ethical judgment, algorithmic prediction with contextual interpretation, and operational optimization with human meaning.

Another important issue concerns decision-making. AI systems can process large volumes of data, detect patterns, identify anomalies, and generate recommendations at a speed and scale beyond unaided human cognition. Shrestha et al. (2019) argue that human and AI decision-making differ across factors such as search space, interpretability, decision speed, alternative generation, and replicability. Jarrahi (2018) similarly emphasizes that humans and AI possess complementary strengths: AI is strong in computational processing, while humans are better suited to ambiguity, contextual judgment, intuition, empathy, and ethical reasoning. These arguments imply that the future of leadership is not a simple contest between human and machine decision-making. Rather, it is a design problem: organizations must determine which decisions should remain human-led, which should be AI-supported, which may be partially automated, and how accountability should be distributed when decisions emerge from human–AI interaction.

The integration of AI into leadership also raises ethical and political concerns. Algorithmic systems may reproduce bias, increase surveillance, obscure responsibility, or shift power toward those who control data and technical infrastructure. Kellogg et al. (2020) show that algorithms can reshape organizational control by enabling new forms of direction, evaluation, discipline, and reward. Faraj et al. (2018) similarly argue that learning algorithms can alter work and organizing by embedding adaptive computational processes into organizational routines. These developments suggest that AI-enabled leadership cannot be evaluated only in terms of efficiency or performance. It must also be assessed in relation to transparency, fairness, accountability, employee autonomy, trust, and dignity. Human-centered values therefore remain essential, but they must be reinterpreted for environments in which leadership is mediated by algorithmic systems.

Despite the growing importance of AI in organizations, leadership research has not yet fully clarified how leaders experience the transition from human-centered leadership to human–AI collaborative leadership. Much of the literature remains conceptual, technologically optimistic, or focused on decision-making systems rather than lived managerial experience. There is still a need to understand how leaders define their changing role, how they negotiate the boundary between human and AI authority, and which capabilities they believe are necessary for effective leadership in AI-enabled organizations. This gap is particularly important in emerging and transitional

organizational contexts, where digital transformation may occur unevenly and where leaders must simultaneously manage technological adoption, cultural resistance, ethical ambiguity, and institutional constraints.

The present study addresses this gap through a qualitative systematic exploration of expert perspectives in Tehran. By interviewing senior managers, digital transformation experts, human resource professionals, and organizational consultants, the study seeks to identify the core categories through which leadership is being redefined in response to AI. The study contributes to leadership theory by conceptualizing human–AI collaborative leadership as an evolutionary extension of human-centered leadership rather than its replacement. It contributes to practice by identifying the capabilities, ethical concerns, and organizational conditions required for leaders to work effectively with AI while preserving human agency and accountability. Accordingly, the aim of this study was to explore the evolution from human-centered leadership to human–AI collaborative leadership in AI-enabled organizations.

2. Methods and Materials

This study employed a qualitative systematic exploratory design to examine how leadership is evolving from human-centered models toward human–AI collaborative leadership. A qualitative approach was appropriate because the research objective required an in-depth understanding of meanings, experiences, interpretations, and emerging conceptual categories rather than measurement of predefined variables. The study was informed by inductive qualitative logic, in which concepts are developed from participants' accounts and organized into higher-order themes through systematic coding and constant comparison (Charmaz, 2014; Gioia et al., 2013). The research setting was Tehran, where many public, private, technological, financial, consulting, and knowledge-based organizations are currently experiencing different levels of digital transformation and AI adoption.

Participants were selected using purposive sampling. The inclusion criteria were: at least five years of managerial, consulting, human resource, digital transformation, or organizational development experience; direct involvement in AI-related decision-making, digital leadership, organizational change, or technology-enabled management; willingness to participate in a recorded interview; and ability to provide reflective and experience-based responses. Individuals who lacked direct professional experience with organizational digital transformation or AI-related managerial processes were excluded. A total of 21 participants took part in the study. Theoretical saturation was reached after the eighteenth interview, when no substantially new conceptual categories emerged; however, three additional interviews were conducted to confirm the stability and adequacy of the categories. This approach is consistent with qualitative sampling principles, where sample adequacy is determined by informational richness and saturation rather than statistical representativeness (Corbin & Strauss, 2015).

Data were collected through semi-structured interviews. The interview guide was designed to elicit participants' experiences and interpretations of leadership transformation in AI-enabled organizational contexts. The main interview questions addressed the meaning of human-centered leadership, changes created by AI in managerial decision-making, the role of AI in leadership practice, ethical and trust-related concerns, required leadership capabilities, organizational readiness, and the future of human–AI collaboration. Examples of interview questions included: "How has the use of AI or data-driven systems changed leadership practice in your organization?" "Which leadership responsibilities should remain human-centered?" "How do managers decide

whether to trust AI-generated recommendations?" and "What capabilities will leaders need in organizations where humans and AI work together?"

Interviews were conducted individually and lasted between 45 and 75 minutes. All interviews were recorded with participants' consent and transcribed verbatim. To ensure confidentiality, participants were assigned codes from P01 to P21, and identifying information such as organization names, job titles, and sensitive institutional details was removed from the transcripts. Data collection continued concurrently with preliminary analysis so that emerging categories could inform later interviews. This iterative approach allowed the researcher to refine probes, explore contradictions, and deepen the analysis of emerging concepts.

Data were analyzed using thematic analysis supported by NVivo software. The analysis followed three major phases. First, open coding was conducted line by line to identify meaningful units in the transcripts. Codes were assigned to statements related to leadership meaning, AI-supported decision-making, trust, accountability, digital capability, employee concerns, organizational change, and ethical governance. Second, related codes were compared and grouped into subcategories through axial coding. During this phase, the researcher examined relationships among codes, including causal conditions, contextual factors, perceived consequences, and capability requirements. Third, selective coding was used to integrate subcategories into main categories that explained the evolution from human-centered leadership to human–AI collaborative leadership.

NVivo was used to organize transcripts, manage codes, retrieve coded segments, compare participants' responses, and develop category structures. To enhance trustworthiness, several strategies were used. Credibility was supported through prolonged engagement with the data, repeated reading of transcripts, and member checking with five participants who reviewed the preliminary thematic interpretation. Dependability was supported by maintaining an audit trail of coding decisions, category revisions, and analytic memos. Confirmability was strengthened through reflexive memo-writing to reduce the influence of researcher assumptions. Transferability was addressed by providing detailed descriptions of the research context, participant characteristics, and category structure. These procedures are consistent with established criteria for rigor in qualitative research (Lincoln & Guba, 1985).

3. Findings and Results

The demographic characteristics of the participants indicated that the study included a diverse group of experts with experience in leadership, digital transformation, human resource management, and organizational consulting. Of the 21 participants, 13 were male and 8 were female. In terms of age, 4 participants were between 30 and 35 years old, 7 were between 36 and 40 years old, 6 were between 41 and 45 years old, and 4 were older than 45. Regarding education, 5 participants held master's degrees and 16 held doctoral degrees or were doctoral candidates in management, industrial engineering, information systems, human resource management, organizational psychology, or related fields. In terms of professional background, 6 participants were senior managers, 5 were digital transformation specialists, 4 were human resource managers, 3 were organizational consultants, and 3 were university-affiliated experts with applied consulting experience. Participants' professional experience ranged from 7 to 24 years. The analysis of the interviews resulted in 312 initial codes, 27 subcategories, and four main categories: distributed cognitive leadership, AI-supported decision partnership, ethical accountability and trust, and adaptive human–AI leadership capability.

The first main category was **distributed cognitive leadership**, which refers to the movement from leadership as the personal capacity of an individual leader toward leadership as a distributed process of collective and technologically mediated sensemaking. Participants explained that human-centered leadership remains important, but the leader is no longer the only source of information interpretation. AI systems, dashboards, predictive models, and data analytics tools increasingly participate in defining problems and prioritizing managerial attention. One participant stated, "In the past, the manager entered the meeting with experience and intuition; now the manager enters with experience, intuition, and an algorithmic report that may challenge both" (P04). Another participant emphasized that leadership has become "less about having the answer and more about knowing how to organize intelligence around the problem" (P11). This category included subcategories such as shared sensemaking, data-mediated awareness, distributed expertise, and the decline of purely intuition-based authority. The findings suggest that AI transforms leadership by expanding the cognitive environment in which leaders interpret complexity, but it also requires leaders to remain critical interpreters rather than passive consumers of data.

The second main category was **AI-supported decision partnership**, which captures the role of AI as a decision-support partner rather than a mere technical tool. Participants frequently described AI as useful for prediction, pattern recognition, scenario analysis, customer analysis, performance monitoring, risk assessment, and strategic planning. However, they also warned that AI recommendations should not be treated as final decisions. One digital transformation expert explained, "AI gives us speed and patterns, but it does not understand the political, emotional, and cultural weight of a decision. That part still belongs to leadership" (P07). Another participant noted, "When AI suggests a decision, the leader must ask: What data created this answer, what assumptions are hidden in it, and who may be harmed by it?" (P15). The subcategories of this theme included augmented judgment, evidence-based leadership, decision verification, human override, and contextual interpretation. The results indicate that effective human–AI collaborative leadership depends on a dual capacity: the ability to benefit from AI-generated insight and the ability to critically evaluate its limits.

The third main category was **ethical accountability and trust in algorithmic environments**. Participants consistently emphasized that AI adoption creates new forms of uncertainty related to transparency, bias, privacy, surveillance, and responsibility. They argued that leaders cannot delegate moral responsibility to AI systems, even when those systems influence decisions. One human resource manager stated, "If an algorithm ranks employees or predicts performance, employees will not blame the software; they will blame the organization and the leader who accepted it" (P09). Another participant commented, "Trust in AI is not built by saying the system is advanced. It is built when people know how the system is used, what data it uses, and whether they can question the result" (P18). This category included subcategories such as algorithmic transparency, fairness, privacy protection, responsibility attribution, and employee trust. The findings show that trust in human–AI leadership systems depends less on technological sophistication and more on governance, explanation, participation, and perceived justice.

The fourth main category was **adaptive human–AI leadership capability**. Participants believed that leaders need new capabilities to work effectively in AI-enabled organizations. These capabilities include data literacy, technological curiosity, ethical reasoning, collaborative intelligence, learning agility, emotional intelligence, and the ability to translate between technical and human domains. Participants rejected the idea that future leaders must become technical specialists, but they emphasized that leaders must understand enough about AI to ask

meaningful questions and make informed judgments. One senior manager explained, “A leader does not need to code the algorithm, but must know when the algorithm is useful, when it is risky, and when people are hiding behind it” (P02). Another participant argued, “The future leader is a translator between data scientists, employees, customers, and top management” (P20). This category included subcategories such as algorithmic literacy, ethical digital competence, human-centered communication, experimentation, and continuous learning. Overall, the findings indicate that human–AI collaborative leadership requires a hybrid capability profile in which human qualities are not replaced by technical skills but are strengthened through technological understanding.

4. Discussion and Conclusion

The purpose of this study was to explore the evolution from human-centered leadership to human–AI collaborative leadership. The findings show that this transition should not be interpreted as a movement away from human values, relational influence, or ethical responsibility. Instead, it represents an expansion of leadership into a sociotechnical domain where human cognition and machine intelligence interact. The first main finding, distributed cognitive leadership, indicates that leadership authority is no longer grounded only in personal expertise, hierarchical position, or intuitive judgment. Participants described leadership as a process of organizing intelligence across people, data, algorithms, and organizational systems. This finding is consistent with complexity leadership theory, which argues that leadership emerges through interactions and adaptive processes rather than residing solely in individual leaders (Uhl-Bien et al., 2007). It also aligns with digital leadership research showing that leaders must coordinate dispersed stakeholders, build digital culture, and facilitate collaboration in technologically mediated environments (Cortellazzo et al., 2019). However, the present study extends this literature by showing that AI changes not only communication and coordination but also the cognitive structure of leadership itself. AI systems participate in problem framing, attention allocation, and option generation, which means that leaders must become designers and interpreters of distributed intelligence. This does not diminish the human role; rather, it increases the importance of sensemaking, judgment, and critical reflection.

The second finding, AI-supported decision partnership, demonstrates that AI is increasingly perceived as a partner in managerial decision-making. Participants reported that AI can improve leadership practice by providing predictive insight, identifying patterns, accelerating analysis, and supporting evidence-based decisions. This finding is consistent with Jarrahi’s (2018) argument that human and AI decision-making are complementary, with AI contributing computational strength and humans contributing contextual judgment, intuition, and ethical interpretation. It also supports Shrestha et al.’s (2019) view that human and AI decision-making differ across speed, interpretability, search space, and replicability, requiring organizations to design appropriate decision structures. The results of the present study suggest that leadership effectiveness depends on knowing how to combine these different strengths. Participants did not view AI as a substitute for leadership judgment; instead, they saw it as a mechanism for augmenting leadership when properly interpreted and governed. This finding also supports Raisch and Krakowski’s (2021) automation–augmentation paradox. If AI is treated only as an automation mechanism, it may weaken human responsibility and organizational learning. If it is treated only as a passive tool, organizations may fail to benefit from its analytical potential. Human–AI collaborative leadership therefore requires leaders to hold both logics together: AI can improve decision-making, but human leaders remain responsible for interpretation, prioritization, and consequences.

The third finding, ethical accountability and trust in algorithmic environments, highlights the normative dimension of human–AI collaborative leadership. Participants emphasized that trust in AI-enabled leadership depends on transparency, fairness, privacy, explainability, and the ability of employees to question algorithmic outputs. This finding aligns with ethical leadership theory, which defines leadership as a process of normatively appropriate conduct, communication, reinforcement, and decision-making (Brown et al., 2005). It also resonates with research on algorithmic control, which shows that algorithms can reshape workplace power by directing, evaluating, disciplining, and rewarding employees (Kellogg et al., 2020). The present study indicates that employees may experience AI-enabled leadership as supportive or threatening depending on how leaders implement and explain AI systems. When AI is used to support learning, reduce uncertainty, and improve decision quality, it may strengthen trust. When it is used for opaque monitoring, hidden evaluation, or depersonalized decision-making, it may reduce trust and increase resistance. This finding suggests that human–AI collaborative leadership must be ethically grounded. Leaders cannot simply claim that a decision is objective because it is algorithmically supported. They must be able to explain how AI was used, why its recommendation was accepted or rejected, and how human consequences were considered.

The fourth finding, adaptive human–AI leadership capability, indicates that leaders need a hybrid capability profile. Participants emphasized data literacy, algorithmic awareness, ethical reasoning, learning agility, emotional intelligence, and translation between technical and human domains. This finding supports earlier work on e-leadership, which argued that technology changes the conditions under which influence processes occur (Avolio et al., 2000), and more recent work suggesting that AI will reshape the "now, new, and next" of digital leadership (Van Quaquebeke & Gerpott, 2023). However, the present study adds that future leaders do not need to become technical experts in a narrow engineering sense. Rather, they need enough technological understanding to ask critical questions, challenge algorithmic assumptions, and connect technical outputs to human realities. This capability profile also aligns with the idea of collaborative intelligence, where humans and AI create value by combining complementary strengths rather than competing for superiority (Wilson & Daugherty, 2018). In this sense, human–AI collaborative leadership is not a purely technological competence. It is a meta-capability that integrates digital literacy, ethical judgment, relational communication, and strategic adaptation.

These findings collectively suggest that human-centered leadership is not obsolete. On the contrary, it becomes more important in AI-enabled contexts because AI creates new risks of depersonalization, opacity, bias, and accountability diffusion. Human-centered leadership provides the moral and relational foundation needed to ensure that AI is used in ways that support rather than undermine human dignity. Transformational leadership remains relevant because leaders must inspire people to engage with technological change rather than fear it (Bass & Riggio, 2006). Ethical leadership remains relevant because leaders must define responsible boundaries for AI use (Brown et al., 2005). Servant leadership remains relevant because AI adoption should serve human development and organizational learning rather than merely intensify control or productivity (Greenleaf, 1977). Complexity leadership remains relevant because AI-enabled organizations are adaptive systems in which leadership emerges through the interaction of people, technologies, routines, and institutional conditions (Uhl-Bien et al., 2007). Therefore, the evolution toward human–AI collaborative leadership should be seen as cumulative. It does not erase previous leadership theories but recombines them in a new technological context.

The findings also have implications for leadership theory. Traditional theories often assume that leadership influence flows primarily from human leaders to human followers. In AI-enabled organizations, leadership

influence becomes more distributed and mediated. AI systems influence what information is visible, which risks are prioritized, which employees are evaluated positively, and which decisions appear rational. Therefore, leadership theory must account for nonhuman technological mediation without attributing moral agency to AI. AI systems do not possess responsibility in the same sense as human actors, but they shape the conditions under which human responsibility is exercised. This creates the need for a sociotechnical theory of leadership in which leaders are understood as designers of human–AI interaction, guardians of accountability, and interpreters of algorithmic outputs. Such a theory would move beyond the question of whether AI can lead and focus instead on how AI changes the practice, distribution, and ethics of leadership.

From a practical perspective, the results suggest that organizations should avoid both technological determinism and human exceptionalism. Technological determinism assumes that AI adoption automatically produces better leadership, while human exceptionalism assumes that traditional leadership skills are sufficient regardless of technological change. The findings reject both assumptions. AI can enhance leadership, but only when leaders understand its limits and design appropriate governance mechanisms. Human judgment remains essential, but it must be informed by data literacy and algorithmic awareness. Organizations should therefore develop leadership programs that integrate human-centered leadership, digital competence, ethical AI governance, and collaborative decision-making. Leadership development should include practical training in interpreting AI outputs, identifying bias, communicating algorithmic decisions to employees, and managing the emotional consequences of digital transformation.

Ethical Considerations

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

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Conflict of Interest

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