

The Future of Human-Centered Leadership: Developing a Conceptual Model for Industry 5.0 Organizations

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Abstract

This study aimed to develop a conceptual model of human-centered leadership for Industry 5.0 organizations by exploring how leaders balance technological advancement, human dignity, ethical responsibility, resilience, and collaborative value creation. This qualitative study was conducted using an exploratory interpretive design. Data were collected through semi-structured interviews with 23 senior managers, digital transformation leaders, human resource directors, innovation consultants, and organizational development specialists working in Tehran-based organizations engaged with digitalization, automation, artificial intelligence, or advanced manufacturing practices. Participants were selected through purposive sampling, and theoretical saturation was achieved after the twentieth interview, with three additional interviews conducted to confirm conceptual completeness. Interviews lasted between 45 and 75 minutes and were transcribed verbatim. Data were analyzed using thematic analysis supported by NVivo software. Open coding, axial categorization, constant comparison, peer review, and member checking were used to improve analytical rigor and trustworthiness. The analysis produced four main categories: human dignity as the strategic core of leadership, technology as augmentation rather than substitution, participatory sensemaking and trust-based coordination, and resilient ethical learning in uncertain socio-technical environments. These categories formed a conceptual model in which human-centered leadership operates through value orientation, human–technology integration, dialogic participation, and adaptive accountability. The model suggests that Industry 5.0 leadership is not merely a soft complement to digital transformation but a strategic capability that converts technological complexity into humane, sustainable, and resilient organizational value. The study concludes that the future of leadership in Industry 5.0 depends on leaders' ability to design organizations in which humans remain the source of meaning, judgment, creativity, and ethical responsibility while intelligent technologies expand organizational capacity. Human-centered leadership should therefore be understood as a multi-dimensional capability integrating empathy, digital literacy, ethical governance, participatory decision-making, and systemic resilience.

Keywords: Human-centered leadership; Industry 5.0; digital transformation; qualitative research; artificial intelligence; organizational resilience; human–technology collaboration

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1. Introduction

Industry 5.0 has emerged as a critical conceptual response to the limitations of purely technology-driven industrial transformation. Whereas Industry 4.0 emphasized automation, cyber-physical systems, data exchange, smart manufacturing, and productivity gains, Industry 5.0 redirects attention toward the human, social, ethical, and ecological consequences of digital industrial development. The European Commission frames Industry 5.0 as a complement to Industry 4.0, emphasizing sustainable, human-centric, and resilient industry and a shift from narrow shareholder value toward broader stakeholder value (Breque et al., 2021). This distinction is important



because the intensification of automation, artificial intelligence, robotics, algorithmic control, and digital platforms has made organizations more technologically capable but not necessarily more humane, inclusive, or adaptive. Recent scholarship similarly argues that Industry 5.0 is value-driven rather than merely technology-driven, requiring organizations to reconsider the relationship between technological sophistication and human flourishing (Xu et al., 2021). In this sense, Industry 5.0 is not simply a new stage of industrial modernization; it is a normative and strategic reorientation of organizational design.

The concept of human-centered leadership becomes highly relevant in this transition because Industry 5.0 organizations cannot be governed effectively through traditional command-and-control models. When intelligent technologies become embedded in production, decision-making, customer relations, workforce monitoring, innovation, and strategic planning, leaders must make decisions not only about efficiency but also about dignity, autonomy, trust, fairness, psychological safety, and meaningful work. Human-centered leadership may be defined as a leadership orientation that places human needs, capabilities, rights, emotions, creativity, and ethical agency at the center of organizational transformation. It does not reject technology; rather, it frames technology as an enabling infrastructure for human development and collective value creation. This view is consistent with human-centered artificial intelligence perspectives, which argue that AI systems should enhance human self-efficacy, creativity, responsibility, and social participation rather than displacing human agency (Shneiderman, 2020). Therefore, the central question for Industry 5.0 leadership is not whether organizations should adopt intelligent technologies, but how leaders can ensure that such technologies remain subordinate to human purpose and organizational responsibility.

The leadership literature offers several theoretical foundations for understanding this issue, but no single leadership theory fully captures the demands of Industry 5.0 organizations. Servant leadership emphasizes humility, empowerment, stewardship, and the growth of followers (Eva et al., 2019; Greenleaf, 1977). Ethical leadership emphasizes normatively appropriate conduct, fairness, moral communication, and principled decision-making (Brown et al., 2005). Responsible leadership expands the leadership relationship beyond leaders and followers to include multiple stakeholders affected by organizational decisions (Maak & Pless, 2006). Complexity leadership theory highlights the importance of enabling adaptive, creative, and learning-oriented dynamics in complex systems (Uhl-Bien et al., 2007). These perspectives are individually valuable, yet Industry 5.0 requires an integrative model that connects human dignity, digital transformation, human-machine collaboration, resilience, sustainability, and stakeholder accountability. In this respect, human-centered leadership should be conceptualized not as a single behavioral style but as a higher-order leadership capability for governing complex socio-technical systems.

The rise of artificial intelligence and collaborative technologies further complicates the leadership function. In Industry 5.0, leaders are increasingly responsible for shaping environments in which humans, algorithms, robots, digital twins, analytics systems, and platform infrastructures interact in real time. Studies on Industry 5.0 enabling technologies identify artificial intelligence, edge/cloud computing, Internet of Everything, big data analytics, blockchain, advanced communication systems, and human-machine interfaces as major technological components of this paradigm (Maddikunta et al., 2022). Yet the mere presence of such technologies does not guarantee human-centered outcomes. If deployed without ethical governance and participatory design, digital systems may intensify surveillance, reduce autonomy, reproduce bias, weaken interpersonal trust, and convert employees into data points. Conversely, when embedded within a human-centered leadership logic, the same

technologies may reduce physical burden, improve decision quality, personalize learning, support inclusive work design, and enable more resilient organizational responses. Thus, leadership becomes the interpretive and ethical bridge between technological potential and human consequences.

Industry 5.0 also requires a new understanding of organizational resilience. Traditional resilience often refers to the capacity to withstand disruption and return to stability. However, in Industry 5.0 organizations, resilience must be understood as adaptive, relational, and learning-oriented. Organizations face rapid technological change, geopolitical uncertainty, labor market transitions, sustainability pressures, cybersecurity threats, and shifting employee expectations. In such conditions, resilience cannot be produced only through technical redundancy or operational contingency planning. It also depends on trust, psychological safety, participatory learning, ethical communication, and the ability of employees to reinterpret change as meaningful rather than threatening. Ghobakhloo et al. (2024) argue that the Industry 5.0 agenda is connected to human-centric, sustainable, and resilient production, while Tóth et al. (2023) emphasize the need for architectures that enable human-AI collaboration in industrial processes. These perspectives suggest that future leadership must integrate technological resilience with social and moral resilience.

Despite the growing literature on Industry 5.0, there remains a conceptual gap regarding how leadership should be reconstructed for this emerging context. Much of the existing scholarship focuses on technologies, production systems, smart manufacturing, sustainability, or human-machine collaboration. However, fewer studies examine how leaders interpret human-centeredness in practice, how they reconcile efficiency with dignity, how they build trust in algorithmic environments, and how they transform organizational culture in ways that make Industry 5.0 more than a technological slogan. This gap is particularly relevant in developing and transitional economies, where digital transformation is often pursued under resource constraints, regulatory ambiguity, uneven technological maturity, and cultural tensions between hierarchy and participation. Tehran-based organizations provide a meaningful context for examining these dynamics because many firms are simultaneously exposed to digital transformation pressures, human capital challenges, sanctions-related uncertainty, and the need for organizational resilience.

Human-centered leadership in Industry 5.0 should therefore be examined as a situated and lived organizational phenomenon. Leaders do not enact human-centeredness merely by adopting formal values or digital tools; they enact it through daily decisions about participation, communication, technology use, performance evaluation, employee development, ethical risk, and stakeholder accountability. A qualitative approach is suitable for exploring this phenomenon because it allows researchers to capture leaders' interpretations, tensions, experiences, and meaning-making processes. Semi-structured interviews can reveal how managers understand the human role in technologically advanced organizations, how they experience the pressure to automate, and how they attempt to protect human judgment and dignity while pursuing competitiveness. Such inquiry is essential because leadership models that are developed only from abstract theory may fail to reflect the contradictions and practical dilemmas that leaders encounter in real organizational settings.

The present study addresses this gap by developing a conceptual model of human-centered leadership for Industry 5.0 organizations. It explores how leaders in Tehran-based organizations interpret the future of leadership in technologically intensified environments and identifies the core categories through which human-centered leadership can be operationalized. The study contributes to the literature by connecting Industry 5.0 theory with leadership studies, human-centered AI, responsible leadership, and organizational resilience. It also offers a

practical framework for managers who must guide digital transformation without reducing employees to instruments of productivity or passive recipients of technological change. Therefore, the aim of this study was to develop a conceptual model of human-centered leadership for Industry 5.0 organizations based on the lived experiences and interpretations of organizational leaders and experts.

2. Methods and Materials

This study employed a qualitative exploratory design to develop a conceptual model of human-centered leadership in Industry 5.0 organizations. A qualitative approach was selected because the phenomenon under investigation is complex, emergent, context-dependent, and insufficiently explained by existing measurement-based models. The study sought to understand how leaders and organizational experts interpret human-centered leadership in relation to digital transformation, artificial intelligence, automation, organizational resilience, and human–technology collaboration. The research setting consisted of Tehran-based organizations operating in technology-intensive or digitally transforming sectors, including manufacturing, information technology, financial services, consulting, healthcare technology, and industrial services. Participants were selected through purposive sampling because the study required individuals with direct knowledge of digital transformation, leadership practice, organizational change, or human resource development. The final sample included 23 participants: seven senior managers, five human resource directors, four digital transformation managers, three innovation or technology consultants, two organizational development specialists, and two operations managers. The inclusion criteria were at least five years of managerial or expert experience, direct involvement in technology-related organizational change, willingness to participate in an interview, and familiarity with the human or organizational implications of digital transformation. Participants who lacked direct experience with organizational transformation or who could not provide detailed reflections on leadership and technology were excluded. Theoretical saturation was reached after the twentieth interview, when no substantially new categories emerged, and three additional interviews were conducted to confirm the stability and completeness of the emerging conceptual model.

Data were collected only through semi-structured interviews. The interview protocol was developed based on the Industry 5.0 literature, human-centered leadership concepts, responsible leadership, digital transformation theory, and preliminary expert consultation. The interviews began with general questions about participants' organizational roles and experiences with digital transformation, followed by more focused questions about the meaning of human-centered leadership, the role of leaders in human–technology collaboration, employee concerns about automation and AI, ethical dilemmas in digital work environments, and the capabilities required for future Industry 5.0 leaders. Examples of interview questions included: "How do you define human-centered leadership in a technologically advanced organization?", "What changes when leaders manage people and intelligent technologies at the same time?", "How can leaders prevent digital transformation from weakening employee dignity or autonomy?", and "What leadership capabilities will be most important for Industry 5.0 organizations?" Interviews lasted between 45 and 75 minutes and were conducted in Persian. With participants' consent, interviews were audio-recorded and transcribed verbatim. Field notes were written immediately after each interview to document contextual impressions, nonverbal emphases, and preliminary analytical ideas.

Participants were assured that their identities and organizational affiliations would remain confidential, and all quotations were anonymized using participant codes.

Data analysis was conducted through thematic analysis supported by NVivo software. The analysis followed an iterative process involving familiarization with the data, initial coding, code comparison, category development, theme refinement, and model construction. First, the interview transcripts were read several times to obtain a holistic understanding of participants' accounts. Second, open coding was conducted line by line to identify meaningful units related to leadership, technology, human dignity, participation, ethics, trust, learning, and resilience. Third, similar codes were grouped into broader categories through constant comparison. Fourth, axial analysis was used to identify relationships among categories and to clarify the structural logic of the emerging model. Fifth, the final conceptual model was developed by integrating the categories into a coherent explanatory framework. NVivo software was used to organize transcripts, manage codes, retrieve coded segments, compare categories, and document analytical memos. To enhance trustworthiness, several strategies were used. Credibility was strengthened through member checking with selected participants and peer review by two qualitative research experts. Dependability was supported by maintaining an audit trail of coding decisions, category revisions, and analytical memos. Confirmability was improved through reflexive memo-writing to reduce the influence of researcher assumptions. Transferability was supported by providing a detailed description of the research context, participants, sampling logic, and analytical procedures.

3. Findings and Results

The demographic profile of the participants showed that 23 individuals took part in the study, including 15 men and 8 women. In terms of age, 4 participants were between 30 and 35 years old, 8 were between 36 and 45 years old, 7 were between 46 and 55 years old, and 4 were older than 55 years. Regarding education, 5 participants held bachelor's degrees, 13 held master's degrees, and 5 held doctoral degrees. In terms of organizational role, 7 participants were senior managers, 5 were human resource directors, 4 were digital transformation managers, 3 were innovation or technology consultants, 2 were organizational development specialists, and 2 were operations managers. Participants' work experience ranged from 6 to 29 years, with 6 participants having 6–10 years of experience, 9 having 11–20 years, and 8 having more than 20 years. All participants were employed in or professionally connected to Tehran-based organizations that had implemented, planned, or evaluated digital transformation initiatives. This demographic diversity enabled the study to capture the perspectives of strategic decision-makers, technology-oriented managers, and human development specialists.

The first main category was **human dignity as the strategic core of leadership**. Participants repeatedly emphasized that Industry 5.0 leadership must begin with the recognition that employees are not merely users of technology, operators of systems, or variables in productivity models. Instead, employees should be understood as moral agents, knowledge holders, creative contributors, and stakeholders whose dignity must shape technological and organizational decisions. Many participants argued that digital transformation projects often fail not because the technologies are technically weak but because leaders ignore the emotional and existential concerns of employees. One senior manager stated, "When people hear automation, they do not first think about productivity; they think about whether they still matter." This statement reflects a central finding of the study: human-centered leadership requires leaders to protect employees' sense of worth during technological change.

Participants described dignity-oriented leadership as involving respect, transparency, listening, fair treatment, meaningful participation, and attention to psychological safety. A human resource director explained, “The future leader should not ask only what technology can do; the leader should ask what this technology does to people’s confidence, identity, and future.” In the emerging conceptual model, human dignity functions as the normative foundation of leadership. It determines how leaders define success, evaluate innovation, communicate change, and balance organizational performance with human consequences.

The second main category was **technology as augmentation rather than substitution**. Participants did not reject automation, artificial intelligence, analytics, or robotics; rather, they emphasized that the purpose of technology should be to expand human capability instead of replacing human judgment. This category captured the distinction between technology-centered transformation and human-centered transformation. Participants believed that Industry 5.0 organizations should design technological systems around human strengths such as creativity, contextual understanding, ethical reasoning, empathy, and tacit knowledge. One digital transformation manager noted, “AI can process more data than a manager, but it cannot understand the fear in a team or the informal tensions behind resistance.” Another participant stated, “The best technology is the one that makes people more capable, not more silent.” Participants reported that leaders must translate technology into a language that employees can understand and connect to their work. This requires digital literacy, but also emotional intelligence and ethical interpretation. In the conceptual model, augmentation-centered leadership includes three sub-processes: identifying human strengths that should be protected, selecting technologies that complement those strengths, and redesigning work processes so that employees remain active decision-makers. This category suggests that Industry 5.0 leadership is fundamentally different from automation-driven leadership because it does not treat efficiency as the only criterion of technological success.

The third main category was **participatory sensemaking and trust-based coordination**. Participants emphasized that Industry 5.0 organizations are too complex to be led through unilateral decision-making. Digital transformation affects roles, routines, power relations, performance indicators, and professional identities. Therefore, leaders must create participatory spaces in which employees can interpret change, express concerns, contribute ideas, and negotiate new ways of working. A consultant explained, “The leader’s role is not to announce the future; it is to help people make sense of the future together.” Participants described participation as especially important when organizations introduce AI-based decision systems, monitoring tools, or automated workflows. Without participation, employees may interpret technology as surveillance or managerial distrust. With participation, the same technology may be understood as a resource for learning and improvement. One operations manager stated, “When workers are involved before implementation, they defend the system. When they are informed after implementation, they resist it.” Trust was therefore identified as both an input and outcome of human-centered leadership. Leaders build trust through honesty, consistency, inclusion, and responsiveness; in turn, trust enables employees to accept uncertainty, experiment with new tools, and engage in collaborative problem-solving. In the conceptual model, participatory sensemaking functions as the relational mechanism that connects human dignity with organizational adaptation.

The fourth main category was **resilient ethical learning in uncertain socio-technical environments**. Participants viewed Industry 5.0 leadership as inseparable from uncertainty. They argued that future organizations will face continuous disruption from technological change, market volatility, environmental pressures, cyber risks, regulatory shifts, and workforce transformation. Under such conditions, leaders cannot rely only on fixed plans

or hierarchical control. Instead, they must create learning systems that are ethically guided and resilient. One participant stated, “In the past, a good leader had answers. Now a good leader creates the conditions where the organization can learn faster than the problem changes.” Participants emphasized that ethical learning includes the ability to question the unintended consequences of technology, identify risks to fairness and privacy, revise decisions when harm appears, and build feedback loops between employees, managers, customers, and technical experts. Another participant explained, “If an algorithm creates pressure or injustice, the leader cannot say, ‘The system decided.’ Responsibility must stay human.” This category shows that Industry 5.0 leadership requires adaptive accountability. Leaders must encourage experimentation while also maintaining ethical boundaries. They must support innovation while preventing technological harm. In the conceptual model, resilient ethical learning represents the dynamic capability through which organizations continuously realign technology, people, values, and strategy.

Based on these four categories, the study developed a conceptual model of human-centered leadership for Industry 5.0 organizations. The model consists of four interconnected dimensions: value foundation, technological orientation, relational process, and adaptive governance. The value foundation is human dignity, which defines the moral purpose of leadership. The technological orientation is augmentation, which ensures that intelligent systems expand rather than diminish human capability. The relational process is participatory sensemaking, which builds trust and collective interpretation during transformation. The adaptive governance dimension is resilient ethical learning, which enables organizations to respond to uncertainty while preserving responsibility. The model suggests that human-centered leadership produces three major organizational outcomes: meaningful digital transformation, sustainable human–technology collaboration, and resilient stakeholder value creation. These outcomes do not emerge automatically from technological investment; they emerge when leaders embed technological change within human values, participatory culture, and ethical learning systems.

4. Discussion and Conclusion

The findings of this study indicate that human dignity is the foundational dimension of human-centered leadership in Industry 5.0 organizations. Participants’ emphasis on dignity, identity, psychological safety, and meaningful work is consistent with the central premise of Industry 5.0, which places the worker’s wellbeing at the center of industrial transformation (Breque et al., 2021). This finding also aligns with the argument that Industry 5.0 represents a value-driven transition rather than a purely technology-driven extension of Industry 4.0 (Xu et al., 2021). In leadership terms, dignity-oriented leadership extends servant leadership and ethical leadership by emphasizing not only the development and fair treatment of followers but also the protection of human meaning in contexts where intelligent systems may reshape work identity. Eva et al. (2019) argue that servant leadership focuses on follower growth, empowerment, and service, while Brown et al. (2005) define ethical leadership in terms of moral conduct and normatively appropriate behavior. The present study expands these perspectives by showing that, in Industry 5.0, dignity becomes a strategic design principle. Leaders must ensure that digital transformation does not unintentionally weaken employees’ sense of agency, relevance, or professional worth. This is particularly important in organizations where AI and automation are introduced primarily through productivity-oriented narratives. When employees perceive technology as a threat to dignity, resistance is not simply irrational conservatism; it is an understandable response to perceived marginalization.

The second major finding, technology as augmentation rather than substitution, supports the human-centered AI literature and the Industry 5.0 emphasis on human-machine collaboration. Shneiderman (2020) argues that human-centered AI should support self-efficacy, creativity, responsibility, and human control. Similarly, Nahavandi (2019) describes Industry 5.0 as a human-centric solution that reintroduces human intelligence and personalization into technologically advanced production. Participants in this study emphasized that leaders must actively frame and design technologies as tools that enhance human capability rather than replace human contribution. This finding is also consistent with Maddikunta et al. (2022), who identify advanced digital technologies as enabling components of Industry 5.0, but it adds a leadership interpretation: technologies become human-centered only when leaders organize them around human strengths. The difference between augmentation and substitution is therefore not merely technical; it is managerial, ethical, and cultural. Leaders determine whether AI is used to support judgment or bypass it, whether data analytics strengthens learning or intensifies surveillance, and whether automation liberates employees from repetitive work or excludes them from meaningful participation. Human-centered leadership requires the capacity to govern these choices consciously.

The third finding, participatory sensemaking and trust-based coordination, shows that Industry 5.0 leadership must be relational and dialogic. This result is aligned with complexity leadership theory, which emphasizes adaptive problem-solving, learning, and emergent coordination in complex systems (Uhl-Bien et al., 2007). Industry 5.0 organizations are complex socio-technical systems in which the consequences of technological change cannot be fully predicted from the top. Therefore, participation is not merely a democratic preference; it is a practical requirement for organizational intelligence. Participants' accounts suggest that employees often possess tacit knowledge about workflows, risks, customer needs, and informal coordination patterns that leaders and technology vendors may overlook. When leaders involve employees in the interpretation and design of technology, they increase both implementation quality and trust. This finding also corresponds with responsible leadership theory, which conceptualizes leadership as a relational and ethical phenomenon involving multiple stakeholders (Maak & Pless, 2006). In Industry 5.0, stakeholders include employees, customers, communities, regulators, technology providers, and future generations affected by sustainability decisions. Participatory sensemaking helps leaders balance these stakeholder expectations and prevents technological transformation from becoming a purely executive or technical project.

The fourth finding, resilient ethical learning, confirms that the leadership demands of Industry 5.0 go beyond empathy and participation. Leaders must create systems that learn continuously while remaining ethically accountable. This result is consistent with recent Industry 5.0 research that links human-centricity with resilience and sustainability (Ghobakhloo et al., 2024). It also supports Tóth et al. (2023), who emphasize the importance of collaborative architectures that integrate human and artificial intelligence in industrial environments. However, the present study adds that collaboration must be governed through ethical learning. Participants were especially concerned that leaders might hide behind algorithms or external vendors when technological systems produce harm, bias, pressure, or exclusion. This concern is consistent with broader debates on AI governance, in which accountability, transparency, fairness, and human oversight are central issues. Human-centered leadership therefore requires adaptive accountability: the willingness to revise systems, challenge automated outputs, create feedback mechanisms, and keep moral responsibility within human governance structures. Resilience in Industry 5.0 should not be reduced to operational continuity; it must include the capacity to detect ethical risks, learn from unintended consequences, and redesign socio-technical arrangements.

Taken together, the findings suggest that human-centered leadership in Industry 5.0 is a multi-dimensional capability composed of dignity orientation, augmentation logic, participatory sensemaking, and resilient ethical learning. This conceptual model contributes to leadership theory by integrating several previously separate streams: servant leadership, ethical leadership, responsible leadership, complexity leadership, digital transformation, and human-centered AI. It also contributes to Industry 5.0 scholarship by showing that human-centeredness is not simply a policy slogan or technological design principle; it is a leadership practice enacted through decisions, relationships, communication, governance, and organizational learning. The model suggests that leaders become effective in Industry 5.0 when they can simultaneously think technologically, ethically, relationally, and systemically. A leader who understands technology but lacks empathy may produce efficient alienation. A leader who values people but lacks digital literacy may fail to guide transformation. A leader who encourages participation but lacks ethical governance may create dialogue without accountability. Therefore, Industry 5.0 leadership requires integrated competence rather than isolated traits.

The study also has practical implications for organizations in Tehran and similar contexts. Many organizations in emerging and transitional economies experience digital transformation under conditions of uncertainty, limited resources, uneven infrastructure, and cultural tensions between hierarchy and participation. In such contexts, human-centered leadership can function as a stabilizing and developmental mechanism. Leaders can reduce fear by communicating transparently about technological change, involving employees before implementation, clarifying that technology is intended to augment rather than erase human contribution, and establishing ethical review processes for AI and automation projects. Human resource systems should also be redesigned to support Industry 5.0 leadership through training in digital ethics, participatory change management, human-centered design, data literacy, and resilience-building. The findings indicate that human-centered leadership should not be treated as a personal virtue alone; it should be institutionalized through organizational routines, leadership development programs, technology governance committees, and employee participation mechanisms.

The limitations of this study should be acknowledged. First, the study was conducted with participants from Tehran-based organizations, which may limit the transferability of the findings to other national, cultural, or industrial contexts. Second, the data were collected only through semi-structured interviews, and the study did not include direct observation, document analysis, or longitudinal tracking of leadership practices. Third, although the sample included managers, consultants, and organizational experts from different sectors, it did not include frontline employees in equal depth. Fourth, the findings reflect participants' interpretations of Industry 5.0 leadership rather than measured organizational outcomes. Therefore, the conceptual model should be understood as an interpretive and exploratory contribution that requires further empirical testing and refinement.

Future research should examine the proposed model in broader and more diverse organizational contexts. Comparative studies could explore whether human-centered leadership has different meanings in manufacturing, healthcare, finance, education, public administration, and technology firms. Quantitative studies could develop and validate a measurement scale for Industry 5.0 human-centered leadership and test its relationship with employee wellbeing, digital transformation success, innovation, trust, resilience, and sustainability performance. Longitudinal studies could investigate how human-centered leadership evolves during different phases of technology adoption, from planning and implementation to routinization and evaluation. Future research should also include employees, technical specialists, and external stakeholders to provide a more comprehensive view of human-centered transformation.

For practice, organizations should treat human-centered leadership as a strategic capability for Industry 5.0 readiness. Leaders should begin every digital transformation project with questions about human consequences, not only technical feasibility or financial return. Organizations should involve employees in technology design and implementation, provide continuous reskilling opportunities, develop ethical guidelines for AI and automation, and establish feedback systems that allow employees to report risks, stress, bias, or unintended harm. Leadership development programs should combine digital literacy with empathy, ethical reasoning, participatory communication, and systems thinking. In Industry 5.0 organizations, the most effective leaders will be those who can make technology more humane and make human potential more visible, protected, and strategically central.

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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