

From Human Leadership to Hybrid Intelligence Leadership: A Theory-Building Qualitative Study

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Abstract

This study aimed to develop a theory-building qualitative model explaining how leadership is transformed when human judgment, artificial intelligence systems, and organizational decision processes become interdependent. This qualitative study used a theory-building design based on semi-structured interviews with 24 participants selected through purposive and theoretical sampling from technology-intensive, financial, consulting, healthcare, and digital service organizations in Tehran. Participants included senior managers, digital transformation leaders, data and AI specialists, human resource managers, and strategy executives with direct experience in AI-enabled organizational decision-making. Data collection continued until theoretical saturation was achieved at the twenty-first interview, followed by three confirmatory interviews. Interviews were audio-recorded, transcribed verbatim, and analyzed using open, axial, and selective coding. NVivo software was used to organize transcripts, coding nodes, analytical memos, and category relationships. The analysis generated five main categories: algorithmic decision augmentation, relational reconfiguration of leadership authority, ethical and explainable governance, human-AI capability integration, and adaptive orchestration of hybrid intelligence. The findings showed that hybrid intelligence leadership does not simply replace human leadership with AI-based automation; rather, it reconstructs leadership as a distributed, interpretive, and ethically mediated practice in which leaders translate algorithmic outputs into organizationally legitimate decisions. Participants emphasized that AI strengthened analytical speed and pattern recognition but increased the need for human sensemaking, accountability, contextual judgment, and trust-building. The proposed model conceptualizes hybrid intelligence leadership as a dynamic leadership form in which human leaders act as orchestrators of human expertise, algorithmic insight, ethical safeguards, and adaptive organizational learning. The study contributes to leadership theory by explaining the transition from leader-centered decision authority to a hybrid configuration of judgment, data, technology, and collective intelligence.

Keywords: Hybrid intelligence leadership; artificial intelligence; qualitative research; theory building; human-AI collaboration; digital leadership; organizational decision-making.

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1. Introduction

Leadership has historically been conceptualized as a human-centered process through which individuals influence, coordinate, motivate, and guide others toward shared goals. Classical and contemporary theories of leadership have emphasized vision, interpersonal influence, ethical responsibility, contextual judgment, and the leader's capacity to mobilize collective action. However, the rapid diffusion of artificial intelligence (AI), machine learning, analytics platforms, algorithmic recommendation systems, and automated decision tools has created a new organizational condition in which leadership is no longer enacted solely through human cognition, interpersonal authority, or hierarchical position. Instead, leadership increasingly unfolds through the interaction of human actors and intelligent technological systems. In such environments, leaders do not merely decide; they interpret algorithmic outputs, govern data-driven systems, negotiate trust in AI-assisted decisions, and coordinate human-machine collaboration.



The movement from human leadership to hybrid intelligence leadership is grounded in a broader transformation of organizations from industrial and bureaucratic systems toward knowledge-intensive, digital, and adaptive systems. Complexity leadership theory argues that leadership in knowledge-era organizations must enable learning, adaptation, and emergent problem-solving in complex adaptive systems rather than rely only on command-and-control authority (Uhl-Bien et al., 2007). This argument becomes even more salient in AI-enabled organizations, where decision environments are marked by uncertainty, speed, interdependence, and data abundance. In such contexts, leadership requires not only social influence but also the capacity to orchestrate distributed intelligence across people, platforms, algorithms, and organizational routines.

Early discussions of e-leadership recognized that advanced information technologies reshape the nature of leadership by mediating communication, influence, and organizational coordination (Avolio et al., 2000). Digital leadership research later expanded this insight by showing that leaders in digitalized environments must build digital culture, support collaboration across dispersed stakeholders, and address ethical issues associated with technological transformation (Cortellazzo et al., 2019). Yet AI introduces a deeper shift than earlier digital tools because AI systems can classify, predict, recommend, learn from data, and participate in organizational decision-making. AI therefore becomes not merely a communication medium but an active component of the decision architecture.

The concept of hybrid intelligence provides a useful theoretical foundation for understanding this transformation. Hybrid intelligence refers to the complementary integration of human intelligence and artificial intelligence so that the combined system performs better than either humans or machines alone (Dellermann et al., 2019; Kamar, 2016). This view rejects simplistic replacement narratives and emphasizes complementarity: humans contribute contextual understanding, ethical reasoning, creativity, social interpretation, and responsibility, while AI contributes computational power, pattern detection, speed, scalability, and consistency. In organizational settings, hybrid intelligence implies that leadership must be reconceptualized as the design and governance of productive human–AI collaboration.

The leadership implications of AI are closely connected to the distinction between automation and augmentation. Automation refers to the substitution of human tasks by machines, whereas augmentation refers to the enhancement of human capabilities through technological support. However, Raisch and Krakowski (2021) argue that these two logics are deeply interdependent in management contexts, creating an automation–augmentation paradox. AI may simultaneously support leaders and displace elements of managerial discretion. For example, predictive dashboards may help leaders identify emerging risks, but they may also narrow attention toward measurable indicators and reduce tolerance for tacit, qualitative, or experiential judgment. Hybrid intelligence leadership therefore requires leaders to manage the tension between delegating decisions to AI and preserving human accountability for outcomes.

Organizational decision-making research further demonstrates that AI changes not only the content of decisions but also their structure. Shrestha et al. (2019) identify several ways in which human and AI decisions can be combined, including full delegation to AI, sequential human–AI decision-making, and aggregated human–AI decision-making. These structures have direct implications for leadership because they redistribute authority, expertise, and responsibility. When AI systems generate forecasts, screen candidates, recommend investment priorities, detect fraud, or optimize operations, leaders must determine when to trust the system, when to override

it, how to explain the decision to stakeholders, and how to maintain legitimacy when decision processes become partially opaque.

This transformation also raises questions about algorithmic control. Kellogg et al. (2020) show that algorithms can reshape organizational control through mechanisms of directing, evaluating, disciplining, and rewarding work. In AI-enabled organizations, leadership may therefore become entangled with algorithmic systems that monitor performance, rank employees, assign tasks, and standardize managerial action. While such systems can increase efficiency and consistency, they can also generate resistance, reduce perceived autonomy, and create new forms of surveillance or asymmetrical power. Hybrid intelligence leadership must therefore include ethical, relational, and political dimensions, not merely technological competence.

Human–AI collaboration also requires attention to the distinctive strengths and limitations of each form of intelligence. Jarrahi (2018) argues that AI is particularly useful for information processing, pattern recognition, and analytical tasks, whereas humans remain essential for judgment under uncertainty, ambiguity, and equivocality. This distinction is central to leadership because many strategic and organizational decisions cannot be reduced to technical optimization. Leaders must interpret weak signals, account for institutional and cultural constraints, manage emotions, negotiate conflicting values, and take responsibility for choices that affect people. AI can support these processes, but it cannot fully replace the human capacity for meaning-making, moral accountability, and relational legitimacy.

The emergence of machine behavior as a research agenda further reinforces the need to study AI systems as organizational actors that shape social, economic, and managerial interactions (Rahwan et al., 2019). Although AI systems do not possess human intentionality in the traditional sense, their outputs influence decisions, incentives, behaviors, and expectations. In leadership contexts, this means that AI becomes part of the leadership environment and, in some cases, part of the leadership process itself. Leaders must understand not only how people respond to leadership but also how AI systems behave, fail, learn, bias outcomes, and shape human behavior.

Despite growing interest in AI, management, and digital leadership, the construct of hybrid intelligence leadership remains theoretically underdeveloped. Existing studies often examine AI adoption, digital transformation, algorithmic management, or human–AI collaboration separately. Less is known about how leaders themselves experience the transition from human-centered authority to hybrid intelligence-based leadership, especially in emerging economy contexts where organizations face uneven digital maturity, regulatory ambiguity, talent shortages, and cultural expectations about managerial authority. The Iranian organizational context, particularly Tehran as the country's major administrative, financial, technological, and entrepreneurial hub, provides a relevant setting for examining how leaders interpret and enact this transition.

This study addresses this gap by developing a qualitative, theory-building model of hybrid intelligence leadership. Rather than treating AI as a neutral tool or leadership as an exclusively human capability, the study examines how leaders construct authority, judgment, ethics, trust, and organizational learning in human–AI decision environments. The central argument is that hybrid intelligence leadership is not a simple extension of digital leadership; it is an emergent leadership form in which human leaders orchestrate algorithmic insight, human expertise, ethical governance, and adaptive learning. Accordingly, the aim of this study was to develop a qualitative model explaining the transition from human leadership to hybrid intelligence leadership in AI-enabled organizational environments.

2. Methods and Materials

This study used a qualitative theory-building design to explore how leadership is transformed in organizations where artificial intelligence systems increasingly support, shape, or mediate decision-making. A qualitative approach was appropriate because the concept of hybrid intelligence leadership remains theoretically emergent and requires in-depth exploration of participants' lived experiences, interpretations, and meaning-making processes. The study followed an inductive logic inspired by grounded theory, with the purpose of generating categories and relationships rather than testing predetermined hypotheses.

The participants consisted of 24 professionals from Tehran-based organizations that had implemented AI-enabled tools, data analytics platforms, algorithmic decision systems, or digital transformation initiatives. Purposive sampling was used at the beginning of the study to select participants with direct knowledge of AI-supported leadership and organizational decision-making. Theoretical sampling was then used to refine emerging categories by recruiting participants who could clarify underdeveloped dimensions of the model. The final sample included 6 senior executives, 5 digital transformation managers, 4 data or AI specialists, 4 human resource managers, 3 strategy and innovation managers, and 2 organizational development consultants. Inclusion criteria were at least five years of professional experience, direct involvement in managerial or strategic decision-making, and practical exposure to AI, analytics, automation, or digital transformation projects. Participants who had only general familiarity with AI but no organizational implementation experience were excluded.

The exact number of participants was 24. Theoretical saturation was reached after the twenty-first interview, when no substantially new conceptual categories emerged and additional interviews primarily confirmed existing relationships among categories. Three further interviews were conducted to strengthen theoretical saturation, refine the proposed model, and validate the interpretive coherence of the emerging categories.

Data were collected through semi-structured interviews. The interview protocol was developed around the main research question: how is leadership reconstructed when human judgment and artificial intelligence systems become interdependent in organizational decision-making? The interview questions explored participants' experiences with AI-supported decisions, changes in managerial authority, trust in algorithmic outputs, leader competencies, ethical concerns, accountability, employee reactions, and the perceived future of leadership in AI-enabled organizations.

Examples of interview questions included: How has AI changed the way leaders make decisions in your organization? In which situations do leaders rely on AI outputs, and in which situations do they override them? How do employees respond when decisions are supported by algorithms? What new competencies do leaders need in AI-enabled organizations? What ethical or accountability challenges have emerged? Interviews lasted between 45 and 80 minutes, with an average duration of approximately 62 minutes. All interviews were conducted in a private setting or through secure online communication, depending on participant availability. With participant consent, interviews were audio-recorded and transcribed verbatim.

Data analysis was conducted using NVivo software. The analysis followed three main stages: open coding, axial coding, and selective coding. In the open coding stage, transcripts were read line by line to identify significant concepts, recurring meanings, and participant expressions related to leadership and AI. Initial codes

included examples such as “leader as interpreter of AI,” “algorithmic confidence,” “loss of intuitive authority,” “ethical responsibility,” “data literacy,” “employee resistance,” “human override,” and “AI as decision partner.”

In the axial coding stage, related codes were grouped into broader categories by examining conceptual similarities, causal relationships, contextual conditions, intervening factors, and consequences. Analytical memos were used to compare incidents across participants and identify patterns in how leaders described the shift from human-centered leadership to hybrid intelligence leadership. In the selective coding stage, the main categories were integrated around a core category: adaptive orchestration of hybrid intelligence. This core category explained how leaders coordinate human judgment, algorithmic recommendations, ethical governance, and organizational learning to produce legitimate and adaptive decisions.

To enhance trustworthiness, the study used member checking, peer debriefing, constant comparison, and an audit trail of coding decisions. Selected participants reviewed the interpretive summary of the findings and confirmed that the categories reflected their experiences. Peer review was conducted by two qualitative researchers familiar with management and digital transformation research. Dependability was supported through documentation of coding stages, memos, and category development in NVivo.

3. Findings and Results

The demographic characteristics of the participants showed diversity in professional role, gender, age, education, and industry. Of the 24 participants, 15 were men and 9 were women. In terms of age, 5 participants were between 30 and 35 years old, 8 were between 36 and 40, 7 were between 41 and 45, and 4 were older than 45. Regarding education, 6 participants held bachelor’s degrees, 14 held master’s degrees, and 4 held doctoral degrees. By organizational field, 6 participants worked in financial services, 5 in information technology and digital platforms, 4 in consulting and professional services, 3 in healthcare and health technology, 3 in manufacturing and supply chain organizations, and 3 in public or semi-public service organizations. In terms of professional position, the sample included 6 senior executives, 5 digital transformation managers, 4 AI or data specialists, 4 human resource managers, 3 strategy and innovation managers, and 2 organizational development consultants.

The first main category was **algorithmic decision augmentation**. Participants described AI as a mechanism that expanded the analytical capacity of leaders by providing faster access to patterns, predictions, risk indicators, customer behavior insights, and operational anomalies. However, they did not interpret AI as a complete substitute for leadership judgment. Rather, AI was described as a decision partner that improved the informational basis of leadership while still requiring human interpretation. One senior executive stated, “The system gives me a probability, not a decision. My responsibility begins exactly where the dashboard ends.” Another participant explained, “Before AI, we relied heavily on experience. Now experience must talk to data.” This category shows that hybrid intelligence leadership begins with the augmentation of managerial cognition, but the value of AI depends on the leader’s ability to interpret, contextualize, and challenge algorithmic outputs.

The second main category was **relational reconfiguration of leadership authority**. Participants emphasized that AI changed the symbolic and relational basis of authority in organizations. Traditional leadership authority was associated with experience, hierarchy, personal expertise, and intuition. In AI-enabled environments, however, authority became shared among leaders, data specialists, systems, and cross-functional teams. Several

participants noted that employees increasingly asked whether decisions were based on managerial preference or data-driven evidence. A human resource manager said, “When a promotion decision is supported by analytics, employees do not only question the manager; they question the model, the data, and the fairness of the criteria.” This category indicates that leadership authority becomes more distributed and more contestable under hybrid intelligence conditions. Leaders must therefore build legitimacy not only through charisma or position but through transparency, explanation, and participatory interpretation of AI-supported decisions.

The third main category was **ethical and explainable governance**. Participants repeatedly argued that AI intensified the ethical burden of leadership because algorithmic recommendations could influence hiring, promotion, customer prioritization, risk assessment, and resource allocation. Leaders were expected to ensure that AI-supported decisions were fair, explainable, and accountable. One data specialist noted, “The danger is not that managers use AI; the danger is that they hide behind AI.” Another participant stated, “If the algorithm is wrong, people still expect the leader to answer.” This category highlights that hybrid intelligence leadership requires governance mechanisms such as explainability, human oversight, bias monitoring, data quality review, and clear accountability boundaries. Ethical leadership in this context is not limited to personal integrity; it includes the design and supervision of responsible AI use.

The fourth main category was **human–AI capability integration**. Participants described new leadership competencies that combined technological literacy with human-centered capabilities. Leaders did not need to become technical AI engineers, but they needed enough AI literacy to ask critical questions about data, model assumptions, limitations, accuracy, and bias. At the same time, participants stressed that emotional intelligence, communication, sensemaking, and change leadership became more important, not less important. One digital transformation manager said, “A leader who understands only people will be slow, but a leader who understands only algorithms will be dangerous.” Another participant explained, “The future leader must translate between data scientists, business teams, and employees who fear being replaced.” This category suggests that hybrid intelligence leadership depends on integrative competencies: data literacy, ethical reasoning, strategic interpretation, relational communication, and adaptive learning.

The fifth main category was **adaptive orchestration of hybrid intelligence**, which emerged as the core category of the study. Participants described effective leaders as orchestrators who coordinate the contributions of humans and AI rather than privileging one over the other. These leaders decide which decisions should be automated, which should be augmented, which require human deliberation, and which require collective judgment. They also create feedback loops through which organizational members learn from AI outputs and AI systems are improved through human correction. A strategy manager stated, “The best leaders are not those who accept or reject AI completely. They know when to listen to the machine, when to listen to people, and when to create a conversation between them.” This category integrates the previous categories into a theoretical model: hybrid intelligence leadership is an adaptive orchestration process through which leaders align algorithmic insight, human judgment, ethical governance, and organizational learning.

4. Discussion and Conclusion

The purpose of this study was to develop a qualitative model explaining the transition from human leadership to hybrid intelligence leadership. The findings suggest that this transition is not a linear movement from human

authority to machine authority. Instead, it is a complex reconstruction of leadership around the interaction between human judgment, algorithmic insight, ethical governance, and organizational adaptation. The core category, adaptive orchestration of hybrid intelligence, shows that leaders in AI-enabled organizations must act as interpreters, integrators, governors, and sensemakers. This finding extends hybrid intelligence theory by applying it specifically to leadership and showing that the integration of human and artificial intelligence is not merely a technical design issue but also a relational, ethical, and organizational leadership process.

The first finding, algorithmic decision augmentation, is consistent with the argument that AI is most valuable when it complements rather than replaces human intelligence. Jarrahi (2018) emphasizes that AI contributes computational capacity, speed, and analytical consistency, while humans contribute contextual judgment and interpretation under ambiguity. Similarly, Dellermann et al. (2019) argue that hybrid intelligence emerges when human and machine capabilities are combined to achieve superior outcomes. The present study supports this view by showing that leaders experienced AI as a tool for expanding decision capacity, but not as a complete decision-maker. Participants' statements indicated that AI improved the informational quality of leadership but also created new interpretive responsibilities. This aligns with Raisch and Krakowski's (2021) automation–augmentation paradox, because leaders must continuously balance the benefits of delegation to AI with the need to preserve human oversight and accountability.

The second finding, relational reconfiguration of leadership authority, contributes to leadership theory by showing that AI changes the basis on which leadership authority is accepted or challenged. In traditional organizations, leadership authority is often grounded in formal position, expertise, experience, and interpersonal influence. In AI-enabled organizations, authority becomes more dependent on data legitimacy, model transparency, and the perceived fairness of decision criteria. This finding is consistent with Shrestha et al. (2019), who argue that AI changes decision-making structures by creating new combinations of human and machine judgment. It also extends digital leadership research, which emphasizes the importance of collaboration, stakeholder relationships, and digital culture in technology-mediated environments (Cortellazzo et al., 2019). The present study shows that hybrid intelligence leadership requires leaders to justify not only what they decide but also how AI participated in the decision process.

The third finding, ethical and explainable governance, supports prior research on algorithmic control and responsible AI. Kellogg et al. (2020) show that algorithms can become mechanisms of workplace control, shaping how employees are directed, evaluated, rewarded, and disciplined. The participants in this study similarly expressed concern that AI-supported decisions could affect employees' careers, autonomy, and trust in management. However, the findings also show that leaders can reduce these risks by establishing explainability, human review, bias monitoring, and accountability mechanisms. This finding is important because it reframes ethical leadership in AI-enabled organizations. Ethical leadership is no longer only a matter of personal values or fair interpersonal conduct; it also involves the governance of data infrastructures, model assumptions, algorithmic outputs, and human consequences.

The fourth finding, human–AI capability integration, indicates that hybrid intelligence leadership requires a new competency profile. Participants emphasized that leaders need AI literacy, data interpretation skills, ethical reasoning, communication ability, and change leadership capacity. This finding is consistent with Mikalef and Gupta (2021), who conceptualize AI capability as a multidimensional organizational capability involving technological, human, and intangible resources. It also aligns with Wilson and Daugherty's (2018) argument that

human–AI collaboration requires humans and machines to perform complementary roles. In leadership terms, this means that leaders must become translators across technical and social domains. They must understand enough about AI to evaluate its outputs, but they must also maintain the human skills required to create trust, reduce fear, and sustain organizational commitment.

The fifth finding, adaptive orchestration of hybrid intelligence, extends complexity leadership theory. Uhl-Bien et al. (2007) argue that leadership in complex adaptive systems should enable learning, creativity, and adaptation. The present study suggests that AI-enabled organizations intensify this requirement because adaptation occurs not only among people but also through the continuous interaction of people, data, algorithms, and organizational routines. Hybrid intelligence leadership therefore involves orchestrating multiple forms of intelligence across changing conditions. Leaders must determine when AI should accelerate decisions, when human deliberation is necessary, when ethical review should interrupt automation, and when organizational learning should reshape the system. This finding positions hybrid intelligence leadership as a dynamic capability for organizations operating in uncertain and data-rich environments.

The findings also contribute to the literature on machine behavior. Rahwan et al. (2019) argue that AI systems increasingly mediate social, economic, and organizational interactions and therefore require interdisciplinary study. The present study shows how this mediation appears in leadership practice. AI systems influence what leaders notice, which risks are prioritized, how employees are evaluated, and how decisions are justified. This means that leadership theory must move beyond the assumption that leadership is only a human-to-human influence process. In hybrid intelligence environments, leadership becomes a human–technology–organization process in which AI systems participate indirectly in influence, coordination, and control.

Another important implication of the findings is that hybrid intelligence leadership is not equivalent to technological adoption. Some organizations may adopt AI tools without developing hybrid intelligence leadership. In such cases, AI may remain isolated in technical departments, be used superficially for reporting, or become a source of mistrust and resistance. Hybrid intelligence leadership emerges only when leaders integrate AI into decision routines while preserving human interpretation, ethical accountability, and organizational learning. This distinction is theoretically significant because it separates AI implementation from leadership transformation. AI adoption is a technological process; hybrid intelligence leadership is a socio-technical leadership capability.

The study also highlights the emotional and cultural dimensions of AI-enabled leadership. Participants noted that employees may fear replacement, distrust algorithmic evaluations, or feel excluded from data-driven decisions. This supports the argument that leaders in digitalized environments must attend to human relationships and ethical concerns, not only technical efficiency (Cortellazzo et al., 2019). In the context of Tehran-based organizations, where managerial authority, interpersonal trust, and organizational hierarchy may remain culturally salient, the introduction of AI can create tension between traditional authority and data-based legitimacy. Hybrid intelligence leaders must therefore manage both technological transition and cultural interpretation.

From a theory-building perspective, the proposed model includes five interrelated components. Algorithmic decision augmentation provides the informational foundation. Relational reconfiguration of leadership authority explains how AI changes legitimacy and influence. Ethical and explainable governance defines the accountability structure. Human–AI capability integration identifies the competency base. Adaptive orchestration of hybrid intelligence integrates these elements into a dynamic leadership process. Together, these categories suggest that

hybrid intelligence leadership is a leadership form in which leaders generate organizational value by combining machine intelligence with human judgment, ethical responsibility, and adaptive coordination.

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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