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Designing a Dynamic Leadership Capability Model for Organizations Facing Continuous Technological Disruption

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Abstract

The objective of this study was to design a dynamic leadership capability model that explains how organizational leaders in technology-disrupted environments sense technological change, mobilize strategic responses, reconfigure organizational routines, and sustain adaptive performance under conditions of continuous uncertainty. This qualitative study used an exploratory inductive design based on semi-structured interviews with 22 senior and middle managers from technology-intensive and digitally transforming organizations in Tehran. Participants were selected through purposive sampling according to their direct experience with technological disruption, digital transformation, artificial intelligence adoption, platform-based competition, or business model redesign. Data collection continued until theoretical saturation was reached, meaning that the final interviews no longer generated substantially new categories or conceptual relationships. Interviews were transcribed verbatim and analyzed through thematic coding with the support of NVivo software. Credibility was strengthened through member checking, peer review, prolonged engagement with the data, and maintenance of an audit trail. The analysis produced a four-dimensional model of dynamic leadership capability. The first category, strategic technological sensing, referred to leaders' ability to interpret weak signals, distinguish temporary technological trends from structural disruption, and translate uncertainty into strategic awareness. The second category, adaptive decision architecture, described the capability to make timely, reversible, evidence-informed decisions in ambiguous technological contexts. The third category, ecosystemic learning and collaboration, reflected the capacity to mobilize internal and external knowledge networks, including startups, technology partners, customers, and cross-functional teams. The fourth category, human-centered organizational reconfiguration, captured leaders' ability to redesign roles, routines, culture, and psychological conditions so that technological change becomes institutionally absorbed rather than merely technically implemented. The study concludes that leadership capability in continuously disrupted technological environments is not a fixed competency profile but a dynamic, recursive, and socially embedded capability system. The proposed model suggests that effective leaders do not merely adopt new technologies; they continuously interpret technological signals, construct adaptive decision processes, activate learning ecosystems, and reconfigure organizational structures around both technological possibilities and human readiness. The findings contribute to dynamic capability theory, digital transformation research, and leadership studies by specifying the leadership-level microfoundations through which organizations maintain adaptability under persistent technological turbulence.

Keywords: Dynamic leadership capability; technological disruption; digital transformation; adaptive leadership; dynamic capabilities; qualitative research; organizational reconfiguration; Tehran organizations.

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1. Introduction

Continuous technological disruption has become one of the defining conditions of contemporary organizational life. Unlike episodic technological change, which allows organizations to adjust through discrete projects, planned investments, or temporary transformation programs, continuous disruption produces a persistent state of strategic

instability in which technological trajectories, customer expectations, organizational routines, and competitive boundaries change simultaneously. Artificial intelligence, cloud infrastructures, automation, platform ecosystems, data analytics, blockchain, digital service architectures, and intelligent decision-support systems are not only tools for efficiency improvement; they alter the logic of value creation, reshape organizational boundaries, and redefine the meaning of managerial authority. Digital transformation research has emphasized that digital technologies trigger strategic responses by disrupting existing value-creation paths and forcing organizations to confront structural barriers, changing routines, and new forms of competition (Vial, 2019). In such environments, leadership can no longer be understood merely as the exercise of influence, control, motivation, or strategic direction. Instead, leadership becomes a dynamic capability through which organizations sense technological change, make adaptive decisions, mobilize knowledge, and reconfigure resources before existing capabilities become obsolete.

The theoretical foundation of this study is rooted in the dynamic capabilities perspective, which explains how firms adapt, renew, and transform their resource base in rapidly changing environments. Teece, Pisano, and Shuen (1997) introduced dynamic capabilities as the firm's ability to integrate, build, and reconfigure internal and external competences to address changing environments. Teece (2007) later elaborated the microfoundations of dynamic capabilities through the interrelated processes of sensing opportunities and threats, seizing opportunities, and transforming or reconfiguring organizational assets. This framework is highly relevant to organizations facing technological disruption because technological change often challenges both the content of strategy and the underlying capabilities through which strategy is enacted. Eisenhardt and Martin (2000) similarly argued that dynamic capabilities consist of identifiable organizational processes, such as product development, strategic decision-making, and alliance formation, that allow organizations to alter their resource configurations. However, in contexts of rapid digital transformation, the question is not only whether organizations possess dynamic capabilities, but also how leaders enact, interpret, coordinate, and institutionalize these capabilities under conditions of uncertainty.

Leadership research has increasingly recognized that adaptive organizational performance depends on more than formal authority or stable competency models. Uhl-Bien and Arena (2018) argued that organizational adaptability requires leaders to enable the interaction of operational, entrepreneurial, and enabling systems, especially when organizations must balance exploitation of current capabilities with exploration of emerging possibilities. Complexity leadership theory similarly suggests that leadership in turbulent environments should not be limited to top-down direction; instead, it should enable adaptive emergence, distributed problem solving, and networked learning across organizational systems (Uhl-Bien et al., 2007). This perspective is particularly important in technology-disrupted organizations, where no single executive group can fully predict technological trajectories or centrally control the knowledge needed for adaptation. Leadership must therefore create conditions under which technological interpretation, experimentation, and organizational learning can occur across multiple levels.

Digital transformation studies reinforce this view by showing that the adoption of technology is insufficient unless organizations develop strategic, cultural, and structural capacities to absorb technological change. Kane et al. (2015) argued that digital maturity is driven more by strategy, culture, leadership, and talent development than by technology alone. Hess et al. (2016) similarly emphasized that digital transformation strategy requires explicit choices about technology use, value creation, structural change, and financial aspects. Warner and Wäger (2019)

further advanced this discussion by conceptualizing digital transformation as an ongoing process of strategic renewal supported by dynamic capabilities, including digital sensing, digital seizing, and digital transforming. These studies suggest that technological disruption is not primarily a technical problem; it is a leadership and capability problem. Organizations must interpret new technologies, align them with strategic intent, mobilize commitment, and redesign established routines that may otherwise resist change.

Despite this growing body of research, existing leadership models often remain insufficient for explaining how leaders operate in environments where technological disruption is continuous rather than exceptional. Traditional competency models tend to present leadership as a set of relatively stable attributes, such as communication, vision, decision-making, emotional intelligence, or strategic thinking. Although these attributes remain important, they do not fully capture the temporal, recursive, and system-level nature of leadership in technology-disrupted environments. A leader may possess strategic vision but fail to detect weak technological signals; may communicate effectively but be unable to redesign decision processes; may support innovation rhetorically but preserve legacy routines that prevent experimentation. Therefore, a dynamic leadership capability model must move beyond individual traits and identify the capability architecture through which leaders repeatedly interpret disruption, mobilize organizational learning, and reconfigure systems.

The managerial cognition literature provides another important basis for this study. Helfat and Peteraf (2015) argued that managerial cognitive capabilities underpin dynamic managerial capabilities by shaping how managers sense, seize, and reconfigure opportunities. In technological disruption, cognition is central because leaders must interpret ambiguous signals before they become visible performance threats. Technologies often emerge in fragmented forms: a new AI tool, a customer data pattern, a competitor's platform partnership, or a regulatory shift related to digital governance. These signals do not automatically become strategic knowledge. Leaders must frame them, assign meaning, compare them with organizational assumptions, and decide whether they require incremental adjustment or fundamental transformation. Thus, dynamic leadership capability includes cognitive, social, and organizational dimensions: the cognitive ability to interpret disruption, the social ability to mobilize people around uncertain futures, and the organizational ability to redesign routines and structures.

A further challenge is the tension between exploitation and exploration. Organizations facing technological disruption must continue delivering current products and services while simultaneously experimenting with new technologies and business models. O'Reilly and Tushman (2013) described organizational ambidexterity as the ability to exploit mature technologies and markets while exploring new opportunities requiring flexibility and experimentation. This tension is intensified in digitally transforming organizations because technological investments may threaten existing power structures, job roles, performance metrics, and professional identities. Leaders must therefore protect operational reliability while creating protected spaces for experimentation. They must decide when to integrate innovation into the core organization and when to separate it from legacy constraints. This balancing capability is not merely strategic; it is political, cultural, and emotional.

In the context of Tehran-based organizations, technological disruption is also shaped by distinctive environmental conditions. Organizations operate within a complex setting marked by regulatory uncertainty, global technological dependence, talent mobility, infrastructural constraints, competitive pressure, and uneven levels of digital readiness. These conditions make dynamic leadership capability especially important because leaders cannot assume that best practices from highly digitized economies can be mechanically transferred. Instead, they must translate technological possibilities into locally viable organizational arrangements. Qualitative

inquiry is therefore appropriate because it allows the study to capture the lived managerial interpretations, decision logics, and organizational practices through which leaders experience continuous technological disruption.

The present study addresses this gap by designing a dynamic leadership capability model for organizations facing continuous technological disruption. Rather than treating leadership as a fixed set of competencies, the study conceptualizes it as an evolving capability system composed of technological sensing, adaptive decision architecture, ecosystemic learning, and human-centered reconfiguration. By drawing on interviews with managers from Tehran-based organizations, the study aims to generate an empirically grounded model that explains how leaders interpret technological disruption, convert uncertainty into action, mobilize collaborative learning, and reshape organizational routines. Accordingly, the aim of this study was to design a dynamic leadership capability model for organizations facing continuous technological disruption.

2. Methods and Materials

This study employed a qualitative exploratory design because the purpose was to generate a conceptual model of dynamic leadership capability rather than to test predetermined hypotheses. Qualitative inquiry was appropriate because the phenomenon under investigation involved managerial interpretations, lived organizational experiences, decision practices, and capability-building processes that could not be adequately captured through standardized quantitative instruments. The study was conducted among managers working in Tehran-based organizations that had experienced continuous technological disruption through digital transformation initiatives, automation projects, artificial intelligence adoption, platform-based service redesign, enterprise software implementation, data-driven decision systems, or technology-based changes in customer interaction. The research design followed an inductive logic in which concepts were developed from participants' accounts and then integrated with relevant theoretical literature on dynamic capabilities, digital transformation, adaptive leadership, and organizational learning.

Participants were selected through purposive sampling. The inclusion criteria required that participants had at least seven years of managerial or professional experience, at least three years of direct involvement in technology-related organizational change, and active participation in strategic, operational, or human-resource decisions connected to technological disruption. The final sample consisted of 22 participants from Tehran. Of these participants, 13 were men and 9 were women. In terms of organizational position, 7 were senior executives, 9 were middle managers, 4 were digital transformation or information technology managers, and 2 were human resource or organizational development managers. Participants represented organizations in financial services, information technology, telecommunications, retail platforms, manufacturing, consulting, and service industries. The participants' ages ranged from 32 to 56 years, and their managerial experience ranged from 7 to 24 years. Data collection continued until theoretical saturation was reached; after the twentieth interview, no substantially new conceptual categories emerged, and two additional interviews were conducted to confirm the stability and adequacy of the categories. This approach is consistent with qualitative research literature emphasizing saturation as a methodological principle for determining the adequacy of data collection (Guest et al., 2006; Saunders et al., 2018).

Data were collected through semi-structured interviews. An interview guide was developed based on the research objective and the theoretical background of dynamic capabilities and digital transformation. The

interview questions focused on participants' experiences of technological disruption, leadership responses to uncertainty, decision-making under ambiguity, organizational learning mechanisms, resistance to technological change, capability renewal, collaboration with external technology actors, and the redesign of structures, roles, and routines. Sample questions included: "How do leaders in your organization identify technologies that may disrupt existing operations or business models?" "Can you describe a situation in which technological change forced leaders to revise established routines?" "What leadership capabilities are most important when employees resist technology-driven change?" and "How do managers balance operational stability with experimentation?" Interviews lasted between 45 and 80 minutes. With participants' consent, all interviews were audio-recorded and transcribed verbatim. To protect confidentiality, participants were identified using codes such as P1, P2, and P3, and all organizational identifiers were removed.

Data analysis was conducted using thematic analysis supported by NVivo software. The analytic process followed a systematic coding procedure. First, all transcripts were read several times to establish familiarity with the data. Second, initial open codes were generated from meaningful statements related to leadership behavior, technological interpretation, decision-making, learning, and organizational reconfiguration. Third, related codes were grouped into subcategories based on conceptual similarity. Fourth, subcategories were compared, refined, and integrated into broader main categories. Fifth, relationships among categories were examined to construct the final dynamic leadership capability model. NVivo was used to organize transcripts, code segments, compare coding patterns, retrieve quotations, and visualize relationships among categories. Thematic analysis was suitable because it provides a flexible method for identifying, analyzing, and reporting patterns within qualitative data (Braun & Clarke, 2006), while the inductive organization of categories was also informed by qualitative rigor principles associated with model development in organizational research (Gioia et al., 2013).

Trustworthiness was addressed through several strategies. Credibility was strengthened through member checking, in which selected participants reviewed summaries of the interpreted findings and confirmed that the categories reflected their experiences. Peer debriefing was used by asking two academic experts in management and organizational studies to review the coding structure and category definitions. Dependability was supported through documentation of the research process, coding decisions, interview procedures, and analytic memos. Confirmability was enhanced by maintaining an audit trail and separating participants' direct statements from the researcher's interpretations. Transferability was supported by providing detailed descriptions of the study context, participants, and organizational conditions. These procedures were consistent with established qualitative criteria of credibility, dependability, confirmability, and transferability (Lincoln & Guba, 1985; Nowell et al., 2017).

3. Findings and Results

The demographic characteristics of the participants showed that the sample included a diverse group of managers with direct experience of technological disruption in Tehran-based organizations. Among the 22 participants, 13 participants were male and 9 were female. Regarding age, 5 participants were between 30 and 39 years old, 11 participants were between 40 and 49 years old, and 6 participants were 50 years old or older. In terms of managerial level, 7 participants held senior executive positions, 9 were middle managers, 4 were digital transformation or IT managers, and 2 worked in human resource management or organizational development roles. Regarding industry background, 5 participants worked in financial services, 4 in information technology, 3

in telecommunications, 3 in online retail or platform-based services, 3 in manufacturing, 2 in consulting, and 2 in other service organizations. The participants' managerial experience ranged from 7 to 24 years, with 8 participants having 7–10 years of experience, 9 having 11–15 years, and 5 having more than 15 years. This distribution provided sufficient variation to identify common patterns across different organizational roles and sectors while maintaining a shared focus on leadership under technological disruption.

The first main category was strategic technological sensing. Participants described effective leaders as those who continuously scan technological, market, and regulatory signals rather than waiting for formal crises to emerge. This capability included monitoring competitors, interpreting customer behavior, following technology vendors, observing global digital trends, and listening to employees who were closer to operational changes. Strategic sensing was not described as passive awareness but as an interpretive capability that allowed leaders to distinguish between temporary technological fashion and genuine structural disruption. One participant stated, "Every week we hear about a new technology, but leadership means understanding which one can really change the rules of the game for our organization" (P6). Another manager explained, "The problem is not lack of information; the problem is that managers do not know which signals deserve attention and which signals only create noise" (P11). Participants emphasized that leaders who relied only on formal reports often detected disruption too late, whereas adaptive leaders created informal channels for early warning. In the proposed model, strategic technological sensing functions as the entry capability of dynamic leadership because it transforms environmental uncertainty into organizational awareness.

The second main category was adaptive decision architecture. Participants repeatedly argued that technological disruption makes conventional decision processes too slow, centralized, and risk-averse. Effective leaders were described as those who redesigned decision-making routines so that organizations could act under uncertainty without waiting for complete information. This category included rapid experimentation, scenario-based thinking, reversible decision-making, evidence-informed judgment, cross-functional decision forums, and tolerance for controlled failure. One participant noted, "In digital projects, if we wait until everything is certain, the opportunity disappears. We learned to make smaller decisions faster and correct them continuously" (P3). Another participant stated, "Our old approval system was designed for stability. Technological disruption forced us to create decision circles where business, technology, finance, and HR could decide together" (P14). Adaptive decision architecture therefore refers not only to individual decisiveness but to the design of organizational mechanisms that enable timely, distributed, and revisable decisions. In the model, this category represents the seizing dimension of dynamic leadership because leaders convert sensed technological opportunities and threats into actionable commitments.

The third main category was ecosystemic learning and collaboration. Participants emphasized that no organization could respond effectively to technological disruption through internal knowledge alone. Leaders needed to create learning connections with startups, universities, consultants, customers, technology suppliers, professional networks, and even competitors in some cases. Internally, this category included cross-functional learning, reverse mentoring, communities of practice, project-based knowledge sharing, and collaboration between technical and nontechnical units. One participant explained, "The most useful knowledge did not come from formal training; it came when our marketing team, IT team, and customer service team sat together and interpreted the same problem from different angles" (P8). Another participant stated, "We had to accept that knowledge about new technologies is distributed. Sometimes a young specialist knows more about the future of

the business than a senior manager" (P17). Ecosystemic learning and collaboration therefore reflects the relational and networked nature of dynamic leadership capability. Leaders do not simply possess knowledge; they activate knowledge flows across boundaries. In the proposed model, this category links sensing and reconfiguration because external and internal learning networks expand the organization's ability to imagine alternative responses to disruption.

The fourth main category was human-centered organizational reconfiguration. Participants consistently argued that technological transformation fails when leaders treat it as a technical implementation project rather than a human and organizational redesign process. This category included redesigning roles, revising performance indicators, changing reporting relationships, addressing fear and resistance, reskilling employees, building psychological safety, and aligning culture with continuous adaptation. One participant stated, "The software was installed in three months, but the real transformation took more than a year because people had to change how they saw their own roles" (P2). Another manager explained, "Employees were not against technology itself; they were afraid that technology would make their experience meaningless" (P19). Participants described effective leaders as those who helped employees reinterpret technological change as capability renewal rather than identity loss. Human-centered reconfiguration was therefore the most integrative category in the model because it involved structural, cultural, emotional, and capability-based change. In the final model, dynamic leadership capability is formed when leaders repeatedly connect strategic sensing, adaptive decision architecture, ecosystemic learning, and human-centered reconfiguration in a continuous cycle of renewal.

4. Discussion and Conclusion

The purpose of this study was to design a dynamic leadership capability model for organizations facing continuous technological disruption. The findings produced a four-dimensional model consisting of strategic technological sensing, adaptive decision architecture, ecosystemic learning and collaboration, and human-centered organizational reconfiguration. Together, these categories suggest that leadership in disrupted technological environments should be understood not as a stable competency profile but as a recursive capability system. Leaders are required to interpret technological signals, create timely decision mechanisms, mobilize distributed knowledge, and redesign organizational routines in ways that sustain adaptation. This finding is consistent with the dynamic capabilities perspective, particularly Teece's (2007) argument that organizations must sense, seize, and reconfigure resources to sustain performance in rapidly changing environments. However, the present study extends this perspective by showing how these processes are enacted at the leadership level through cognitive interpretation, decision architecture, learning networks, and human-centered transformation.

The first finding, strategic technological sensing, supports prior research emphasizing that dynamic capabilities begin with the identification and interpretation of opportunities and threats. Teece (2007) argued that sensing involves scanning, learning, interpretation, and creative activity, while Helfat and Peteraf (2015) showed that managerial cognitive capabilities influence the ability to sense and interpret change. The present study confirms this argument in the context of continuous technological disruption by showing that leaders must not only collect information but also filter, prioritize, and interpret technological signals. Participants distinguished between technological noise and meaningful disruption, suggesting that sensing is both cognitive and strategic. This finding also aligns with Vial's (2019) view that digital transformation begins when digital technologies disrupt value-

creation paths and trigger organizational responses. In practice, leaders who lack sensing capability may respond too late, overinvest in fashionable technologies, or underestimate weak signals that later become disruptive forces.

The second finding, adaptive decision architecture, indicates that leadership capability under technological disruption depends on the redesign of decision processes. This finding is aligned with Eisenhardt and Martin's (2000) argument that dynamic capabilities are identifiable organizational processes, including strategic decision-making routines that enable resource reconfiguration. In disrupted environments, traditional decision hierarchies may become obstacles because they assume predictability, stable authority, and sufficient information. Participants emphasized smaller, faster, cross-functional, and reversible decisions. This supports research on digital transformation strategy suggesting that technological transformation requires systematic managerial choices about technology, value creation, structure, and financial logic (Hess et al., 2016). It also resonates with Kane et al. (2015), who argued that digital transformation is driven more by strategy and leadership than by technology itself. The contribution of the present study is that it identifies decision architecture as a leadership capability: leaders must design the decision environment, not merely make individual decisions.

The third finding, ecosystemic learning and collaboration, demonstrates that technological disruption expands the boundaries of leadership beyond the formal organization. This finding is strongly supported by digital innovation research, which shows that digital technologies enable distributed innovation agency and require new forms of collaboration across actors, platforms, and knowledge domains (Nambisan et al., 2017). Participants described effective leaders as those who activated learning connections with startups, customers, technology vendors, universities, and cross-functional internal teams. This finding is also consistent with complexity leadership theory, which emphasizes adaptive emergence, network interaction, and distributed problem solving rather than centralized command (Uhl-Bien et al., 2007). In this sense, dynamic leadership capability is not located solely in the individual leader. It is relationally produced through the leader's ability to create knowledge flows, connect diverse expertise, and legitimize learning across hierarchical, functional, and organizational boundaries.

The fourth finding, human-centered organizational reconfiguration, highlights the social and emotional foundations of technological adaptation. While many digital transformation initiatives emphasize systems, platforms, and technical infrastructure, participants indicated that technological disruption becomes sustainable only when leaders redesign roles, routines, meanings, and cultural assumptions. This finding aligns with Warner and Wäger's (2019) argument that digital transformation is an ongoing process of strategic renewal supported by digital sensing, seizing, and transforming capabilities. It also supports Uhl-Bien and Arena's (2018) argument that adaptability requires leaders to enable entrepreneurial activity while maintaining operational coherence. The present study adds that reconfiguration must be human-centered because employees often experience technological disruption as a threat to competence, status, autonomy, or professional identity. Therefore, leadership capability includes the ability to convert fear into learning, resistance into participation, and technological implementation into organizational renewal.

The findings also contribute to organizational ambidexterity literature. O'Reilly and Tushman (2013) argued that organizations must simultaneously exploit existing capabilities and explore new opportunities. The present study shows that dynamic leadership capability is the mechanism through which this ambidexterity becomes possible in technologically disrupted contexts. Strategic sensing supports exploration by identifying new technological possibilities, while adaptive decision architecture allows organizations to test opportunities without abandoning operational discipline. Ecosystemic learning connects internal exploitation with external exploration,

and human-centered reconfiguration helps integrate new practices into the existing organization. Thus, the proposed model does not treat exploration and exploitation as separate structural choices only; it treats them as leadership-mediated processes that must be continuously balanced.

Another important implication of the findings is that leadership under technological disruption requires a shift from control-centered leadership to capability-enabling leadership. Traditional leadership models often emphasize planning, coordination, supervision, and performance control. Although these functions remain relevant, they are insufficient when the technological environment changes faster than formal planning cycles. Participants described leaders as interpreters, architects, connectors, and reconfigurers. This view aligns with Yukl's (2012) broader understanding of effective leadership behavior, which includes task-oriented, relations-oriented, change-oriented, and external leadership behaviors. However, the present study suggests that in technologically disrupted environments, change-oriented and external behaviors become especially central because leaders must continuously connect the organization with emerging technological possibilities and reshape internal systems accordingly.

The proposed model also has contextual significance for Tehran-based organizations. Participants' accounts suggested that technological disruption is experienced not only as a global technological process but also as a local organizational challenge shaped by resource limitations, talent constraints, regulatory uncertainty, infrastructure issues, and uneven digital maturity. Therefore, dynamic leadership capability in this context requires improvisational judgment and contextual translation. Leaders cannot simply import digital transformation models; they must adapt them to organizational readiness, employee capabilities, market constraints, and local institutional conditions. This finding supports the broader argument that dynamic capabilities are context-dependent and must be understood through the specific environments in which organizations operate (Teece et al., 1997; Eisenhardt & Martin, 2000).

Theoretically, the study contributes to leadership and dynamic capability literature by identifying leadership-level microfoundations of adaptation under continuous technological disruption. Prior studies have discussed dynamic capabilities at the organizational level (Teece, 2007), digital transformation capabilities at the firm level (Warner & Wäger, 2019), and managerial cognitive capabilities at the executive level (Helfat & Peteraf, 2015). The present model integrates these streams by conceptualizing dynamic leadership capability as a system of sensing, decision, learning, and reconfiguration capabilities. This integration helps explain how organizational adaptation actually occurs through managerial interpretation and social coordination. Practically, the findings suggest that organizations should not evaluate leadership readiness for technological disruption only through general leadership traits. Instead, they should assess whether leaders can detect technological signals, design adaptive decision routines, build learning ecosystems, and lead human-centered reconfiguration.

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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