



## *Orchestrating Human–AI Work Systems: Leadership, HPWS, and Agentic Intelligence*

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### Abstract

As artificial intelligence (AI) systems evolve from passive tools to agentic collaborators, organizations must redesign work systems to integrate human and machine intelligence effectively. This article develops a conceptual framework for orchestrating Human–AI work systems by synthesizing research on leadership, High-Performance Work Systems (HPWS), and agentic intelligence. We argue that leadership plays a central coordinating role in aligning AI capabilities with human expertise, shaping psychological safety, trust, and adaptive learning climates. Extending HPWS theory, we propose that practices such as selective staffing, continuous training, participatory decision-making, and performance-based incentives must be reconfigured to accommodate AI agents as semi-autonomous contributors. We introduce the concept of agentic intelligence orchestration, emphasizing dynamic role allocation, human oversight, and ethical governance as key mechanisms for value creation. The article advances theory by integrating sociotechnical systems thinking with strategic HRM and AI governance, offering a multilevel model linking leadership behaviors, HPWS configurations, and system-level outcomes including innovation, resilience, and responsible AI use. Implications for research and practice highlight how leaders can cultivate hybrid intelligence ecosystems that enhance performance while preserving human agency and accountability.

**Keywords:** Human–AI collaboration; High-Performance Work Systems (HPWS); agentic intelligence; AI leadership; sociotechnical systems; hybrid intelligence; organizational design; digital transformation; AI governance; strategic HRM



## 1. Introduction

The rapid integration of artificial intelligence (AI) into organizational work systems is transforming both operational processes and strategic leadership practices. Traditional AI implementations—once limited to automation and data processing—are evolving into systems with **agentic capabilities**, capable of autonomous decision-making, adaptive task performance, and continuous learning (Ajmal, 2022). These AI agents increasingly collaborate with humans toward shared organizational goals, shifting the locus of control from human actors alone to hybrid human–AI teams. This transformation presents both opportunities and challenges for contemporary leadership and High-Performance Work Systems (HPWS).

AI's evolution from passive tools to **collaborative agents** has expanded the scope of organizational design and strategic human resource management (Ajmal, Islam, & Khan, 2023). Research in organizational psychology and technology studies shows that advanced technologies not only augment employee performance, but can also co-produce outcomes with human collaborators when integrated effectively into work processes and leadership structures (Danatzis et al., 2025). Such *human–technology synergies* are essential in complex service and production environments, where autonomous AI capabilities act in concert with human expertise to achieve superior performance outcomes (Ahmed, Ajmal, & Haq, 2024).

Within the human resource management literature, HPWS represent a set of interrelated practices—including selective staffing, extensive training, performance-based rewards, and participatory decision-making—designed to enhance workforce capabilities and align individual contributions with organizational strategy (Ajmal, Islam, & Khan, 2024). Evidence shows that HPWS can improve employee satisfaction, retention, and performance (Benítez-Núñez et al., 2024). However, these practices were conceptualized prior to the widespread adoption of AI, leaving open questions about how HPWS must adapt when AI systems become active contributors to work outcomes. Empirical work indicates that AI adoption can support HPWS by enhancing employee development and training, underscoring the role of upskilling in translating AI integration into HR effectiveness (Zahoor et al., 2025).

Leadership in hybrid human–AI work systems is equally critical. Emerging scholarship highlights leadership's role in shaping the conditions under which human intelligence (HI) and artificial intelligence collaborate effectively (Ajmal, Khan, & Islam, 2024). Leaders must mediate strategic, normative, and ethical dimensions of human–AI interaction, ensuring that AI systems reinforce human judgment and organizational values rather than supplant them. Conceptual models emphasize leadership as a dynamic mediator between HI and AI, guiding ethical oversight, cognitive adaptability, and strategic integration of autonomous systems (Zárate-Torres et al., 2025).

As agentic AI systems assume a greater role in organizational workflows, leaders face a growing imperative to cultivate **agentic intelligence orchestration**—the capability to manage, coordinate, and ethically govern both human and AI agents within work systems (Ajmal, Manzoor, & Khan, 2024). This orchestration extends beyond traditional human leadership practices to encompass AI governance frameworks, human expertise amplification, and dynamic role allocation. Without such orchestration, organizations risk misalignment between human goals and machine actions, undermining performance, fairness, and accountability (Ajmal, Rahat, & Islam, 2024).



In this article, we synthesize research on leadership, HPWS, and agentic AI to offer a multilevel conceptual framework for orchestrating human–AI work systems. By integrating insights from organizational behavior and AI governance, we aim to clarify how leadership and HPWS configurations can be redesigned to leverage the strengths of both human and machine agents while preserving human agency, ethical oversight, and organizational accountability.

## 2. Literature Review

### 2.1. Human–AI Collaboration and Sociotechnical Systems

The integration of artificial intelligence (AI) into organizational settings represents a profound shift in sociotechnical systems design. Sociotechnical systems theory posits that organizational effectiveness depends on the joint optimization of social and technical subsystems (Trist & Bamforth, 1951). As AI evolves from decision-support tools to autonomous and adaptive systems, the boundaries between the social and technical domains increasingly blur (Zulfiqar, Ajmal, & Islam, 2024).

Recent scholarship conceptualizes AI as a team member rather than a passive tool (Seeber et al., 2020). In collaborative contexts, AI systems can augment human cognition, automate routine tasks, and enhance decision quality; however, effective integration requires redesigning workflows, authority structures, and accountability mechanisms. Human–AI collaboration is thus best understood as a form of hybrid intelligence, where complementary strengths—human creativity and contextual reasoning combined with machine computational power—drive performance outcomes (Raisch & Krakowski, 2021).

Empirical evidence suggests that AI can both enhance and disrupt work processes. On one hand, AI adoption has been associated with improved productivity and innovation when accompanied by organizational learning and skill development (Brynjolfsson, Rock, & Syverson, 2017). On the other hand, algorithmic management and opaque decision systems may reduce employee autonomy and trust if not governed appropriately (Kellogg, Valentine, & Christin, 2020). These tensions underscore the need for leadership structures capable of orchestrating hybrid human–AI systems.

### 2.2. Leadership in the Age of AI

Leadership research has increasingly addressed digital transformation and AI integration. Traditional leadership theories—such as transformational and empowering leadership—emphasize vision articulation, psychological safety, and capability development, all of which are critical in technology-intensive contexts (Avolio, Sosik, Kahai, & Baker, 2014). In AI-enabled organizations, leaders must go beyond motivating human followers to coordinating interactions between human and artificial agents.

Raisch and Krakowski (2021) argue that managing AI involves balancing automation and augmentation strategies, requiring ambidextrous leadership that simultaneously leverages machine efficiency and human creativity. Similarly, Shrestha et al. (2019) highlight the importance of human oversight in algorithmic decision-making, proposing governance structures that preserve accountability and transparency (Ajmal, Islam, & Khalid, 2025b).

Leadership also shapes employee responses to AI adoption. Research indicates that perceptions of fairness, trust, and ethical alignment mediate acceptance of algorithmic systems (Lee, 2018). Leaders therefore play a crucial role in framing AI as a collaborative partner rather than a threat, influencing psychological safety and adaptive learning climates. Digital leadership capabilities—including technological literacy, ethical



reasoning, and change management—are increasingly recognized as strategic assets in AI-driven organizations (Cortellazzo, Bruni, & Zampieri, 2019).

### 2.3. High-Performance Work Systems (HPWS) and Technological Change

High-Performance Work Systems (HPWS) refer to coherent bundles of human resource practices designed to enhance employee skills, motivation, and opportunities to contribute (AMO framework). Foundational research demonstrates that HPWS positively influence organizational performance, productivity, and employee commitment (Huselid, 1995; Jiang et al., 2012).

The AMO model (Ability, Motivation, Opportunity) suggests that employees perform optimally when organizations invest in skill development, performance incentives, and participatory structures (Appelbaum et al., 2000). However, digital transformation challenges traditional HPWS assumptions by introducing AI agents that perform tasks historically reserved for humans.

Recent studies indicate that technology adoption interacts with HPWS in complex ways. For example, AI implementation often necessitates reskilling initiatives and continuous learning systems to maintain workforce relevance (Brynjolfsson & McAfee, 2014). Moreover, HR analytics and AI-based performance management tools reshape evaluation processes, raising questions about transparency and bias (Minbaeva, 2018).

Importantly, the complementarities between AI systems and human capital investments appear critical. Research shows that productivity gains from digital technologies are strongest in organizations that combine technological investments with robust HR practices (Brynjolfsson & Hitt, 2000). Thus, HPWS may serve as an enabling infrastructure for effective AI integration, provided they evolve to address issues of algorithmic oversight, ethical governance, and human–AI collaboration.

### 2.4. Agentic Intelligence and Organizational Agency

The concept of agentic intelligence refers to AI systems capable of autonomous goal pursuit, adaptive learning, and interactive decision-making. Unlike rule-based automation, agentic AI exhibits a degree of independence in task execution and coordination. This shift raises theoretical questions regarding agency, accountability, and control in organizations (Ajmal, Islam, & Islam, 2025).

Agency theory traditionally conceptualizes relationships between principals and human agents (Jensen & Meckling, 1976). With the introduction of AI agents, the organizational landscape includes non-human actors whose actions can significantly influence outcomes. Research in information systems suggests that governance mechanisms must evolve to address algorithmic opacity and distributed accountability (Faraj, Pachidi, & Sayegh, 2018).

Agentic intelligence also intersects with ethical AI debates. Scholars emphasize the importance of transparency, explainability, and human-in-the-loop systems to mitigate risks associated with autonomous decision-making (Shrestha et al., 2019). Organizations must therefore establish leadership and HR frameworks that define the boundaries of AI authority and preserve human oversight.

### 2.5. Toward an Integrated Framework

The literature suggests three converging insights. First, human–AI collaboration requires sociotechnical alignment to optimize complementary capabilities. Second, leadership plays a central role in shaping trust, governance, and strategic direction in AI-enabled systems. Third, HPWS provide a structural foundation for developing workforce capabilities but



must adapt to incorporate AI agents as semi-autonomous contributors (Ajmal, Khalid, & Islam, 2025a).

Despite these advances, research remains fragmented across disciplines. Few studies integrate leadership theory, HPWS, and agentic AI into a unified framework for orchestrating hybrid work systems. This gap motivates the present study, which proposes a multilevel model linking leadership behaviors, HPWS configurations, and agentic intelligence governance mechanisms to organizational outcomes such as innovation, resilience, and responsible AI use.

### 3. Conceptual Framework: Orchestrating Human–AI Work Systems

#### 3.1. Theoretical Foundations

The orchestration of Human–AI work systems builds on three complementary theoretical foundations: (1) sociotechnical systems theory, (2) the High-Performance Work Systems (HPWS) perspective grounded in the AMO framework, and (3) leadership theory in digitally enabled contexts.

##### 3.1.1 Sociotechnical Systems and Hybrid Intelligence

Sociotechnical systems (STS) theory posits that organizational effectiveness depends on the joint optimization of social and technical subsystems (Trist & Bamforth, 1951). Historically, technologies were considered tools embedded within human-controlled processes. However, AI systems increasingly display adaptive and autonomous characteristics, functioning as quasi-agents within workflows (Faraj, Pachidi, & Sayegh, 2018).

Recent scholarship conceptualizes AI not merely as automation but as augmentation—enhancing human decision-making while also performing independent tasks (Raisch & Krakowski, 2021). The automation–augmentation paradox suggests that organizations must balance efficiency gains from automation with innovation and judgment derived from human cognition. Thus, hybrid intelligence systems require dynamic coordination rather than static task allocation.

Building on STS logic, we conceptualize Human–AI work systems as **interdependent networks of human actors and AI agents**, jointly contributing to performance outcomes. Orchestration refers to the continuous alignment of goals, capabilities, authority, and accountability across these actors.

#### 3.2. Leadership as System Orchestrator

Leadership theory provides the coordinating mechanism that integrates human and artificial agents. Traditional transformational and empowering leadership models emphasize vision creation, capability development, and psychological safety (Avolio et al., 2014). These elements become even more critical when AI technologies introduce uncertainty and perceived threats.

##### 3.2.1 Digital and Algorithmic Leadership

Digital transformation research highlights that leaders must develop technological literacy, ethical reasoning, and change management capabilities to effectively integrate AI (Cortellazzo, Bruni, & Zampieri, 2019). Leaders influence how employees interpret AI systems—either as supportive collaborators or as mechanisms of control.

Algorithmic management literature further demonstrates that leadership determines whether AI enhances autonomy or undermines trust (Kellogg, Valentine, & Christin, 2020). Without human oversight and transparent governance, algorithmic systems may erode legitimacy and employee engagement.



We therefore propose that **AI-oriented leadership** performs three orchestration functions:

1. **Strategic alignment** – linking AI deployment to organizational goals (Raisch & Krakowski, 2021).
2. **Capability enablement** – fostering digital skills and continuous learning (Brynjolfsson & McAfee, 2014).
3. **Ethical governance** – ensuring transparency, explainability, and accountability in algorithmic decisions (Shrestha, Ben-Menahem, & von Krogh, 2019).

Through these functions, leadership mediates the interaction between HPWS practices and agentic AI capabilities.

### 3.3. HPWS in Human–AI Contexts

HPWS are traditionally defined as coherent bundles of HR practices designed to enhance employee Ability, Motivation, and Opportunity (AMO framework) (Appelbaum et al., 2000). Extensive empirical evidence demonstrates that HPWS positively affect organizational performance (Huselid, 1995; Jiang et al., 2012).

#### 3.3.1 Reconfiguring HPWS for AI Integration

In Human–AI systems, HPWS must extend beyond human capital optimization to incorporate AI capabilities. This requires adaptation across three dimensions:

##### **Ability-enhancing practices.**

AI adoption increases the demand for digital literacy, data interpretation skills, and human–AI collaboration competencies (Brynjolfsson & McAfee, 2014). Continuous training and reskilling become central.

##### **Motivation-enhancing practices.**

Performance management systems must address hybrid outputs—evaluating both human contributions and AI-assisted outcomes. Transparency in algorithmic performance metrics influences fairness perceptions (Lee, 2018).

##### **Opportunity-enhancing practices.**

Participatory structures allow employees to shape AI implementation and provide feedback, improving acceptance and innovation outcomes (Faraj et al., 2018).

Importantly, research shows complementarities between technological investment and HR practices: productivity gains from digital technologies are strongest when accompanied by robust HR systems (Brynjolfsson & Hitt, 2000). Thus, HPWS function as the human capability infrastructure enabling AI-driven value creation.

### 3.4. Agentic Intelligence and Governance Mechanisms

Agentic intelligence refers to AI systems capable of autonomous goal pursuit and adaptive learning. Unlike traditional software, agentic systems influence organizational outcomes in semi-independent ways. This raises governance and agency challenges.

Agency theory (Jensen & Meckling, 1976) originally conceptualized principal–agent relationships between human actors. In AI-enabled systems, artificial agents introduce a new layer of delegated authority. Organizational decision structures must therefore define boundaries of AI autonomy.

Research on algorithmic decision-making emphasizes the need for **human-in-the-loop governance**, ensuring oversight in high-stakes contexts (Shrestha et al., 2019). Similarly, information systems research stresses the importance of transparency and explainability in maintaining trust (Faraj et al., 2018).

Within our framework, agentic intelligence contributes to:



- **Operational efficiency** (automation of routine tasks)
- **Analytical augmentation** (enhanced data-driven decision-making)
- **Adaptive learning** (continuous performance improvement)

However, its effectiveness depends on leadership and HPWS structures that regulate scope, accountability, and ethical alignment.

### 3.5. Integrated Multilevel Model

Drawing on the preceding foundations, we propose a multilevel conceptual framework with three core components:

#### (1) Leadership → Orchestration Capability

AI-oriented leadership establishes strategic clarity, fosters digital competence, and ensures ethical governance.

#### (2) HPWS → Human Capability Infrastructure

HPWS provide the skill base, motivational alignment, and participatory structures necessary for effective human-AI collaboration.

#### (3) Agentic Intelligence → Technological Capability

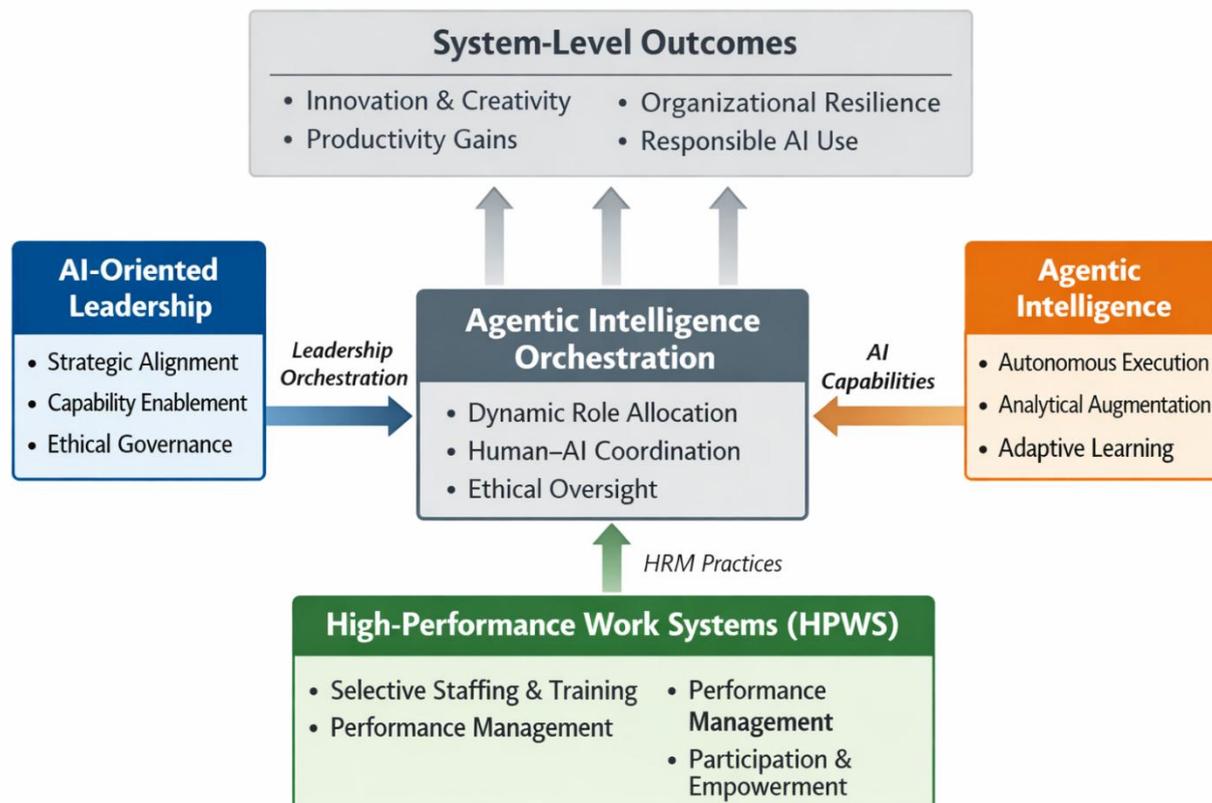
AI agents contribute autonomous execution and adaptive analytics.

These components interact dynamically. Leadership shapes HPWS configurations; HPWS enable effective use of agentic AI; and AI capabilities reshape work design and leadership demands.

The joint effect of these mechanisms leads to system-level outcomes:

- Innovation performance
- Organizational resilience
- Productivity enhancement
- Responsible and ethical AI utilization

This integrative perspective extends sociotechnical systems theory by incorporating leadership and HR architecture as primary coordination mechanisms in hybrid intelligence environments.



#### 4. Explanation of the Conceptual Model

The model proposes that effective Human-AI work systems emerge through the orchestration of three interdependent pillars: **AI-oriented leadership**, **High-Performance Work Systems (HPWS)**, and **Agentic Intelligence capabilities**, which jointly shape system-level organizational outcomes. The framework extends sociotechnical systems theory by integrating strategic leadership and HR architecture into hybrid intelligence environments.

##### 4.1. Theoretical Foundation: Sociotechnical Integration

The model is grounded in sociotechnical systems (STS) theory, which argues that performance depends on the joint optimization of social and technical subsystems (Trist & Bamforth, 1951). Traditionally, the technical subsystem was a passive tool. However, AI introduces adaptive, semi-autonomous agents that reshape the social structure of work (Faraj, Pachidi, & Sayegh, 2018).

Recent management research frames AI integration as an **automation-augmentation paradox**: organizations must balance machine efficiency (automation) with human creativity and judgment (augmentation) (Raisch & Krakowski, 2021). The present model builds on this by positioning orchestration as the central coordinating mechanism that aligns both subsystems dynamically.

##### 4.2. AI-Oriented Leadership: The Strategic Orchestrator

In the model, **AI-oriented leadership** drives orchestration through three core functions:

###### 4.2.1 Strategic Alignment

Leaders define how AI deployment supports organizational strategy. AI investments generate productivity gains only when aligned with complementary organizational



practices (Brynjolfsson & Hitt, 2000). Without strategic coherence, AI adoption may produce inefficiencies rather than value.

Raisch and Krakowski (2021) argue that leaders must balance automation and augmentation strategies simultaneously, requiring ambidexterity in technology governance.

#### 4.2.2 Capability Enablement

AI changes skill requirements, increasing demand for digital literacy, analytical reasoning, and adaptive learning (Brynjolfsson & McAfee, 2014). Leaders must create environments that support reskilling and continuous learning.

Transformational and digital leadership research shows that leaders influence how employees interpret technological change, shaping engagement and performance (Avolio et al., 2014; Cortellazzo, Bruni, & Zampieri, 2019).

#### 4.2.3 Ethical Governance

AI systems introduce algorithmic opacity and accountability challenges. Research on algorithmic management shows that poorly governed AI can reduce trust and perceived fairness (Kellogg, Valentine, & Christin, 2020).

Organizational decision-making literature emphasizes the need for human-in-the-loop structures to preserve accountability and transparency (Shrestha, Ben-Menahem, & von Krogh, 2019).

Thus, AI-oriented leadership ensures that AI enhances rather than undermines human agency.

### 4.3. High-Performance Work Systems (HPWS): The Human Capability Infrastructure

HPWS represent bundles of HR practices designed to enhance employee Ability, Motivation, and Opportunity (AMO) (Appelbaum et al., 2000). Meta-analytic research confirms that HPWS positively affect organizational performance (Jiang et al., 2012; Huselid, 1995).

In the model, HPWS function as the enabling infrastructure for human-AI collaboration.

#### 4.3.1 Ability-Enhancing Practices

Selective staffing, training, and digital upskilling ensure employees can effectively collaborate with AI (Brynjolfsson & McAfee, 2014).

#### 4.3.2 Motivation-Enhancing Practices

Performance management and incentive systems must adapt to hybrid outputs. Employee perceptions of fairness in algorithmic evaluation significantly affect acceptance (Lee, 2018).

#### 4.3.3 Opportunity-Enhancing Practices

Participation and empowerment structures allow employees to shape AI deployment and contribute to continuous improvement (Faraj et al., 2018).

Importantly, research demonstrates complementarities between digital technologies and HR systems—technology alone does not improve performance without supportive HR architecture (Brynjolfsson & Hitt, 2000).

### 4.4. Agentic Intelligence: Technological Capability

The right-hand pillar of the model captures **Agentic Intelligence**, referring to AI systems capable of autonomous execution, analytical augmentation, and adaptive learning.

Unlike traditional automation, agentic AI introduces semi-independent decision-making. Agency theory provides a useful lens here. Originally applied to human principal-agent



relationships (Jensen & Meckling, 1976), agency theory becomes more complex when artificial agents execute delegated authority.

Shrestha et al. (2019) argue that organizations must redesign decision structures to accommodate AI agents while preserving human accountability.

Faraj et al. (2018) further emphasize that learning algorithms reshape coordination patterns and authority boundaries, requiring new governance mechanisms.

Thus, agentic intelligence enhances:

- Operational efficiency (automation of routine tasks)
- Analytical quality (data-driven augmentation)
- Adaptive performance (continuous improvement)

But its impact depends on leadership and HPWS alignment.

#### 4.5. Agentic Intelligence Orchestration (Central Mechanism)

At the core of the model lies **Agentic Intelligence Orchestration**, the dynamic coordination of:

- Role allocation between humans and AI
- Human–AI task interdependence
- Ethical oversight and accountability

This mechanism reflects the sociotechnical principle of joint optimization (Trist & Bamforth, 1951). Orchestration is not static; it evolves as AI capabilities and human competencies co-develop.

Raisch and Krakowski (2021) emphasize that effective AI management requires continuously recalibrating the balance between automation and augmentation.

#### 4.6. System-Level Outcomes

The model proposes four key organizational outcomes:

1. **Innovation & Creativity** – AI augments human problem-solving (Raisch & Krakowski, 2021).
2. **Productivity Gains** – Digital technologies improve performance when combined with organizational complements (Brynjolfsson & Hitt, 2000).
3. **Organizational Resilience** – Adaptive human–AI systems enhance flexibility in uncertain environments (Faraj et al., 2018).
4. **Responsible AI Use** – Ethical governance structures maintain trust and legitimacy (Shrestha et al., 2019; Kellogg et al., 2020).

The model therefore argues that leadership and HPWS do not independently affect outcomes; rather, they shape how agentic AI capabilities are orchestrated within the organization.

#### Integrated Logic of the Model

The conceptual model suggests:

- Leadership shapes HPWS configuration and AI governance.
- HPWS enable employees to collaborate effectively with AI.
- Agentic AI provides technological capability.
- Orchestration mediates the relationship between these pillars and performance outcomes.

This integrated perspective extends sociotechnical theory by embedding leadership and HR systems as primary coordination mechanisms in hybrid intelligence environments.



## 5. Discussion

The findings of this conceptual model underscore the growing interdependence between leadership, HR architectures, and agentic AI capabilities in shaping Human–AI work systems. Rather than treating AI adoption as a purely technological upgrade, the model situates AI within a broader sociotechnical transformation that alters authority structures, work design, and performance logics. This perspective aligns with emerging scholarship arguing that AI does not simply automate tasks but reshapes coordination patterns and organizational cognition (Faraj, Pachidi, & Sayegh, 2018).

A central insight of the model is that AI's value creation potential depends on dynamic orchestration rather than static implementation. Prior research demonstrates that productivity gains from digital technologies are contingent upon complementary organizational investments (Brynjolfsson & Hitt, 2000). Similarly, the automation–augmentation paradox suggests that organizations must continually recalibrate the division of labor between human and artificial agents (Raisch & Krakowski, 2021). The model extends this logic by positioning orchestration as a continuous process of role negotiation, capability alignment, and governance calibration.

The discussion also highlights the evolving nature of organizational agency. Traditional agency theory conceptualizes delegation relationships among human actors (Jensen & Meckling, 1976). However, as AI systems assume semi-autonomous decision roles, accountability structures become more distributed and complex. Research on algorithmic decision-making indicates that organizations must redesign governance mechanisms to preserve transparency and human oversight (Shrestha, Ben-Menahem, & von Krogh, 2019). The model captures this shift by embedding ethical oversight within the orchestration mechanism.

Another salient theme concerns trust and legitimacy in AI-enabled workplaces. Empirical research shows that algorithmic systems can erode employee autonomy and perceived fairness when opaque or poorly governed (Kellogg, Valentine, & Christin, 2020). Likewise, perceptions of algorithmic fairness significantly influence user acceptance (Lee, 2018). These findings reinforce the argument that leadership and HR systems must operate in tandem to maintain legitimacy as AI assumes greater operational authority.

The role of HPWS within the model reflects a broader recognition that technological transformation amplifies the importance of human capital development. Extensive research confirms that HPWS positively influence organizational performance (Huselid, 1995; Jiang et al., 2012). Yet digital transformation introduces new skill requirements and coordination demands (Brynjolfsson & McAfee, 2014). The discussion therefore situates HPWS as adaptive infrastructures capable of sustaining hybrid intelligence environments by supporting reskilling, participation, and performance alignment.

Importantly, the model also acknowledges tensions inherent in Human–AI systems. While AI can enhance analytical quality and operational efficiency, excessive automation may crowd out human judgment and reduce innovation capacity (Raisch & Krakowski, 2021). Conversely, insufficient integration may limit AI's potential contributions. Research on learning algorithms indicates that hybrid systems function most effectively when humans and AI complement rather than substitute one another (Faraj et al., 2018). The orchestration mechanism thus reflects a balancing process that mitigates over-reliance on either subsystem.



Finally, the model situates Human–AI work systems within broader organizational adaptation processes. Digital technologies reshape competitive dynamics, requiring continuous learning and resilience (Brynjolfsson & McAfee, 2014). Organizations that integrate AI within coherent leadership and HR architectures are more likely to achieve sustainable performance outcomes than those adopting isolated technological solutions. This aligns with sociotechnical theory's core premise that joint optimization—not isolated subsystem enhancement—drives organizational effectiveness (Trist & Bamforth, 1951).

Overall, the discussion emphasizes that agentic intelligence introduces a structural shift in how work is coordinated, governed, and evaluated. The interplay among leadership, HPWS, and AI capabilities forms an adaptive system in which value creation depends on alignment, transparency, and dynamic recalibration. As AI systems continue to evolve toward greater autonomy, the orchestration of hybrid intelligence systems will likely become a defining feature of organizational design in the digital era.

## 6. Theoretical Implications

The proposed model advances theory at the intersection of leadership, strategic human resource management, and artificial intelligence by offering an integrative framework for understanding Human–AI work systems as dynamically orchestrated sociotechnical configurations. Several theoretical contributions emerge.

### 6.1. Extending Sociotechnical Systems Theory to Agentic AI

First, the model extends sociotechnical systems (STS) theory beyond its traditional focus on the alignment of human and technical subsystems (Trist & Bamforth, 1951). While STS theory emphasizes joint optimization, it historically conceptualized technology as passive infrastructure. Contemporary AI systems, however, exhibit adaptive and semi-autonomous characteristics that reshape coordination patterns and authority structures (Faraj, Pachidi, & Sayegh, 2018).

By introducing the concept of *agentic intelligence orchestration*, the framework reconceptualizes the technical subsystem as an active participant in organizational processes. This extension reflects the reality that AI systems increasingly perform evaluative and decision-making functions traditionally reserved for human actors (Shrestha, Ben-Menahem, & von Krogh, 2019). The model therefore advances STS theory by incorporating non-human agency as a structural feature of modern organizations.

### 6.2. Reframing Leadership Theory in Hybrid Intelligence Contexts

Second, the framework reframes leadership theory by positioning leaders not only as influencers of human followers but as orchestrators of hybrid intelligence systems. Traditional leadership models, such as transformational and e-leadership frameworks, emphasize vision articulation, empowerment, and technological facilitation (Avolio et al., 2014). However, they largely assume human-only team structures.

By integrating AI governance and algorithmic oversight into leadership functions, the model expands leadership theory to account for digital and algorithmic authority structures. The automation–augmentation paradox literature suggests that leaders must simultaneously leverage AI efficiency and preserve human creativity (Raisch & Krakowski, 2021). The present model deepens this perspective by conceptualizing leadership as a continuous balancing mechanism across automation, augmentation, and accountability domains.



This theoretical repositioning moves leadership research toward a systemic, multi-actor orientation where leaders coordinate interactions between heterogeneous agents—human and artificial—rather than managing homogeneous human teams.

### 6.3. Advancing HPWS Theory in the Digital Era

Third, the model contributes to High-Performance Work Systems (HPWS) theory by embedding AI capabilities within the AMO framework. Foundational HPWS research demonstrates that bundles of HR practices enhance organizational outcomes by increasing employee ability, motivation, and opportunity (Appelbaum et al., 2000; Jiang et al., 2012). Yet these frameworks were developed before the widespread emergence of AI-driven work systems.

By situating HPWS within Human–AI collaboration contexts, the model extends HPWS theory from a purely human capital optimization lens to a hybrid capability perspective. It highlights complementarities between technological investments and HR systems, consistent with research showing that digital technologies yield performance gains only when paired with complementary organizational practices (Brynjolfsson & Hitt, 2000).

This reframing shifts HPWS theory toward a broader understanding of capability ecosystems, where human competencies and AI functionalities co-evolve within coordinated systems.

### 6.4. Reconceptualizing Organizational Agency

Fourth, the framework advances agency theory by incorporating artificial agents into principal–agent relationships. Classical agency theory conceptualizes delegation and monitoring between human principals and agents (Jensen & Meckling, 1976). However, AI systems now execute delegated authority and influence outcomes in semi-autonomous ways.

The model contributes by theorizing how leadership and HR systems define boundaries of AI discretion, thus embedding governance within organizational design. This aligns with research emphasizing that algorithmic decision-making requires redesigned oversight structures to preserve accountability (Shrestha et al., 2019). By integrating these elements, the framework expands agency theory into a multi-actor domain that includes artificial agents as institutionalized organizational participants.

### 6.5. Integrating Disparate Research Streams

Finally, the model contributes by synthesizing previously fragmented research streams—leadership theory, HPWS research, AI governance, and sociotechnical systems—into a unified multilevel framework. Prior studies have examined AI's organizational impact in isolation (Faraj et al., 2018; Raisch & Krakowski, 2021), and HR research has separately explored the performance effects of HPWS (Huselid, 1995; Jiang et al., 2012).

The integrative framework demonstrates that these elements are interdependent rather than additive. Leadership shapes HPWS design; HPWS enable effective AI use; and AI capabilities reshape leadership demands. This systemic perspective provides a coherent theoretical architecture for analyzing organizational design in the era of agentic intelligence.

## 7. Practical Implications

The proposed model offers several actionable insights for organizations navigating the integration of agentic AI into work systems. Rather than approaching AI implementation



as a stand-alone technological initiative, organizations should treat it as a systemic transformation requiring coordinated leadership, HR, and governance redesign.

### **7.1. Leadership Development for AI-Oriented Orchestration**

Organizations should prioritize developing leaders capable of managing hybrid human–AI systems. Research indicates that digital transformation success depends heavily on leadership capabilities, including technological literacy and change management skills (Cortellazzo, Bruni, & Zampieri, 2019). Leaders must understand not only AI functionalities but also their implications for workflow design, employee autonomy, and ethical governance.

Furthermore, managing the automation–augmentation balance requires ambidextrous leadership that leverages AI efficiency while safeguarding human creativity (Raisch & Krakowski, 2021). Organizations should therefore invest in executive education and leadership training programs that emphasize AI governance, data-driven decision-making, and responsible AI use.

### **7.2. Redesigning HR Systems to Support Human–AI Collaboration**

AI adoption significantly reshapes workforce skill requirements. Evidence suggests that digital technologies yield productivity gains only when paired with complementary investments in human capital (Brynjolfsson & Hitt, 2000). Accordingly, organizations should embed AI capability development within High-Performance Work Systems (HPWS).

#### **7.2.1 Reskilling and Continuous Learning**

AI integration increases demand for analytical, interpretive, and digital collaboration skills (Brynjolfsson & McAfee, 2014). Organizations should establish continuous learning infrastructures, including digital literacy training and cross-functional AI education initiatives.

#### **7.2.2 Transparent Performance Management**

Algorithmic evaluation systems can influence perceptions of fairness and trust (Lee, 2018). HR departments must ensure transparency in AI-assisted performance metrics and provide mechanisms for human review and appeals to maintain legitimacy.

#### **7.2.3 Participation and Employee Voice**

Research on algorithmic management shows that opaque AI systems can erode employee autonomy (Kellogg, Valentine, & Christin, 2020). Involving employees in AI deployment decisions increases acceptance and enhances system refinement (Faraj, Pachidi, & Sayegh, 2018). Structured feedback channels and participatory design approaches are therefore critical.

### **7.3. Governance Structures for Agentic AI**

As AI systems assume semi-autonomous decision roles, organizations must establish clear governance frameworks. Decision rights, oversight responsibilities, and escalation protocols should be explicitly defined.

Organizational decision-making research emphasizes the importance of human-in-the-loop systems to preserve accountability and ethical standards (Shrestha, Ben-Menahem, & von Krogh, 2019). Organizations should implement:

- Explainability mechanisms for AI outputs
- Risk assessment and monitoring processes
- Clear boundaries of AI discretion

These governance mechanisms help maintain trust among employees and external stakeholders.



#### 7.4. Balancing Automation and Augmentation

Excessive automation may undermine human expertise, while underutilization may limit efficiency gains. The automation–augmentation paradox suggests that organizations should treat AI deployment as a dynamic calibration process rather than a one-time implementation (Raisch & Krakowski, 2021).

Leaders should periodically reassess task allocation between humans and AI, ensuring that AI handles routine, data-intensive tasks while humans retain roles requiring creativity, ethical judgment, and contextual reasoning.

#### 7.5. Building Organizational Resilience

Hybrid intelligence systems can enhance adaptability when properly integrated. Learning algorithms reshape coordination patterns and allow organizations to respond more effectively to environmental uncertainty (Faraj et al., 2018). However, resilience depends on leadership alignment and HR support structures.

Organizations that integrate AI within coherent leadership and HPWS architectures are better positioned to sustain long-term performance advantages than those adopting fragmented technological solutions (Brynjolfsson & Hitt, 2000).

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