Journal of Business Research 205 (2026) 115878

Contents lists available at ScienceDirect

Journal of Business Research

journal homepage: www.elsevier.com/locate/jbusres

Strategic leadership at high altitude: Investigating how AI affects the required skills of top managers

Simone Bevilacqua [a,b,*], Alberto Ferraris [a,c,d], Kurt Matzler [b], Michal Kuděj [e,f]

[a] Department of Management "Valter Cantino", University of Turin, Turin, Italy
[b] Department of Strategic Management, Marketing, and Tourism, University of Innsbruck, Universitätsstraße 15, 6020 Innsbruck, Austria
[c] Institute of Entrepreneurship and Innovation, Corvinus University of Budapest, Hungary
[d] Mediterranean Institute for Management Science, School of Business, University of Nicosia 2417 Nicosia, Cyprus
[e] European Centre for Business Research, Pan-European University, Prague, Czech Republic
[f] Prague University of Economics and Business, Prague, Czech Republic

ARTICLE INFO

Keywords:
Top managers
Artificial intelligence
Skills
Upper echelons theory
Strategic Leadership

ABSTRACT

As artificial intelligence (AI) becomes a core driver of organizational digital transformation, several studies emphasize the critical role of top managers. While prior research has examined the skills at the top levels in digital contexts, few studies differentiate the implications of diverse AI technologies for the strategic leadership skills of top managers. Drawing on upper echelons theory (UET), we conducted 23 interviews with senior executives across diverse industries. Our findings identify four interdependent leadership skills: 1) AI open mindset; 2) AI strategic co-thinker; 3) Multi-level connector; 4) Ethics risk management. We propose a multi-level framework that captures the interactive nature of these skills, operating across personal, organizational, and relational dimensions and shaped by top-down and bottom-up dynamics. The study, grounded in UET, contributes to the emerging debate on how AI reshapes top managers' strategic leadership skills and introduces the enabling role of middle managers in AI transformation.

1. Introduction

Recently, there has been a growing interest in exploring the intersection of AI and business context (Enholm et al., 2022; Kraus et al., 2023; Roy et al., 2025). Far from being a monolithic technology, AI comprises a heterogeneous set of technologies including generative AI (GenAI), machine learning algorithms, robotics, and augmented reality (Chowdhury et al., 2024; Kanbach et al., 2024; Mikalef et al., 2023; Volkmar et al., 2022). Unlike previous digital technologies, AI introduces autonomous, adaptive, and learning-based capabilities that directly affect how decisions are generated, evaluated, and executed, altering processes and decision-making at the top levels (Bevilacqua et al., 2025a,b; Chatterjee et al., 2022; Hougaard et al., 2024; Mikalef & Gupta, 2021).

Several studies have identified the strategic leadership of the top managers as the driving force of innovation technologies in organizations (Firk et al., 2022; Kiss et al., 2022; Li et al., 2023). The top managers embedded all the executives at the top levels of an organization (CEOs, TMT members, Directors, General Managers) who are intended to have strategic consequences for the firm (Samimi et al., 2022; Singh et al., 2023). This stream of research is grounded on the upper echelons theory (UET), which posits that organizational outcomes, including strategy and performance, mirror the characteristics of their executive leaders (Hambrick & Mason, 1984; Hambrick, 2007). To explain strategic performance outcomes, early work in UET focused on demographic and psychological traits, such as age, tenure, or risk aversion (Buyl et al., 2011; Herrmann & Datta, 2005). More recently, scholars have begun to emphasize leaders' skills as critical to decision quality and firm performance, especially in uncertain, fast-changing environments (Fernandez-Vidal et al., 2022; Hambrick & Wowak, 2021; White & Borgholthaus, 2022).

In this evolving theoretical landscape, several studies have examined how the digital transformation has affected the top managers' skills, such as technological literacy, change management, resilience, agility, and strategic foresight (AlNuaimi et al., 2022; Fernandez-Vidal et al., 2022; Müller et al., 2024; Schmidt et al., 2023; Wrede et al., 2020).

* Corresponding author at: Department of Management "Valter Cantino", University of Turin, Turin, Italy.
E-mail addresses: simone.bevilacqua@unito.it (S. Bevilacqua), alberto.ferraris@unito.it (A. Ferraris), Kurt.Matzler@uibk.ac.at (K. Matzler), michal.kudej@vse.cz (M. Kuděj).

https://doi.org/10.1016/j.jbusres.2025.115878
Received 30 January 2025; Received in revised form 24 November 2025; Accepted 24 November 2025
Available online 2 December 2025

While these contributions provide an initial understanding of how digitalization has influenced executive skillsets, AI introduces new challenges and demands (Bevilacqua et al., 2025a,b; Enholm et al., 2022; Jorzik et al., 2023). Despite its growing importance, much of the current literature treats AI as a generic subcomponent of digital transformation, lacking a differentiated focus on the distinct types of AI and their strategic consequences. Moreover, strategic leadership skills are often conceptualized in static or fragmented terms, with limited attention to how such skills evolve in interaction with the multifaceted nature of AI.

Therefore, this gap presents an exceptional opportunity to explore the following research question: *How does AI affect the required strategic leadership skills of top managers*?

To address this question, we adopt a qualitative, exploratory approach and conduct 23 semi-structured interviews with senior executives across five sectors: automotive, consumer goods, engineering, logistics, and telecommunications.

The research contributes to the literature in several ways. First, grounded in UET (Hambrick & Mason, 1984; Hambrick, 2007) and strategic leadership literature (Boal & Hooijberg, 2000; Samimi et al., 2022), the study contributes to the emerging debate on how AI technologies reshape the strategic leadership skills of top managers. While prior research has explored digital leadership broadly, it often overlooks the diversity of AI technologies and their specific strategic implications (Bevilacqua et al., 2025a; Fernandez-Vidal et al., 2022; Jorzik et al., 2023). This study addresses that gap by offering an empirically grounded and differentiated understanding of how distinct AI forms, such as GenAI, machine learning, robotics, and augmented reality, transform the leadership skills required at the top levels. Second, the study proposes a multi-level framework that articulates four interdependent AI-driven leadership skills: 1) AI open mindset; 2) AI strategic co-thinker; 3) Multi-level connector, and 4) Ethics risk management. Within this framework, these skills are structured across personal, organizational, and relational dimensions and are shaped through both top-down and bottom-up mechanisms, providing a more integrated view of how strategic leadership adapts in AI-intensive environments. Third, the study extends UET by moving beyond the traditional focus on upper echelons to emphasize the enabling role of middle management in AI transformation (Foss & Mazzelli, 2025; Heyden et al., 2017). Middle managers emerge as key actors in experimentation, knowledge integration, and hybrid role development, underscoring the need for a cross-level perspective on how leadership capabilities are co-constructed within organizations.

From a practical perspective, this study offers actionable guidance for top managers facing the strategic and cultural shifts brought by AI integration. The four identified skills form a cohesive leadership repertoire for navigating AI complexity. Organizations should move beyond ad hoc training by embedding structured development pathways, such as immersive learning experiences, cross-functional AI labs, and peer-based learning mechanisms. The study also provides a cross-sectoral perspective, showing how different industries apply AI technologies, including GenAI, machine learning, robotics, and augmented reality, and how these shape leadership skills. This cross-contextual lens enhances the practical relevance of the framework and supports its application in diverse organizational environments.

2. Theoretical background

2.1. Perspectives on top managers from upper echelon theory and strategic leadership literature

Management scholars have long focused on the role of leaders within organizations (Finkelstein et al., 2009; Hambrick and Mason, 1984; Hambrick, 2007; Luciano et al., 2020). One of the main theories that marked the beginning of academic attention to this topic is the UET, developed by Hambrick and Mason in 1984. This theory posits that the individual characteristics of top executives strongly influence organizational outcomes (Hambrick & Mason, 1984; Hambrick, 2007). Specifically, personal backgrounds, previous experiences, personality traits, and skills of top executives have been identified as critical factors shaping strategic decision-making processes and, consequently, organizational outcomes (Avery et al., 2003; Daily et al., 2002; Finkelstein et al., 2009; Samimi et al., 2022). A significant contribution to enriching the theory was made by Carpenter et al. (2004), who further expanded the concept, highlighting the increasing importance of strategic leadership within the upper echelons in management literature (Boal & Hooijberg, 2000; Boal & Schultz, 2007; Elenkov et al., 2005; Vera & Crossan, 2004). According to Samimi et al. (2022), strategic leadership is defined as "*the functions performed by individuals at the top levels of an organization (CEOs, TMT members, Directors, General Managers) that are intended to have strategic consequences for the firm.*" (Samimi et al., 2022, p. 3).

Strategic leadership encompasses eight core functions essential for top managers: making strategic decisions (Quigley & Hambrick, 2012), engaging with external stakeholders (Carter 2006), performing human resource management activities (Chadwick et al., 2015), motivating and influencing (Boehm et al., 2015), managing information, overseeing operations and administration, managing social and ethical issues, managing conflicting demands (Samimi et al., 2022). These core functions are executed through the managerial skills of top managers (Samimi et al., 2022). Indeed, one of the primary research streams that plays a significant role in the UET focuses on the individual skills of top managers' strategic leadership, which is instrumental in shaping organizational decision-making processes and outcomes (Hambrick and Wowak, 2021; White and Borgholthaus, 2022). As the business landscape becomes more dynamic and uncertain, the strategic skills of top executives are emerging as pivotal assets that differentiate high-performing organizations from their competitors (Fernandez-Vidal et al., 2022; Wrede et al., 2020).

2.2. Strategic leadership skills

Yukl (2012, pp. 175–176) defines a skill as "*the ability to do something in an effective manner*," emphasizing its functional and performance-oriented nature. More specifically, managerial skills are described as a set of integrated and complementary capabilities that enable top managers to act effectively within complex organizational environments (Carmeli & Tishler, 2006; Datta & Iskandar-Datta, 2014; Mumford et al., 2007). Based on these definitions, studies grounded in UET have identified several skills essential to the strategic leadership of top managers. These include timely and informed decision-making, cognitive and behavioral complexity (Boal & Hooijberg, 2000), the capacity for long-term strategic vision (DeChurch et al., 2010), the courage to advocate bold strategies (Andrews & David, 1987), and the ability to adapt leadership styles to evolving circumstances (Vera & Crossan, 2004). Collectively, these skills are regarded as critical enablers for navigating uncertainty and shaping organizations' strategic trajectories. Moreover, Samimi et al. (2022) comprehensively examine the individual and relational dimensions of executives' strategic leadership. At the individual level, attributes such as charisma, power, intrinsic motivation, and risk propensity significantly affect strategic decision-making and firm performance (Agle et al., 2006; Boehm et al., 2015; Wowak et al., 2016). At the relational level, the focus shifts to the composition and diversity of top management teams, particularly how differences in functional expertise influence team dynamics and organizational outcomes (Hambrick et al., 2015). While such diversity can broaden strategic perspectives, it also introduces coordination and integration challenges, underscoring the importance of collaborative mechanisms to achieve performance outcomes.

Over the past decade, the acceleration of digital transformation has significantly reshaped the scholarly discourse on the strategic leadership skills of top managers. Table 1 offers an overview of previous studies on

Table 1
Overview of UET studies on digitalization and top managers' skills.

Paper	Title	Methodology	Leadership skills and digitalization
Bock & Von der Oelsnitz (2025)	Leadership-competences in the era of artificial intelligence–a structured review	Systematic literature Review	1)Collaborating, 2) Communication, 3) Discipline, 4) Delegating, 5) Empowerment, 6) Executing, 7) Liaison, 8) Listening, 9) Motivation, 10) People managing, 11) Technical understanding,12) Follower valuation
Bevilacqua et al., 2025a	Enhancing top managers' leadership with artificial intelligence: insights from a systematic literature review	Systematic Literature Review	1) Data-driven decision making 2) Agility 3) Emotional and social intelligence
Gilli et al., 2024	The future of leadership: new digital skills or old analog virtues?	Qualitative method: interviews with top and middle management	1) Effective leadership skills; 2) Change management skills; 3) Conceptual digitalization skills
Jorzik et al., 2023	Artificial intelligence-enabled business model innovation: Competencies and roles of top management	Qualitative method: semi-structured interviews	1) Knowledge and understanding of artificial-intelligence technology 2) AI mindset 3) AI leadership capabilities 4) ability to navigate artificial intelligence abstraction 5) ability to make artificial intelligence-based becisions
Fernandez-Vidal et al., 2022	Managing digital transformation: The view from the top	Qualitative method: semi-structured interviews	1) Drive business change, 2) Master fluid & loose organizational structures, 3) Master Talent Complexity, 4) Prioritize learning
Schiuma et al., 2022	The transformative leadership compass: six competencies for digital transformation entrepreneurship	Critical literature review	1) Mentor; 2) Pragmatic; 3) Righteous; 4) Facilitator; 5) Communicator; 6) Catalyst
Klus & Müller, 2021	The digital leader: what one needs to master today's organizational challenges		1) Flexibility 2) Entrepreneurial Thinking; 3) Self-Organization; 4) IT Skills; 5) Creativity 6) English Language Proficiency 7) Commitment
Wrede et al., 2020	Top managers in the digital age: Exploring the role and practices of top managers in firms' digital transformation	Qualitative method: semi-structured interviews	1) Understanding digitalization; 2) Setting the formal context for digitalization; 3) Leading change
Schwarzmüller et al., 2018	How does the digital transformation affect organizations? Key themes of change in work design and leadership		1) Resilience; 2) Problem-solving, 3) Creativity, 4) Agility, 5) Willingness to learn, 6) Readiness to take over responsibility
Singh & Hess (2017)	How chief digital officers promote the digital transformation of their companies	Qualitative method: interviews	1) IT competency, 2) change management skills, 3) inspiration skills, 4) digital pioneering skills, and 4) resilience

Source: Authors' elaboration.

the topic.

Initial research in this area explored how digitalization impacted managerial practices and organizational structures, highlighting the technological literacy, change management expertise, problem-solving abilities, and resilience as essential skills for leaders navigating digitally evolving environments (Schwarzmüller et al., 2018; Singh & Hess, 2017). As the digital transformation agenda matured, scholars began emphasizing the importance of more adaptive, strategic, and transformational capabilities (Schiuma et al., 2022). Wrede et al. (2020) and Fernandez-Vidal et al. (2022) emphasize the importance of leaders understanding digitalization at a systemic level, setting the formal and cultural conditions for change, and leading the reconfiguration of organizational structures. Their findings suggest that strategic leaders must facilitate technological adoption and manage talent complexity, promote a culture that fosters learning, and continually align innovation efforts with overarching business objectives.

More recently, scholarly attention has shifted toward the disruptive influence of AI in redefining leadership paradigms. Jorzik et al. (2023) introduce the concept of AI-enabled business model innovation, identifying emerging competencies such as an AI mindset, data-driven decision-making, and the development of AI capabilities. Similarly, Bevilacqua et al. (2025a) and Bock & von der Oelsnitz (2025) conducted systematic reviews of the initial landscape of leadership skills in the AI era.

Moreover, broader leadership theories offer valuable insights into how executives navigate technological disruption. Transformational leadership theory highlights how leaders inspire and motivate followers to embrace profound technological changes, shedding light on the motivational aspects of guiding organizations through disruptive transitions (Bass & Riggio, 2006; Chen et al., 2019; Gumusluoglu & Ilsev, 2009). Adaptive leadership in complex systems emphasizes the dynamic capabilities required to respond to uncertainty and emergent properties, underscoring leaders' ability to experiment, learn, and foster resilience (Uhl-Bien & Arena, 2018). These perspectives complement UET by explaining why some leaders excel in AI contexts while others struggle.

However, while these studies recognize AI as a transformational force that affects top managers' leadership, they are grounded in prior literature and do not offer a new empirical perspective on AI's impact on top managers' skills, which have been changing rapidly over the past few years. Moreover, much of the existing literature continues to conceptualize AI as a homogeneous phenomenon within the broader umbrella of digital transformation. There remains a limited differentiation between the various types of AI, such as GenAI, machine learning models, robotics, and augmented reality, and their respective implications for leadership skills. This lack of conceptual specificity underscores the need for more targeted, differentiated research in this rapidly evolving field.

3. Methodology

3.1. Research approach

We adopted a qualitative research design based on the grounded theory approach to thoroughly explore how AI affects the skills of top managers. Grounded theory is a widely applied approach, particularly suited when the goal is to examine underexplored or emergent phenomena for which existing literature provides only partial explanations (Gioia et al., 2013; Gehman et al., 2018; Roy et al., 2025). Although drawing on grounded theory, the study's primary aim is not to develop a novel theory but to construct a rich, data-driven understanding of a phenomenon that remains underexplored in the current literature (Corbin & Strauss, 2014).

A qualitative approach is particularly suited to this aim, as it enables an in-depth investigation of complex organizational phenomena while allowing for the emergence of contextually grounded insights (Hautamäki & Heikinheimo, 2025; Hennink et al., 2020). Following an inductive logic, we relied on participants' accounts to identify patterns, clarify relationships, and build an interpretive understanding of how AI reshapes the strategic leadership skills of top managers. (Jain, 2021; Liu, 2016; Thomas, 2006).

To enhance methodological rigor and transparency, we employed the Gioia methodology for data coding and analysis (Gioia et al., 2013; Gioia, 2021). This structured approach aligns well with inductive inquiry and is particularly suited to organizing qualitative data systematically, supporting theoretical elaboration. It structures the data into first-order concepts, second-order themes, and aggregate dimensions, thereby offering a clear audit trail from raw data to conceptual development (Langley & Abdallah, 2015; Magnani & Gioia, 2023). This approach allowed us to distill and organize emergent insights without the formal ambition of theory generation, remaining consistent with our exploratory intent.

3.2. Sample and Selection of respondents

A total of 23 semi-structured interviews were conducted with executives from various companies operating in the European market, with at least 250 employees. Interviewees include leaders at the top levels of organizations (e.g., CEOs, CFOs, CDOs, CMOs) who play key roles in technology implementations (Ferraris et al., 2019). Following previous studies, the criterion of selecting companies by the minimum number of employees provides the necessary size to study the impact of AI on management practices on a larger scale and with a more structured approach to digitalization (Fernandez-Vidal et al., 2022; Perotti et al., 2024; Wrede et al., 2020).

Several high-impact digital sectors were chosen, including automotive, consumer goods, engineering, logistics, and telecommunications. These sectors were selected for their relevance to AI adoption, as each requires specific capabilities for integrating technology and adapting to digital innovations (Fernandez-Vidal et al., 2022). While the variety of sectors adds complexity to the research, it allows for identifying cross-cutting and specific patterns in the skills required for top managers. Table 2 below summarizes the firms and respondents in the data collection.

The authors conducted semi-structured interviews to explore key themes and to allow respondents to express their experiences and perceptions, without predetermined questions. According to previous studies, this format was chosen to ensure depth and flexibility, facilitating complex data collection (Ferraris et al., 2019; Perotti et al., 2024; Shah et al., 2023). The interviews lasted between 30 and 60 min, with an average of 46 min. They were conducted either face-to-face (n = 6) or via Zoom (n = 17), based on participants' preferences and convenience. Prior consent was obtained for the audio recording of all interviews. Table 3 shows the interview guide.

Table 2
Summary of firms and respondents in the data collection.

1	AUTO – 1	Automotive	Chief Technology Officer	45 min
2	AUTO – 2	Automotive	Head of Innovation Strategy	50 min
3	AUTO – 3	Automotive	Directors of operations	42 min
4	AUTO – 4	Automotive	Chief Innovation Officer	48 min
5	AUTO – 5	Automotive	Chief Strategy Officer	35 min
6	CG – 1	Consumer goods	Chief Marketing Officer	46 min
7	CG – 2	Consumer goods	Vice President	49 min
8	CG – 3	Consumer goods	General Manager	44 min
9	CG – 4	Consumer goods	Director of Business Strategy	40 min
10	ENG – 1	Engineering	Head of R&D	50 min
11	ENG – 2	Engineering	Chief Executive Officer	38 min
12	ENG – 3	Engineering	CEO	47 min
13	ENG – 4	Engineering	Vice President	45 min
14	ENG – 5	Engineering	Executive President	52 min
15	LOG – 1	Logistics	Chief Human Resource Manager	43 min
16	LOG – 2	Logistics	CEO	48 min
17	LOG – 3	Logistics	Chief Marketing Officer	39 min
18	LOG – 4	Logistics	Vice President	44 min
19	TELCO – 1	Telecommunications	Chief Technology Officer	55 min
20	TELCO – 2	Telecommunications	CEO	50 min
21	TELCO – 3	Telecommunications	Chief Digital Officer	37 min
22	TELCO – 4	Telecommunications	Chief Risk Officer	42 min
23	TELCO – 5	Telecommunications	CEO	34 min

Source: Authors' elaboration.

Table 3
Interview guide.

Number	Questions
1	How long has your company used artificial intelligence in its processes, and how frequently is it applied in day-to-day operations?
2	What impact has artificial intelligence had on critical processes in your industry? Are there, in your opinion, specific characteristics that make this impact unique compared to other sectors?
3	According to your vision, how is artificial intelligence changing the concept of top managers' leadership?
4	What technical or "hard" skills do you think a member of top management should possess to understand and lead the artificial intelligence processes?
5	What soft skills are critical to managing and communicating artificial intelligence change in the company?

Source: Authors' elaboration.

3.3. Data analysis

Data analysis was conducted by integrating the grounded theory approach with the Gioia methodology, using a systematic, progressive coding structure to ensure rigor and transparency in theoretical construction (Corbin & Strauss, 2014; Gioia et al., 2013). We followed the principles of grounded theory (Strauss and Corbin, 1998), using an analysis process that involved deriving a range of codes organized into thematic categories. Given the exploratory nature of this study, an inductive approach was deemed suitable for thematic analysis (Fernandez-Vidal et al., 2022; Wrede et al., 2020). The grounded theory method enabled us to explore emerging themes derived from participants' real-life experiences (Charmaz, 2006). During the first coding cycle, open codes were identified by thoroughly reading and reviewing all transcripts to gain a deep understanding of the content. In the second cycle, the identified codes were grouped into higher-order categories, with the specific sector under investigation used to define sector-specific tendencies. Finally, aggregate dimensions were developed by iteratively connecting second-order themes across companies and sectors. This process led to identifying four interdependent AI-driven skills: 1) AI open mindset, 2) AI strategic co-thinker, 3) Multi-level connector, and 4) Ethics risk management. Fig. 1 provides an overview of all phases, reflecting the methodology of Gioia et al. (2013).

3.4. The reliability of the research

To ensure the rigor and trustworthiness of our qualitative study, we applied established quality criteria: credibility, transparency, and reliability throughout the research process (Charmaz, 2006; Charmaz & Thornberg, 2021; Hautamäki & Heikinheimo, 2025).

First, we strengthened credibility through both researcher triangulation and data triangulation. The research team brought complementary theoretical and empirical expertise and collaborated throughout the data collection and analysis process. To enhance interpretive reliability, we validated our emerging insights via follow-up interactions with selected participants, incorporating their feedback to refine unclear categories or interpretations. In addition to interview data, we integrated secondary data from company documents and publicly available websites. These materials were used to contextualize and enrich the primary data, allowing us to cross-check factual details, industry practices, and firm-level AI deployments, thereby reinforcing the consistency of the findings. In Table 4 below, we illustrate our findings using first-order concepts, supported by verbatim excerpts and company references, to preserve participants' voices.

Second, we ensured transparency by providing a detailed account of the methodological procedures, including data collection, coding phases, and theoretical development. All interviews were extensive and allowed for rich, in-depth exploration of managerial practices related to AI adoption.

Third, to ensure intercoder reliability, we adopted an iterative, interactive coding process consistent with the constant comparison method (Gioia et al., 2013). As new themes and patterns emerged during the analysis of later interviews, coders systematically revisited and recoded earlier transcripts to refine category boundaries and ensure coherence across the dataset.

The coders conducted the initial coding independently and then engaged in structured comparison and reconciliation sessions (Robertson et al., 2025). Discrepancies were discussed in depth and resolved through a collaborative interpretation, thereby enhancing the reliability and interpretive richness of the coding structure. Data saturation (Glaser & Strauss, 2017) was reached after 18 interviews, with five additional interviews conducted thereafter to ensure coverage and confirm thematic stability.

.

4. Findings

The following section examines the overarching findings on how AI impacts the leadership skills of top managers. Based on the coding of the interviews, we identified the following skills: "AI open mindset," "AI strategic co-thinker," "Multi-level connector", and "Ethics risk management."

4.1. AI open mindset

4.1.1. Top managers' AI willingness

According to the respondents, senior executives' willingness is a fundamental driver of initiating and sustaining AI transformation

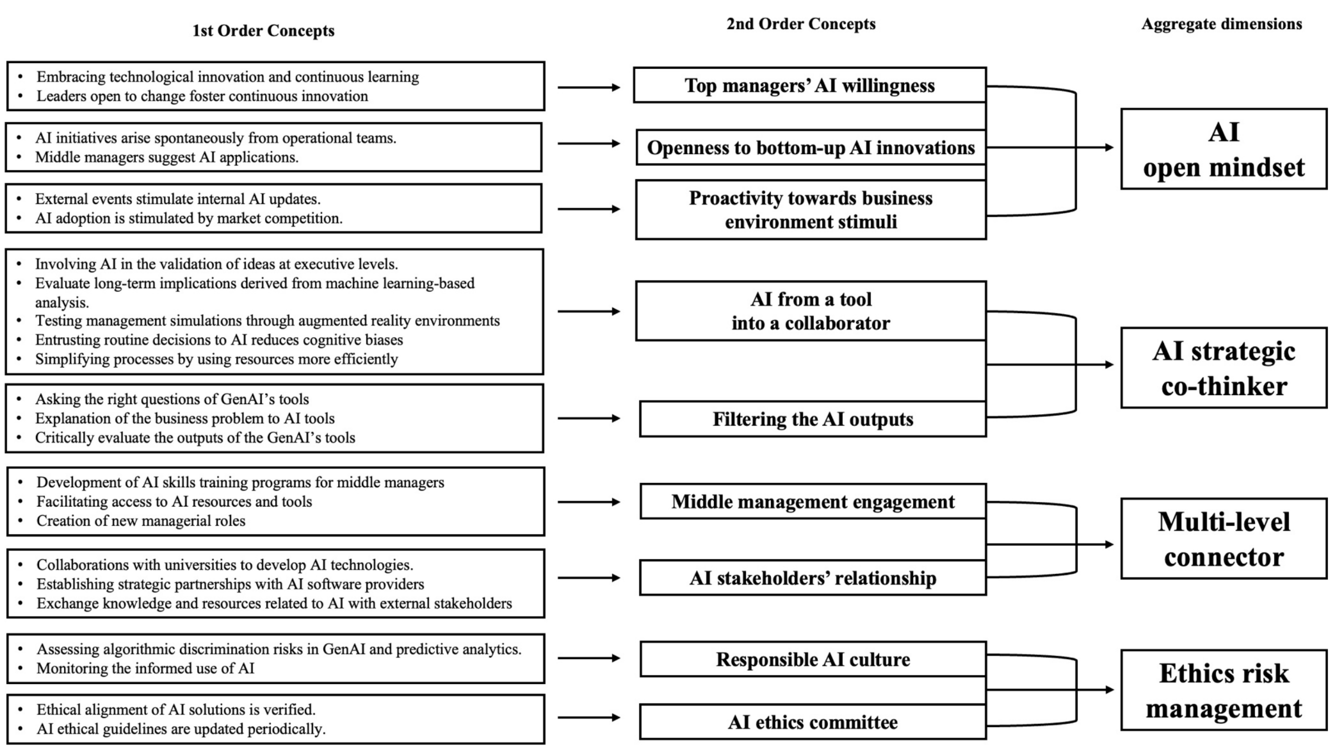

Fig. 1. Data structure.

Table 4
Raw data to support 1st order concepts.

1st Order Concept	Illustrative Raw Data (Interview Excerpt & Sector Insights)
Embracing technological innovation and continuous learning	"We must be agile and ready to adapt quickly to change and embrace new technologies and work methodologies." (ENG-1). The company website emphasizes continuous upskilling initiatives and internal learning platforms to support digital transformation (ENG-4).
Leaders open to change foster continuous innovation	"We started from the top! If top managers don't get it, how can the rest follow?" (AUTO-4). Leadership exposure to emerging tech is a key part of the transformation journey (AUTO-1).
AI initiatives arise spontaneously from operational teams	"The initiative to use AI for customer support came from the field." (CG-2). Decentralized innovation labs allow front-line teams to prototype AI applications (AUTO-2).
Middle managers suggest AI applications	"The most impactful AI innovation began with a proposal from middle managers." (ENG-4). Cross-functional programs enable mid-level professionals to co-design AI use cases (TELCO-1).
External events stimulate internal AI updates	"After COVID-19, we understood that the only way forward was to radically change." (LOG-1). Post-crisis, AI-based resilience tools were scaled rapidly (CG-1)
AI adoption is stimulated by market competition	"If our competitors are already using AI, we can't afford to stay behind." (CG-1). Benchmarking AI integration in supply chain performance is a driver for strategic investment (LOG-3).
Involving AI in the validation of ideas at executive levels	"Entrusting routine decisions to AI allows us to minimize human cognitive biases." (TELCO-3). AI is integrated in simulation tools used by executives for network planning. AI is integrated in simulation tools used by executives for network planning (TELCO-1).
Evaluate long-term implications derived from machine learning-based analysis	"We use predictive analytics to simulate strategic outcomes." (AUTO-2). Forecasting future vehicle demand using ML models supports strategic choices (AUTO-5).
Testing management simulations through augmented reality environments	"We simulated the new setup with AI-enhanced AR tools." (LOG-2). AR-AI simulations are deployed to test warehouse layouts before operational rollout (LOG-4).
Entrusting routine decisions to AI reduces cognitive biases	"Entrusting routine decisions to artificial intelligence allows us to automate processes, reduce costs, and minimize human cognitive biases. This enables us to make more informed and efficient decisions in less time" (TELCO-3).
Simplifying processes by using resources more efficiently	"We've used AI to identify what slows down our teams." (LOG-2). AI-based diagnostics guide layout reconfigurations in logistics hubs (LOG-3).
Asking the right questions to the GenAI's tools	"The quality of the AI response depends on how well you define the problem." (ENG-2). GenAI prompting is part of leadership development (TELCO-2).
Explanation of the business problem to AI tools	"We teach the AI what the real challenge is." (CG-4). Business-framing sessions are run to train AI tools properly (AUTO-3).
Critically evaluate the outputs of the GenAI's tools	"Only experience helps you pick the one that works in this environment." (LOG-4). Leaders are trained to assess the validity of AI suggestions (ENG-5).
Development of AI skills training programs for middle managers	"We created personalized learning paths for AI training." (CG-1). Internal training platforms align modules by role and learning pace (ENG-3).
Facilitating access to AI resources and tools	"Middle managers can access AI experimentation tools." (AUTO-5). AI tools are used for hands-on prototyping by business teams (AUTO-3).
Creation of new managerial roles	"We now have AI product managers and ethical AI specialists." (ENG-4). Hybrid AI roles are emerging in LinkedIn posts (For all companies).
Collaborations with universities to develop AI technologies	"We run joint labs with universities." (TELCO-1). Academic partnerships drive applied research and innovation (ENG-2).
Establishing strategic partnerships with AI software providers	"We co-develop AI tools with vendors." (LOG-3).
Exchange knowledge and resources related to AI with external stakeholders	"We've streamlined knowledge sharing with our partners." (TELCO-2).
Assessing algorithmic discrimination risks in GenAI and predictive analytics	"If the data is flawed, the AI will reinforce those biases." (ENG-3). Model validation protocols include fairness audits (TELCO-5).
Monitoring the informed use of AI	"We need to make ethics visible and operational." (CG-3). AI ethics protocols include transparency metrics and internal audits (CG-3).
Ethical alignment of AI solutions is verified	"Transparency builds trust." (ENG-5). Ethical impact assessments are part of the approval process for AI tools (AUTO-4).
AI ethical guidelines are updated periodically	"We are defining internal procedures aligned with evolving regulation." (ENG-4). Periodic reviews of AI policies are led by the governance board (CG-4).

Source: Authors' elaboration.

processes. Business leaders are expected to cultivate an open mindset that embraces technological innovation while promoting continuous learning and experimentation throughout the organization. A logistics top manager emphasized, *"We must be willing to challenge ourselves, take risks, and learn from mistakes, always with the goal of improvement and growth"* (LOG-3). In several cases, top managers' openness to change translated into tangible support for AI adoption, such as strategic investments in cloud infrastructure, GenAI platforms, and cross-functional upskilling initiatives. This strategic framing of AI as a catalyst for cultural and organizational renewal was echoed across multiple interviews.

Leaders who actively engage with AI-related innovation signal its legitimacy to the entire organization. Rather than relying solely on delegated implementation, many executives took personal ownership of learning about AI tools and methodologies. As one interviewee in the automotive sector noted, "W*e started from the top! If top managers don't get it, how can the rest follow*?" (AUTO-4). Executives positioned themselves as enablers of a broader organizational learning culture, where taking risks, experimenting with new technologies, and learning from mistakes became accepted and encouraged. As such, AI is not perceived as a threat but as an enabler of growth and innovation.

A key aspect of this mindset is agility. Leaders are expected to anticipate change and foster a culture that views technological advancements as opportunities. A top engineering manager noted, *"We must be agile and ready to adapt quickly to change and embrace new technologies and work methodologies. This requires an ongoing commitment to learning and personal development" (*ENG-1*)*. To remain agile, leaders must anticipate market opportunities and proactively integrate new technologies and innovations into their operations to stay ahead. This means continuously adopting cutting-edge AI tools and frameworks to stay ahead of the curve. A telecommunications executive shared, *"The speed of technological change means we can't wait to react! We must stay ahead by embracing innovation and embedding it into our daily practices"* (TELCO-5).

4.1.2. Openness to bottom-up AI innovations

While executive leadership is critical in driving AI transformation, many top managers interviewed revealed that innovation also emerges within the middle layers. In several cases, AI initiatives were proposed not by top management, but by middle managers or functional teams responding to concrete needs, inefficiencies, or aspirations for improvement. These bottom-up contributions illustrate how AI innovation can emerge from direct exposure to day-to-day challenges, where the potential impact of automation, analytics, or generative tools is most evident.

According to the respondents, middle managers act as key boundary-spanners, translating strategic intent into applied experimentation. They often proactively identify opportunities to integrate AI into workflows, such as optimizing reporting, automating routine queries, or improving accessibility, and bring these ideas forward without waiting for formal directives. In some firms, these suggestions triggered structured experimentation programs, such as utilizing GenAI to enhance customer service or enhance knowledge sharing across departments. Indeed, the decision to test AI for customer service automation, as noted by a top manager, could emerge directly from the observation of operational inefficiencies: "*The initiative to use AI for customer support came from the field, where we were struggling with overload and delay*." (CG-2). This highlights how those closest to the problem are often best positioned to propose technological solutions.

Similarly, some firms identified opportunities to refine or adapt AI tools based on bottom-up feedback. As one respondent explained, "*We often realize the limitations of technology by listening to feedback from those who use it daily.*" (AUTO-2). These inputs, although informal, played a critical role in shaping how AI tools were adopted or customized to fit real operational contexts. This bottom-up dynamism challenges traditional hierarchies in innovation governance. Leaders must recognize and validate grassroots AI initiatives, even when they emerge outside predefined innovation channels. As one top manager noted, "*the most impactful AI innovation began with a proposal from middle managers who just tried a new tool and realized its value*." (ENG-4). When operational staff and middle managers feel empowered to explore, suggest, and test AI-enabled solutions, organizations enhance their ability to innovate continuously and foster a culture where AI becomes seamlessly integrated into everyday practices.

4.1.3. Proactivity towards business environment stimuli

Beyond internal motivations, AI adoption is also strongly influenced by external pressures and environmental triggers. Many interviewees emphasized how external events, such as the COVID-19 pandemic or increasing competitive pressure, catalyzed internal transformation. These stimuli created a sense of urgency and broke organizational inertia, pushing companies to revisit their operational models and explore AI-enabled solutions.

One common pattern across cases was the role of crisis as an accelerator. As one executive explained, "*After COVID-19, we understood that the only way forward was to radically change: AI innovation had to become central*." (LOG-1). This demonstrates how external shocks can realign priorities and open space for innovation that might have otherwise been deprioritized. In this context, AI was not adopted solely due to internal readiness, but rather because external disruptions forced firms to act. Another recurring theme was the need to remain competitive in rapidly evolving markets. Some organizations have adopted AI tools to keep pace with digitally advanced competitors or meet the rising expectations of tech-savvy clients. One respondent noted that *"we realized that if our competitors are already using AI, we can't afford to stay behind.*" (CG-1). In this sense, market dynamics operated as a benchmarking mechanism, stimulating internal innovation by exposing performance gaps and technological lag.

In addition to competitors, several top managers highlighted customers as drivers of change. Organizations feel compelled to integrate AI to remain relevant and responsive as clients increasingly adopt digital channels and expect faster, more innovative services. One participant remarked, "*Our clients are now used to AI-powered experiences. We had to adapt quickly or risk losing credibility!"* (CG-3). These ecosystem dynamics push companies to keep pace with the broader technological environment, not just their immediate competitors.

These findings underscore how the external environment can serve as both a threat and an opportunity, prompting firms to reconsider their technological capabilities. However, capitalizing on these inputs requires a mindset that is not defensive but open, capable of interpreting change as a source of learning and growth. Leaders who frame market shifts and external events as opportunities for strategic renewal rather than mere survival are more likely to adopt AI in an integrated, future-oriented manner.

4.2. AI strategic co-thinker

4.2.1. AI from a tool into a collaborator

A salient pattern across the interviews concerns the evolving role of AI in strategic decision-making. While AI is often introduced as a support tool, it is being progressively reframed as a collaborative agent, a partner in exploring options, generating insights, and validating ideas, in many firms. Executives are increasingly involved in AI-driven decision-making, particularly in the early stages of strategic planning and reflection.

In several cases, top managers reported using predictive analytics powered by machine learning algorithms to anticipate long-term implications of strategic choices. Rather than relying solely on intuition or experience, decision-makers began consulting AI-generated forecasts to evaluate potential outcomes and hidden interdependencies. This shift positions AI as a thinking partner that supports hypothesis testing, uncovers patterns invisible to human reasoning, and reduces cognitive biases. As one executive noted, "*Entrusting routine decisions to artificial intelligence allows us to automate processes, reduce costs, and minimize human cognitive biases. This enables us to make more informed and efficient decisions in less time*" (TELCO-3).

The collaborative function of AI also emerged in process redesign initiatives. Several organizations applied AI-based diagnostics to identify bottlenecks and reconfigure workflows for greater agility and efficiency. In some cases, robotic process automation helped reduce redundancies, while others used simulations and real-time data to test organizational configurations. *"We've used AI to identify what slows down our teams and to propose better configurations,"* (LOG-2) said one executive in the logistics sector, describing a process where AI acts as a co-designer of operations.

Beyond analysis, leaders increasingly rely on GenAI tools to support strategic communication and team alignment. Executives described using GenAI to articulate motivating team purposes, synthesize strategic documents, or co-develop customer engagement strategies. In parallel, before implementation, AI-augmented reality platforms are being deployed to simulate complex organizational scenarios, such as supply chain adjustments, team structure reconfigurations, or workspace redesigns. These environments integrate AI's analytical capabilities with immersive visualization, allowing leaders and teams to experience and test the implications of strategic decisions in a shared, dynamic space. This fusion of simulation and data-driven feedback enhances collective understanding, reduces uncertainty, and supports more aligned and confident decision-making.

AI also plays a key role in simplifying resource allocation and operational complexity. AI systems provide real-time analysis, pattern recognition, and workflow optimization, enabling organizations to redirect their time and attention toward creative, human-centered leadership tasks. "AI simplifies processes that required multiple managerial layers, making operations faster and more efficient" (TELCO-4). Far from replacing leaders, AI augments their ability to focus on innovation, coaching, and cross-functional alignment.

However, algorithmic recommendations often do not align with managerial intuition, forcing leaders to decide whether to prioritize data accuracy or contextual sensitivity. This could create a new leadership tension: maintaining human decisional agency while integrating AI as a legitimate cognitive partner. Consequently, effective strategic co-thinking does not imply surrendering intuition but rather orchestrating a dialogue between analytical precision and experiential insight.

4.2.2. Filtering the AI outputs

As AI systems become more integrated into strategic processes, top managers are increasingly required to interpret, validate, and refine their outputs rather than accept them at face value. A recurring insight from the interviews is that using AI effectively, particularly generative and machine learning models, requires asking the right questions, contextualizing problems, and applying critical thinking to the results. This process often begins with how the problem is framed. Several leaders emphasized the importance of articulating business challenges in a manner that AI systems, particularly GenAI tools and large language models, can comprehend. "*The quality of the AI response depends on how well you define the problem*," (ENG-2) noted one executive, who described how strategic prompts must include context, constraints, and objectives. This emphasis on problem formulation and prompting applies across AI technologies.

Once results are generated, critical evaluation becomes central. Leaders emphasized that AI should not be viewed as an absolute truth, but rather as an assistant whose outputs should be questioned and refined. *"We always ask: does this make sense in our context? Could it be misleading? What's missing?" (AUTO-3)* said one manager in the automotive sector, illustrating a reflective attitude that blends data interpretation with business logic.

In this regard, experience and intuition remain crucial complements to AI outputs. Interviewees described how leaders use their strategic judgment to determine whether AI-generated options align with a company's values, culture, or long-term objectives. As one executive explained, *"AI can show you ten options, but only experience helps you pick the one that works in this environment."* (LOG-4). This mindset acknowledges that while AI provides analytical horsepower, especially in detecting patterns and simulating scenarios, it lacks the situational awareness and tacit knowledge embedded in human leadership. This balance is particularly critical in settings where GenAI proposes creative content or process alternatives but lacks contextual nuance. Similarly, predictive analytics in machine learning models may reveal statistically robust correlations that are operationally irrelevant or ethically sensitive. Leaders must therefore play a filtering role, translating raw AI output into strategically meaningful insights, sometimes by combining it with stakeholder input or front-line feedback.

However, delegating cognitive authority to AI systems raises new expectations of transparency and accountability. This underscores that AI-driven decision-making redefines, rather than replaces, the executive's ultimate responsibility. Leaders must therefore balance openness to AI insights with an explicit reaffirmation of their role as final decision-makers, ensuring that accountability remains anchored in human judgment.

Filtering and interpreting AI outputs are becoming active leadership tasks. It involves formulating the right questions, understanding the capabilities and limits of various AI tools (from generative models to robotics and forecasting algorithms), and leveraging human insight to ground decisions. According to the respondents, this reconceptualization reflects a broader leadership evolution: from task delegation to co-thinking with AI, where data-driven intelligence and human judgment converge to shape more adaptive, informed, and future-ready organizations.

4.3. Multi-level connector

4.3.1. Middle management engagement

One of the most relevant transformations brought by AI adoption concerns the renewed role of middle managers: no longer passive implementers of top-down strategies, but active leaders of organizational change and enablers of technological innovation. AI is redefining the relationship between executive leadership and intermediate layers, fostering a new architecture of distributed responsibility. This empowerment is particularly evident in the increasing autonomy of middle managers to shape their learning journeys. A top manager stated, "*Our middle managers choose their courses based on the technical skills they want to acquire*" (AUTO-5). This shift reveals a decentralized learning model in which AI catalyzes the distribution of agency and decision-making power within the organization.

Companies have responded by designing targeted AI training programs for middle management. These programs combine technical components, such as GenAI tools, machine learning basics, and data ethics, with strategic competencies like output interpretation, communication across human–machine teams, and change facilitation. As reported by a senior executive, "*We created personalized learning paths based on a survey to align AI training with each individual's experience level. Moreover, with AI, we've drastically reduced the time needed for skills training, and employees feel empowered by the immediate, actionable feedback they receive" (CG-1)*. This blended approach enables middle managers to operate confidently at the intersection of business strategy and emerging technologies, acting as cultural translators and facilitators of transformation.

Access to intuitive AI tools and experimentation environments also plays a central role. Firms increasingly offer curated datasets, sandbox platforms, and collaborative GenAI environments where managers can test ideas, fail safely, and implement rapid iterations. In this context, middle managers foster a culture of responsible experimentation, bridging localized innovation and institutional learning. As a logistics executive emphasized, "*Promoting a test-and-learn culture enables us to view mistakes as moments of discovery, reducing the fear of failure. By prioritizing regular feedback and incorporating it into future improvements, we can address small challenges early, preventing them from escalating into larger problems*" (LOG-4).

The diffusion of AI throughout business functions also prompts the emergence of new mid-level roles that blend technical, ethical, and managerial expertise. Examples include the Data & AI Product Manager, who aligns AI-driven innovation with user needs and strategic objectives; the AI Trainer and Data Modeler, who adapt algorithms to real-world scenarios in close collaboration with teams; and the Ethical AI Specialist, who ensures fairness, transparency, and alignment with corporate values.

Finally, this transformation is not only structural but also relational. AI is transforming how executives and middle managers communicate with each other and with their teams. Middle managers are expected to engage critically with AI outputs, interpret their implications, and communicate them effectively across organizational layers. As one engineering leader observed, "*Effective communication with AI systems is essential, as it shapes how leaders interact with technology and their teams"* (ENG-5). In this emerging AI-enabled environment, middle managers are change architects, trust builders, and translators of complexity. Their centrality in AI adoption makes them indispensable players in shaping resilient, inclusive, and future-ready organizations.

4.3.2. AI stakeholders' relationship

As AI becomes more embedded within organizations, its influence increasingly extends beyond internal boundaries, reshaping how firms interact with external stakeholders. Across the interviews, a consistent theme emerged: AI is not only a technological tool, but also a strategic lever for building, strengthening, and reconfiguring inter-organizational relationships. These include customers, suppliers, universities, tech providers, and institutional actors.

One important area of stakeholder engagement concerns collaborations with universities and research centers. Several firms have established partnerships to co-develop AI applications, train AI talent, and conduct experimentation in applied contexts. These collaborations help companies remain at the forefront of innovation while creating pipelines of highly skilled professionals. As one top manager from the telecommunications sector explained, "*We run joint labs with universities*" (TELCO-1), highlighting how such partnerships serve as a foundation for advancing AI research and practical applications.

A second strategic pillar involves building long-term partnerships with AI software providers. Rather than passively adopting standard solutions, many firms actively participate in co-development relationships, contributing to the evolution of products and aligning functionalities with sector-specific requirements. These partnerships are particularly valuable in contexts where explainability, customization, and compliance are essential. Through these interactions, AI becomes a shared technological infrastructure shaping the innovation trajectory across firms.

The interviews also highlighted the growing importance of supplier integration through AI. As one logistics executive explained, *"AI-driven tools can analyze supplier performance and identify shared goals across value chains, enabling deeper collaboration and more efficient resource utilization*" (LOG-1). This reflects a shift toward data-enabled orchestration of supply networks, where shared insight enhances coordination, trust, and joint value creation. Additionally, organizations are increasingly relying on AI-powered collaboration platforms to facilitate knowledge exchange with partners. These platforms enable the sharing of models, datasets, and process innovations, significantly accelerating learning cycles. A telecommunications manager noted, "*Using AI-powered collaboration platforms, we've streamlined knowledge sharing with our partners, which has significantly reduced the time needed to bring innovations to market*" (TELCO-2). In this view, AI is an enabler of agile, networked innovation.

Finally, another key dynamic is co-creating products and services with customers. The AI systems enable firms to model customer behaviors, simulate product configurations, and integrate feedback iteratively. As a leader in the consumer goods sector shared, "*Co-creating solutions with our customers using AI insights has enhanced both customer satisfaction and our ability to stay ahead of market demands*" (CG-4). This practice reflects a broader movement toward collaborative value generation, where stakeholders are informed and directly involved in innovation processes.

Therefore, according to the respondents, AI transforms how organizations connect with the outside world. AI enables shared data infrastructures, modular co-development, and multi-actor collaboration, allowing firms to cultivate adaptive and strategically valuable relationships with their stakeholder ecosystem.

4.4. Ethics risk management

4.4.1. Responsible AI culture

As AI becomes increasingly embedded in strategic and operational workflows, top managers are confronted with a new generation of ethical risks, complex, systemic, and often invisible at first glance. From the interviews, it emerged that "*Building a responsible AI culture is not simply a compliance matter. It is a strategic imperative tied to trust, reputation, and long-term viability*" (AUTO-1). Leaders are required to move beyond technical considerations to proactively manage issues of bias, privacy, accountability, and social responsibility.

One of the most pressing concerns is algorithmic discrimination, particularly in areas like hiring, pricing, and customer segmentation. Biased training data, inherited from historical inequalities, can produce unfair outcomes that may go unnoticed until reputational damage has already occurred. "*The dataset used for AI must be transparent and free from bias. If the data is flawed, the AI will reinforce those biases*" (ENG-3). For this reason, many companies are beginning to view data integrity and fairness as shared organizational responsibilities, rather than just technical tasks. Initiatives such as bias audits, ethical model validations, and interdisciplinary review teams are becoming standard practices in AI development. But these concerns don't emerge equally across all firms; they evolve as the organization's AI maturity progresses. Companies at the early stages of AI integration are often focused on preventing immediate harm and maintaining compliance. As they become more advanced, ethical risks take on more strategic dimensions. Leaders are beginning to ask how algorithmic decisions influence employee behavior, customer trust, and long-term legitimacy. In mature organizations, responsible AI shifts from crisis avoidance to aligning innovation with values, building stakeholder confidence, and maintaining a social license to operate.

Some companies have begun embedding ethical oversight directly into their development pipelines, designating AI ethics liaisons within product teams and conducting stress tests through ethical impact simulations. These practices reflect a shift toward anticipatory governance, where potential dilemmas are surfaced and addressed upstream. Transparency and accountability are crucial to this process. As one engineering manager emphasized, "*Transparency builds trust. Employees must feel confident that AI decisions are accountable and respectful of their privacy*" (ENG-5). Creating conditions of clarity and psychological safety around AI use is seen not just as a technical objective but as a cultural one, essential for ethical resilience and employee engagement.

Ultimately, fostering a responsible AI culture means ensuring that ethics is a fundamental condition of innovation. It involves making ethical risk visible, discussable, and addressable through shared practices and leadership commitment. For top managers, the challenge is to shape a culture in which technological progress is grounded in fairness, transparency, and human dignity.

4.4.2. AI ethics committee

To translate this cultural shift into structured governance, many organizations are establishing AI ethics committees, which are cross-functional bodies responsible for ensuring that AI aligns with both internal values and external societal expectations. Several interviewees explained that these committees serve as strategic overseers, reviewing AI systems before deployment, updating ethical guidelines, and advising leadership on high-stakes innovation. *"We need to make ethics visible and operational! Otherwise, AI risks becoming just another black box" (CG-3).*

These committees are not limited to technologists. Firms increasingly include ethicists, legal experts, AI engineers, and business strategists to ensure that AI projects' technical and societal implications are considered. Their composition reflects the recognition that ethical risk is multidimensional and requires input from across expertise areas. "*We're producing rules and regulations in abundance! These technologies have deep ethical and regulatory consequences*" (LOG-1).

One of the most impactful practices is adopting dynamic governance models: rather than issuing one-off policies, AI ethics boards regularly revisit and revise guidelines to stay ahead of rapidly evolving challenges, including misuse of GenAI, data privacy risks, and explainability failures. These periodic reviews help transform the committee into a dynamic governance mechanism that evolves in tandem with technological advancements. "*We have a team trying to define internal procedures aligned with evolving regulation, both technical and behavioral. It's a continuous process of ethical adaptation*" (ENG-4).

While not all organizations grant formal veto power to these committees, those that do report higher levels of internal trust, regulatory preparedness, and stakeholder confidence. When integrated with broader risk management and innovation processes, the AI ethics committee becomes a strategic asset, reinforcing the company's reputation, protecting it from compliance failures, and demonstrating public accountability. "*Having a governance function, what we call "Hand on the wheel and foot on the accelerator", helps us stay on the ethical road with AI*" (AUTO-4).

In this light, AI ethics committees are essential drivers of responsible innovation. Their presence signals to employees, partners, and the public that the organization takes its ethical commitments seriously, ensuring that AI is used in a principled manner.

4.5. Framework development

Given these findings, we develop a framework to comprehensively understand the impact of AI on top managers' strategic leadership skills. It is structured across three dimensions: personal, organizational, and relational. These dimensions are not isolated categories, but interconnected layers through which strategic capabilities are activated, translated into action, and amplified across and beyond the organizational boundaries. Fig. 2 below presents the framework in detail.

The personal dimension represents the foundational level of strategic action, where the skill of an AI open mindset plays a central role. This mindset encompasses a leader's ability to embrace continuous learning, experimentation, and cognitive flexibility when engaging with AI technologies. It enables executives to view AI as a strategic enabler of organizational renewal. A set of sources shapes the AI open mindset: (1) top-down drivers, such as senior executive willingness to AI experimentation and proactive learning; (2) openness to bottom-up AI innovations, including grassroots innovation and the active role of middle managers in identifying and testing AI solutions; and (3) external triggers, such as competitive pressure, client expectations, and environmental disruptions (e.g., the COVID-19 pandemic). These antecedents collectively foster a mindset oriented toward agility, proactiveness, and psychological readiness to face technological change. This skill acts as a gateway: without a sufficiently strong AI open mindset, executives may struggle to develop the more advanced competencies of AI strategic co-thinker, ethics risk management, and multi-level connector, since openness to experimentation and uncertainty is a precondition for reframing decision processes with AI.

The organizational dimension captures how these personal attitudes translate into concrete strategic behavior and operational reconfiguration. The key skill in this dimension is the AI strategic co-thinker, reflecting the ability of top executives to engage AI systems as cognitive collaborators in strategic planning, forecasting, and process redesign. Leaders no longer rely solely on intuition or experience but actively co-create decisions with AI, leveraging data-driven insights, scenario simulations, and predictive analytics. A crucial element of this skill involves interpreting and critically filtering AI outputs: executives must contextualize AI-generated recommendations, ask the right strategic questions, and combine algorithmic logic with organizational knowledge and values.

Alongside this capability, ethical risk management skill also emerges within the organizational sphere. As AI systems become deeply embedded in decision-making, leaders must ensure that ethical considerations, such as algorithmic bias, transparency, accountability, and data privacy, are embedded within organizational routines. This includes cultivating a responsible AI culture and formalizing governance structures such as AI ethics committees. Rather than compliance-driven, these practices serve as strategic mechanisms that enhance stakeholder trust, ensure regulatory alignment, and safeguard the long-term legitimacy of AI integration.

These two skills are deeply interdependent. AI strategic co-thinker skills sharpen leaders' awareness of the assumptions, blind spots, and unintended consequences embedded in algorithmic outputs, thereby naturally heightening the relevance of ethical scrutiny. At the same time, ethical risk management skills provide the normative guardrails and governance routines that make co-thinking with AI sustainable, ensuring that innovation is pursued without compromising trust or legitimacy. In this sense, co-thinking and ethics operate as a dual capability: one without the other risks either uncritical adoption of AI outputs or excessive caution that stifles innovation. Moreover, this interdependence could reinforce openness to continuous learning and experimentation, turning the growth mindset from an individual disposition into an organizationally sustained orientation.

The relational dimension represents the outer layer of strategic leadership skills, where AI-driven capabilities extend across both internal hierarchies and external ecosystems. The central skill here is the Multi-level connector, which unfolds in two distinct yet complementary sub-dimensions. Internally, it is manifested through the engagement of middle management, who no longer act as passive implementers of top-down directives but take an active role in co-leading the adoption of AI. This involves tailored training programs, experimentation environments, and the emergence of hybrid roles (e.g., AI product managers, ethical AI specialists) that bridge technical and strategic domains. Externally, the relational dimension is reflected in AI stakeholder relationships, where organizations leverage AI to forge collaborative ties with customers, suppliers, technology partners, and academic institutions. These connections are enabled through co-development initiatives, data-sharing platforms, and ecosystem-based innovation

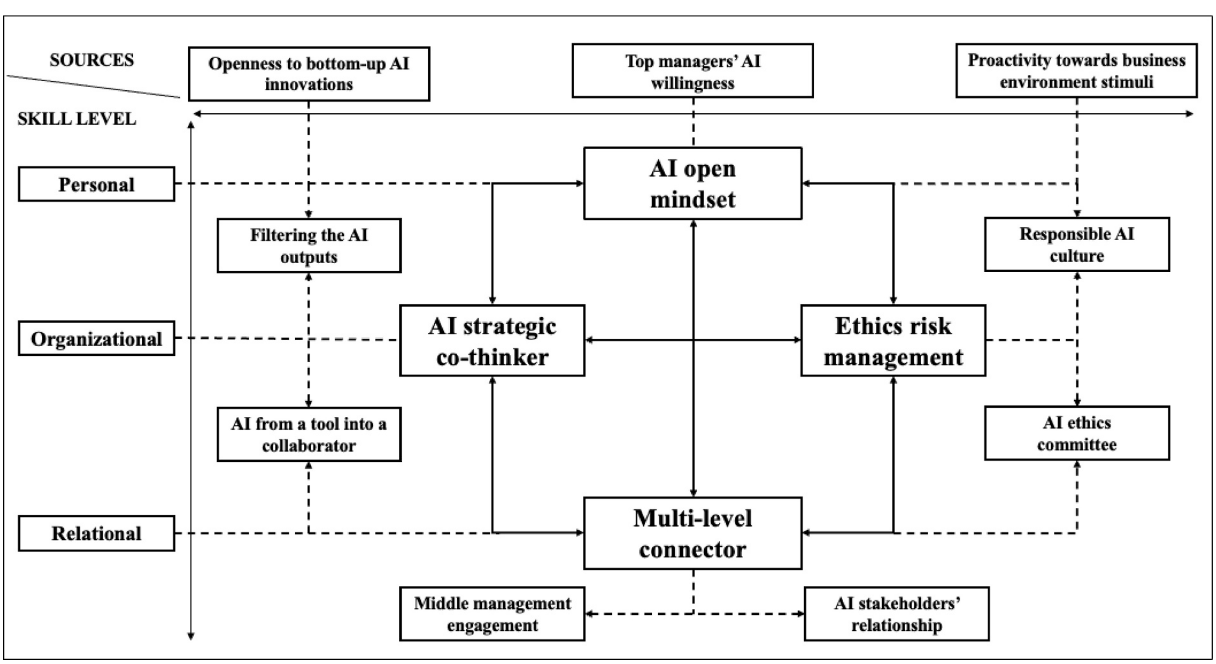

Fig. 2. Multi-level framework for top managers' skills in the AI era.

strategies. In both cases, the top managers play a pivotal role in orchestrating distributed knowledge, aligning diverse interests, and promoting a culture of shared learning and experimentation. This relational skill actively shapes others' effectiveness. First, ethical risk management depends on multi-level connector capabilities to diffuse governance mechanisms across organizational layers and embed shared accountability with external partners. Without these relational infrastructures, ethical guidelines risk remaining symbolic rather than enacted. Second, the AI strategic co-thinker requires strong connectivity to translate human–machine insights into collective action, since strategic reasoning with AI only acquires organizational value when distributed across teams, middle managers, and partner ecosystems. Third, the AI open mindset, initially rooted in executive orientation, is reinforced by the relational webs created through multi-level connections, which broaden experimentation, legitimize failures, and circulate learning across boundaries. In this sense, the multi-level connector functions as the enabling architecture that sustains and amplifies the other three skills, transforming individual dispositions into systemic organizational and inter-organizational capabilities.

This integrated perspective positions strategic skills affected by AI as dynamic, multi-level, and context-sensitive assets. It provides a conceptual foundation for understanding how top executives can effectively navigate the complexities of AI transformation, balancing innovation with governance, and individual learning with collective change.

Table 5 presents a synthesis of best practices across sectors, derived from the raw empirical data collected through interviews. The table connects sectoral best practices, distinct applications of AI technologies (GenAI, machine learning, robotics, and augmented reality), and the four strategic leadership skills identified in this study. This cross-sectoral mapping provides further validation of the proposed framework, demonstrating how strategic leadership skills are applied in practice and how they align with various AI typologies and business priorities across different industries.

To further refine this analysis, Table 6 was developed to specify how each distinct form of AI (GenAI, machine learning models, robotics, and augmented reality) shapes and interacts with the four strategic leadership skills identified. This complementary overview highlights the differentiated yet interconnected ways in which AI technologies influence top managers' strategic skills, emphasizing how each AI form demands specific responses from executive leaders.

5. Discussion

This study investigates how AI technologies are transforming the strategic leadership skills required of top managers, addressing the research question: *How does AI affect the required strategic leadership skills of top managers*? Drawing on UET, we conducted 23 interviews with top-level executives across multiple sectors. Our findings identify four key AI-driven skills: (1) AI open mindset, reflecting openness to experimentation and proactive learning; (2) AI strategic co-thinker, describing the ability to collaborate cognitively with intelligent systems in decision-making processes; (3) Multi-level connector, capturing both internal (middle management engagement) and external (stakeholder coordination) relational capabilities; and (4) Ethics risk management, denoting the integration of algorithmic responsibility, fairness, and transparency into strategic governance. These skills interact across personal, organizational, and relational levels of leadership influence.

While a growing body of literature addresses the intersection of top managers' leadership skills and digital technologies, most prior research tends to treat AI as a generic component of digital transformation, lacking specificity regarding its diverse technologies and their distinct implications for executives (Bevilacqua et al., 2025a; Jorzik et al., 2023). Systematic reviews by Bevilacqua et al. (2025a) and Bock and von der Oelsnitz (2025) acknowledge AI as a transformative force but primarily draw on existing literature and focus on generalized skill sets such as communication, agility, and emotional intelligence. Similarly,

Table 5
Sector AI practices, AI forms, and strategic leadership skills.

Sector	Best Practices	AI Type(s)	Linked Leadership Skills
Automotive	- Use machine learning to predict potential vehicle failures and optimize maintenance cycles. - Integrate generative AI into vehicle design to accelerate development and improve sustainability. - Adopt robotics and AI to advance autonomous driving, prioritizing safety and ethical risk governance.	Generative AI, Machine learning models, Robotics, Augmented reality	(1) AI Open Mindset (2) AI Strategic Co-Thinker (3) Multi-Level Connector (4) Ethics Risk Management
Consumer Goods	- Leverage AI for hyper-personalization based on consumer behavior data. - Use machine learning to optimize sustainable supply chain decisions. - Deploy predictive analytics to anticipate market shifts and inform product innovation.	Generative AI, Machine learning models, Robotics, Augmented reality	(1) AI Open Mindset (2) AI Strategic Co-Thinker (3) Multi-Level Connector (4) (4) Ethics Risk Management
Engineering	- Apply generative AI and AR in product prototyping to reduce design time and enhance innovation. - Use machine learning to detect structural anomalies and ensure product quality. - Launch AI training programs across teams to cultivate data-driven problem-solving.	Generative AI, Machine learning models, Robotics, Augmented reality	(1) AI Open Mindset (2) AI Strategic Co-Thinker (3) Multi-Level Connector (4) Ethics Risk Management
Logistics	- Optimize delivery logistics using real-time predictive algorithms. - Implement robotics to streamline inventory management and warehouse operations. - Forecast demand trends and automate stock replenishment.	Generative AI, Machine learning models, Robotics, Augmented reality	(1) AI Open Mindset (2) AI Strategic Co-Thinker (3) Multi-Level Connector (4) Ethics Risk Management

(*continued on next page*)

Table 5 (*continued*)

Sector	Best Practices	AI Type(s)	Linked Leadership Skills
Telecommunications	- Deploy generative AI-powered chatbots for customer service automation. - Use machine learning to enhance 5G network optimization and reduce latency. - Monitor and prevent cyber threats using AI-based anomaly detection systems.	Generative AI, Machine learning models, Robotics, Augmented reality	(1) AI Open Mindset (2) AI Strategic Co-Thinker (3) Multi-Level Connector (4) Ethics Risk Management

Source: Authors' elaboration.

empirical contributions, such as those by Jorzik et al. (2023) and Gilli et al. (2024), address emerging skills, such as an AI mindset and digital conceptual skills, but do not provide a differentiated analysis of how AI technologies reshape leadership skills across organizational levels and sectors. Our study addresses this conceptual limitation by offering an empirically grounded, multi-level framework that clarifies how distinct AI-related demands are operationalized through specific skillsets in strategic leadership practice.

Table 7 compares prior strategic leadership skills grounded on UET to the AI-driven strategic leadership skills identified in this study.

First, the AI open mindset builds on and extends previous studies on digital transformations that have identified skills such as agility, flexibility, adaptability, and willingness to learn (Bevilacqua et al., 2025a; Fernandez-Vidal et al., 2022; Klus & Müller, 2021; Schwarzmüller et al., 2018; Uhl-Bien & Arena, 2018). Our findings reveal that AI demands a qualitatively different orientation: an openness to multiple and heterogeneous strategic inputs and an epistemic stance that actively cultivates uncertainty as a structured resource for innovation. While cognitive skills such as active learning, adaptive reasoning, and information processing, previously defined in the Mumford leadership skill Satrataplex (Mumford et al., 2007), are foundational for leadership, the AI open mindset takes it a step further by embedding these abilities into organizational routines that are explicitly designed for continuous interaction with opaque and evolving AI systems. In this perspective, this skill, grounded in the intellectual stimulation of transformational leadership, is reframed as a systemic capacity (Bass & Avolio, 1996; Bass & Riggio, 2006; Chen et al., 2019; Gumusluoglu & Ilsev, 2009). The AI open mindset not only encourages followers to question assumptions but also institutionalizes AI-driven experimentation as a cultural and strategic norm. Therefore, the AI adoption requires leaders to actively engineer cultural conditions for experimentation by legitimizing failures, sponsoring AI pilot projects, and signaling curiosity as a strategic norm. In this sense, top managers shape the organization's collective cognitive orientation, turning uncertainty into a resource for innovation and strategic renewal. At the same time, failure to foster such a mindset can lead to stalled AI adoption, as organizations may avoid experimentation, misinterpret uncertainty, or prematurely abandon initiatives.

Second, the AI strategic co-thinker skill reconfigures the executive's role from a data interpreter to a cognitive collaborator and a critical evaluator of intelligent systems. Prior studies on digital transformation have underscored the importance of data-driven decision-making (Bevilacqua et al., 2025a) and digital literacy (Singh & Hess, 2017), yet these perspectives do not fully capture the qualitative shift introduced by AI. Such accounts portray leaders primarily as informed interpreters of technological inputs. By contrast, our findings suggest that AI positions executives as co-thinkers with intelligent systems, requiring them to frame problems, critically interpret AI outputs, verify their credibility and trustworthiness, recognize potential biases, and balance algorithmic reasoning with human intuition and contextual judgment. Moreover, while strategic skills such as systems perception, causal mapping, and long-term problem-solving remain central to executive work (Mumford et al., 2007), the AI strategic co-thinker advances them by requiring active guidance of algorithmic reasoning and scenario exploration. Similarly, sense-making, which has long been established as a leadership responsibility (Zaccaro, 2001; Zaccaro et al., 2001; Zaccaro & Bader, 2003), takes on a new form when enacted jointly with intelligent systems, rather than exclusively within human teams. Finally, building on the transformational leadership theory, it extends intellectual stimulation as a process of human–machine co-creation between the leader and the middle managers (Bass & Avolio, 1996; Bass & Riggio, 2006; Murphy & Anderson, 2020). Consequently, executives must institutionalize

Table 6
Interconnection between AI forms and strategic leadership skills of top managers in the AI era.

AI Form	AI Open Mindset	AI Strategic Co-Thinker	Multi-Level Connector	Ethics Risk Management
Generative AI	Fosters curiosity, creative confidence, and a willingness to experiment with novel solutions. Leaders develop a growth-oriented mindset that legitimizes iteration, learning from failure, and cross-functional experimentation.	Enables leaders to engage in strategic co-creation, synthesizing ideas, designing scenarios, and aligning communication and vision across teams and stakeholders.	Strengthens collaboration and knowledge sharing across internal and external actors, enhancing co-creation with teams, customers, and partners through GenAI-powered collaboration platforms.	Raises issues of bias, misinformation, and content integrity, pushing leaders to develop anticipatory governance and establish ethical review mechanisms for responsible GenAI use.
Machine Learning Models	Promotes a data-driven culture grounded in evidence-based learning and continuous adaptation. Leaders cultivate analytical curiosity and trust in algorithmic insights without losing critical judgment.	Equips leaders to use predictive analytics for forecasting, scenario testing, and pattern recognition, fostering co-thinking with data while contextualizing AI outputs.	Encourages cross-departmental coordination, as machine learning models insights require integration between technical experts, managers, and executives to inform collective decisions.	Demands vigilant oversight of data quality, bias prevention, and accountability frameworks to ensure fairness and transparency in decision-making.
Robotics	Shapes a proactive mindset that views automation as an opportunity for value creation, safety, and process innovation rather than job displacement.	Invites leaders to rethink workflows, balancing human and machine collaboration to optimize efficiency and creativity in operational design.	Requires coordination among teams, suppliers, and partners to align automation processes, ensuring human–machine integration and shared operational standards.	Highlights safety, liability, and workforce well-being, reinforcing the need for ethical safeguards, inclusive redesign, and transparent accountability.
Augmented Reality	Cultivates openness and experiential learning by immersing leaders and teams in AI-driven simulations that visualize technological and strategic possibilities.	Supports interactive strategy development, enabling leaders to test decisions, visualize outcomes, and co-design future scenarios through immersive experimentation.	Facilitates participatory engagement and collective learning among distributed teams and stakeholders, bridging spatial and functional boundaries through shared simulations.	Raises concerns about privacy, data protection, and psychological effects of immersive environments, requiring responsible design and transparency standards.

Source: Authors' elaboration.

Table 7
Comparison between previous strategic leadership skills and new ones influenced by AI.

AI-driven strategic leadership skills	Prior strategic leadership skills	Key differentiating elements
1. AI Open Mindset	- Willingness to learn (Schwarzmüller et al., 2018) - Flexibility (Klus & Müller, 2021; Uhl-Bien & Arena, 2018) - Agility (Bevilacqua et al., 2025a) - Inspiration (Singh & Hess, 2017) - Entrepreneurial thinking (Klus & Müller, 2021) - Cognitive skills such as active learning, adaptive reasoning, and information processing (Mumford et al., 2007) - Intellectual stimulation and novel thinking (Bass & Avolio, 1996; Bass & Riggio 2006; Gumusluoglu & Ilsev, 2009; Murphy & Anderson, 2020)	Transcends adaptability or growth mindset. It is driven by top-down, bottom-up, and external sources of strategic inputs, fostering an experimentation culture and cognitive transformation rather than passive adjustment.
2. AI Strategic Co-Thinker	- Data-driven decision-making (Bevilacqua et al., 2025a) - IT/digital competence (Singh & Hess, 2017; Wrede et al., 2020) - Understanding AI (Jorzik et al., 2023) - Conceptual digitalization skills (Gilli et al., 2024) - Problem-solving (Schwarzmüller et al., 2018) - Strategic reasoning (Boal & Hooijberg, 2000) - Systems perception, causal mapping, and problem solving (Mumford et al., 2007) - Sense-making and direction-setting (Zaccaro, 2001; Zaccaro et al., 2001; Zaccaro & Bader, 2003) - Intellectual stimulation and encouraging critical reflection (Bass & Riggio 2006; Chen et al., 2019; Gumusluoglu & Ilsev, 2009; Murphy & Anderson, 2020).	Repositions AI as a cognitive partner rather than a mere tool. It includes prompting, scenario exploration, and reflective filtering of AI outputs. Additionally, it encompasses the capacity to critically interpret AI-derived insights, verify their credibility, recognize implicit biases, and balance algorithmic recommendations with human intuition and experiential judgment.
3. Multi-Level Connector	- People management (Bock & von der Oelsnitz, 2025) - Motivation and influence (Boehm et al., 2015) - Talent complexity management (Fernandez-Vidal et al., 2022) - Communication and liaison (Schiuma et al., 2022) - External stakeholder engagement (Carter, 2006) - Interpersonal skills, including social perceptiveness, coordination, and persuasion (Mumford et al., 2007) - Operational coordination and empowerment (Zaccaro, 2001) - Individualized consideration and inspirational motivation (Bass & Avolio, 1996; Gumusluoglu & Ilsev, 2009; Murphy & Anderson, 2020)	Combines internal (middle management engagement) and external (stakeholder orchestration, co-creation ecosystems) relational work. It enables systemic coordination across boundaries, including timely and potentially real-time monitoring and synchronization of multiple actors, functions, and data flows within and across organizational ecosystems.
4. Ethics Risk Management	- Managing social and ethical issues (Samimi et al., 2022) - Follower valuation (Bock & von der Oelsnitz, 2025) - Responsibility and fairness (Bevilacqua et al., 2025a; Jorzik et al., 2023) - Readiness to take over responsibility (Schwarzmüller et al., 2018) - Business skills such as governance, risk oversight, and resource allocation (Mumford et al., 2007)	Embeds ethics into core leadership skillset. It entails designing governance structures, AI ethics committees, and risk mitigation frameworks that align algorithmic transparency with strategic accountability. It also requires heightened awareness of implicit biases, proactive bias detection, and continuous oversight of fairness and accountability across AI systems.

Source: Authors' elaboration.

reflective routines that support the critical appraisal of AI-generated outputs, the examination of alternative scenarios, and the integration of contextual organizational knowledge into algorithmic decision-making. In this respect, top managers act as cognitive orchestrators, designing and governing hybrid decision-making processes. However, without these reflective routines, leaders risk overreliance on opaque algorithmic outputs, leading to misaligned strategies and flawed decisions.

Third, the multi-level connector underscores how AI leadership broadens the relational domain of executives, extending previous studies that defined people management, motivation, liaison, and empowerment (Bock & von der Oelsnitz, 2025), talent complexity and change-driving (Fernandez-Vidal et al., 2022), and communication and coordination as key skills in the digital transformation era (Schiuma et al., 2022; Wrede et al., 2020). Earlier contributions frequently treat internal people management and external stakeholder engagement as separate competencies (Bock & von der Oelsnitz, 2025; Fernandez-Vidal et al., 2022). Interpersonal skills, such as social perceptiveness, coordination, and persuasion, have long been regarded as fundamental to leadership effectiveness (Mumford et al., 2007). However, the multi-level connector extends these skills by integrating relational work across organizational hierarchies and external ecosystems simultaneously. In AI contexts, this role increasingly involves timely monitoring and coordination across multiple actors and levels, enabling systemic alignment and agility. While coordination within teams has been widely emphasized in team leadership research (Zaccaro, 2001), in AI contexts, leaders must build relational linkages spanning diverse stakeholders, including middle managers, technology providers, and regulators. Likewise, whereas transformational leadership stresses individualized consideration and inspirational motivation (Chen et al., 2019; Gumusluoglu & Ilsev, 2009; Murphy & Anderson, 2020), this skill translates those follower-oriented behaviors into infrastructures that sustain cooperation across heterogeneous actors. Accordingly, the multi-level connector requires leaders to institutionalize mechanisms such as cross-functional AI taskforces, joint ventures, and structured data-sharing platforms. Top managers thus move beyond conventional people management to act as architects of systemic connectivity, enabling accelerated learning and boundary-spanning innovation. Internally, this involves empowering middle managers through customized upskilling, safe experimentation environments, and new hybrid roles. Externally, it means cultivating ecosystem partnerships through data sharing, co-development with technology providers, and academic-industry collaborations. This dual-level relational orientation is particularly critical in AI contexts, where trust, learning speed, and cross-boundary integration determine the success of innovation efforts. Yet if leaders fail to build these systemic connections, AI initiatives may collapse due to a lack of trust, fragmented data sharing, or weak cross-boundary coordination.

Finally, ethics risk management introduces a normative dimension that reshapes strategic leadership literature. While prior frameworks acknowledge responsibility and fairness (Bevilacqua et al., 2025a; Jorzik et al., 2023), these themes are frequently relegated to peripheral values or compliance requirements. Business-oriented skills related to governance, risk oversight, and resource allocation (Mumford et al., 2007) provide a foundation. Still, ethics risk management expands them into anticipatory governance practices explicitly aimed at algorithmic integrity. In this way, ethics becomes integral to strategic leadership, rather than an ancillary aspect. This skill also requires continuous awareness of biases, ensuring that AI governance mechanisms and ethical oversight processes reflect both transparency and inclusivity. Top managers evolve from being guardians of compliance to stewards of algorithmic integrity, embedding ethical considerations into the core of organizational governance and thereby reinforcing legitimacy and long-term competitive advantage. Nevertheless, neglecting this dimension can expose organizations to reputational crises, regulatory sanctions, and the erosion of stakeholder trust, undermining both legitimacy and competitiveness.

From a higher-level theoretical perspective, our findings can advance Mumford et al.'s (2007) seminal Strataplex framework, which distinguishes leadership skills across four categories based on organizational level: cognitive, interpersonal, business, and strategic. This framework has provided a robust foundation for conceptualizing the multifaceted requirements of leadership. Yet the four AI-driven skills identified in this study, AI open mindset, AI strategic co-thinker, multi-level connector, and ethics risk management, move beyond the Strataplex in three ways. First, they reconfigure cognitive and strategic capacities for contexts in which leaders must collaborate with opaque, continuously evolving technologies, rather than merely process and disseminate information. Second, they extend interpersonal skills beyond dyadic or team-level interactions to encompass systemic relational architectures that integrate internal hierarchies with external ecosystems. Third, they transform business and governance skills by embedding ethics and risk management into the very architecture of strategic decision-making, elevating responsibility from a peripheral value to a core leadership competence. Thus, while Mumford's Strataplex remains a baseline for understanding leadership skill requirements, our study illustrates how AI reshapes both the content and configuration of leadership skills, offering an updated conceptualization structurally attuned to the opportunities and challenges of the AI era.

5.1. Theoretical contributions

From a theoretical perspective, this study offers three main contributions.

First, grounded in UET (Hambrick & Mason, 1984; Hambrick, 2007) and strategic leadership literature (Boal & Hooijberg, 2000; Samimi et al., 2022; Hambrick & Wowak, 2021), this study advances the emerging stream of research examining how AI technologies reshape the strategic leadership skills of top managers. While recent contributions (Bevilacqua et al., 2025a; Bock & von der Oelsnitz, 2025; Jorzik et al., 2023) have begun to explore the implications of AI for executive skills, they often fail to distinguish between different forms of AI or to examine their specific effects on leadership skills. In contrast, this study presents an empirically grounded, differentiated view of AI's impact on top executives, accounting for the distinct organizational and cognitive implications of GenAI, machine learning algorithms, robotics, and augmented reality. By doing so, it highlights how the evolving nature of AI technologies requires new strategic skills, rather than merely extending traditional digital capabilities, and contributes to a more precise and nuanced understanding of AI-driven leadership transformation.

Second, this study introduces a multi-level conceptual framework that captures the four AI-driven leadership skills identified by organizing them across three interdependent dimensions: personal, organizational, and relational. The model illustrates how these interact dynamically across levels, reinforcing one another in the face of AI-induced complexity. The framework also reflects how strategic leadership transformation unfolds through the interplay of top-down and bottom-up mechanisms, executive willingness and cultural modeling, grassroots innovation, and middle-management engagement. In doing so, the framework extends Mumford et al.'s (2007) Strataplex by showing how classical skill categories (cognitive, interpersonal, business, and strategic) are reconfigured under the pressures of AI. Rather than operating as discrete domains, these skills are recast into interdependent domains that embed experimentation, hybrid human–machine cognition, systemic connectivity, and proactive ethical governance.

Third, this study offers a more holistic and distributed view of strategic leadership by extending the analytical focus beyond the traditional locus of top executives. While UET has historically concentrated on upper echelons, our findings emphasize the critical role of middle managers in enabling AI-related strategic change. Middle managers emerge not only as passive implementers but as active contributors to AI innovation, particularly through localized experimentation, interpretive work, and the emergence of hybrid professional roles. This perspective emphasizes a cross-level phenomenon in which strategic direction is co-constructed across the upper and middle layers of the organization (Foss & Mazzelli, 2025; Heyden et al., 2017). In doing so, the study contributes to expanding UET's explanatory scope and offers fertile ground for future research on leadership in complex, AI-enabled environments.

5.2. Managerial contributions

From a practical frontier, this study provides several actionable insights for top managers navigating the growing integration of AI within their organizations.

First, the findings underscore that AI transformation is not merely a technological initiative but a profound strategic and cultural shift that redefines the nature of executive leadership. As such, top managers must move beyond conventional digital skills and actively develop an AI open mindset. This involves cultivating a personal disposition that fosters experimentation, critical thinking, and continuous learning. Executives should model this mindset visibly, for example, by engaging in hands-on exploration of AI tools (e.g., prompt engineering for GenAI), sponsoring learning communities, and legitimizing failure as part of innovation. Moreover, leadership development programs and executive training should incorporate modules focused on cognitive flexibility and algorithmic reasoning, enabling top managers to confidently guide organizations through technological complexity.

Second, the research highlights the need to reconfigure decision-making processes by adopting an AI strategic co-thinker posture. This implies treating AI systems as cognitive partners in strategic planning and forecasting. Managers must learn to interact iteratively with AI, prompting, interpreting, and refining algorithmic insights, while maintaining accountability and critical judgment. Organizations should support this shift by developing hybrid decision-making structures that combine human and AI inputs, and by embedding explainability and contextual validation steps into their strategic workflows.

Third, the skill of multi-level connector reveals the importance of leadership that transcends hierarchical boundaries. Internally, top executives must proactively empower middle managers by providing safe spaces for experimentation, involving them in early-stage AI initiatives, and recognizing their role as translators between strategic vision and operational execution. This includes rethinking incentive systems, fostering cross-functional collaboration, and supporting the emergence of new hybrid roles. Externally, managers should leverage AI to strengthen relationships within the ecosystem. Strategic partnerships with technology providers, startups, universities, and research labs can accelerate the development of capabilities and access to innovation. Top managers should act as orchestrators of collaborative ecosystems, aligning external actors around shared goals and responsible AI practices.

Fourth, the emergence of ethics risk management as a core strategic skill calls for a proactive and embedded approach to AI governance. Executives must take the lead in institutionalizing ethical principles and accountability mechanisms throughout the organization. This includes establishing multidisciplinary AI ethics committees, formalizing processes for impact assessment and risk monitoring, and ensuring that ethical considerations are integrated into the design of AI systems from the outset. Managers should also foster a culture of algorithmic responsibility, where employees at all levels are aware of the implications of AI decisions and are encouraged to raise concerns about them.

Fifth, organizations should design structured development pathways to cultivate the four AI leadership skills identified in this study. Rather than attempting to develop all capabilities simultaneously, firms may adopt a progressive, iterative approach aligned with the proposed framework's logic. Specifically, they should begin by fostering an AI open mindset as the cultural foundation, then strengthen AI strategic co-thinking to enhance decision-making quality, build multi-level connector capabilities to support organizational integration, and finally institutionalize ethics risk management as a mature governance layer. In doing so, organizations can follow the underlying logic and data structure of the Gioia methodology that informed this study, using it as a practical roadmap for implementation. For instance, experiential learning programs, such as AI immersion bootcamps, real-time strategic simulation exercises with AI tools, or executive shadowing of data science teams, can foster direct familiarity with AI applications and encourage mindset shifts. These initiatives should be complemented by structured mentoring, executive coaching, and reflective sessions that help internalize learning outcomes and connect them to concrete managerial practices. Additionally, peer learning mechanisms, including AI-focused executive roundtables, internal communities of practice, or reverse mentoring with AI-literate junior staff, can help create a safe environment where executives can openly share their doubts, experiment, and reflect on AI's role in strategy. Organizations should also establish cross-functional AI leadership labs, where executives, data scientists, ethicists, and operational managers work together to co-develop AI use cases, aligning technical feasibility with strategic intent and ensuring ethical scrutiny. These labs can function as capability incubators, breaking silos and modeling hybrid leadership behaviors. By utilizing the proposed framework as both an analytical and developmental scaffold, organizations can transition from a conceptual understanding to an embedded practice, ensuring that AI leadership skills are cultivated systematically and iteratively across their leadership ranks.

5.3. Future research lines

This study provides an empirical perspective on how AI affects the strategic leadership skills of top managers. Building on these findings, several avenues for future research can help deepen and extend the theoretical and empirical relevance of this work.

First, future studies could explore the relationship between the AI-driven leadership skills identified and organizational performance outcomes. While this study highlights the strategic relevance of the skills AI open mindset, AI strategic co-thinker, multi-level connector, and ethics risk management, their direct impact on firm-level outcomes remains to be empirically tested. Quantitative research could examine how these skills influence key performance indicators such as innovation capability, strategic adaptability, AI project success rates, and financial performance. Longitudinal studies or cross-industry analyses could also shed light on how these skills mediate or moderate the effects of AI adoption on competitive advantage. Establishing such links would help validate these skills as strategically consequential for firms navigating AI transformation.

Second, an important avenue for future research concerns the measurement and assessment of these AI leadership skills. The present study's objective was to identify and conceptualize the strategic leadership skills required in the age of AI rather than to operationalize or test them quantitatively. However, future studies could develop reliable and valid instruments to measure these skills, enabling the evaluation of their presence and impact within organizations.

Third, future research should further investigate the role of middle management in the execution of AI strategies and the development of AI capabilities. While UET has traditionally focused on top executives, our findings suggest that middle managers emerge as pivotal agents in enabling AI experimentation, translating vision into action, and embedding new working practices. Future studies could examine the specific conditions under which middle managers thrive in AI-intensive environments, including organizational support structures, levels of autonomy, hybrid role design, and training opportunities.

Fourth, another avenue is to analyze how different strategic leadership styles interact with the adoption and use of AI. While the strategic leadership field has extensively examined styles such as transformational, transactional, responsible, servant, and charismatic leadership (Carter & Greer, 2013), little is known about how these styles influence, enable, or constrain leadership in AI-driven contexts. Future research could investigate how specific leadership styles shape leaders' openness to AI, ethical orientation, and capacity to collaborate with intelligent systems. Moreover, this analysis could be enriched by examining the interplay between leadership styles and individual characteristics such as cognitive traits, educational background, or industry experience.

Fifth, future research should consider the role of leaders' characteristics in shaping the development and application of AI leadership skills. Factors such as age, industry tenure, and educational background may affect how executives approach AI adoption. This line of inquiry could provide valuable insights into leadership development strategies and succession planning in the era of AI. Moreover, adopting a multi-echelon perspective (Georgakakis et al., 2022; Heyden et al., 2017), future research could explore how diverse individual characteristics and their dynamic interactions among CEOs, top management teams, and middle managers affect AI adoption, governance, and effectiveness.

Ultimately, future research should examine the potential barriers and sources of resistance that may impede the development of AI-related strategic leadership skills. While this study emphasizes the strategic importance of the skills, it is essential to understand why and how certain leaders or organizations may struggle to acquire or apply them. Organizational factors, such as rigid hierarchical structures, siloed communication channels, or a lack of digital infrastructure, can inhibit experimentation and cross-functional collaboration, both of which are foundational to AI leadership. Moreover, cultural barriers, such as risk aversion, fear of obsolescence, or entrenched power dynamics, can foster skepticism or defensive behavior among executives, undermining openness to AI-driven transformation. At the individual level, cognitive rigidity, low digital literacy, and resistance to changing decision-making logics may limit a leader's ability or willingness to integrate AI into strategic processes. Future research could investigate how these organizational, cultural, and personal inhibitors interact and under what conditions they can be overcome.

5.4. Limitations and conclusions

While this study provides an in-depth understanding of how AI is transforming top managers' strategic leadership skills, several limitations must be acknowledged.

First, although the sample includes organizations across a range of industries, it may be biased by organizational size, AI maturity, sectors, and geographic distribution. The interviewees represent large firms or established corporations, where leadership structures are formalized and AI projects are typically relatively advanced. As a result, the findings may not fully capture the dynamics of small and medium-sized enterprises or startups, where decision-making structures, resource constraints, and leadership requirements differ substantially. In particular, smaller firms often lack dedicated IT resources, formal governance mechanisms, or specialized AI talent, which may shape distinct trajectories of AI adoption and skill development. Startup leaders, for instance, may need to be more hands-on with AI implementation, while family business leaders may face unique challenges in reshaping long-standing decision-making traditions. Future studies should broaden the sample to include diverse organizational sizes, ownership structures, and AI maturity stages, enabling comparative insights across different adoption profiles. Moreover, while the five sectors examined (automotive, consumer goods, engineering, logistics, and telecommunications) offer a broad representation of AI adoption patterns, the study does not include other AI-intensive industries, such as financial services and healthcare. Given the cross-sectoral impact of AI (Jorzik et al., 2024), future research could extend this framework to additional industries to validate and refine the findings in other sectors. Finally, all participating organizations operate within the European market, which provides a coherent regulatory and cultural context. While this focus ensures analytical consistency, it also limits the generalizability of the results beyond Europe, where institutional conditions, regulatory regimes, and cultural orientations toward technology and hierarchy may differ significantly. Comparative studies across continents, such as North America or Asia, could thus offer valuable insights into how contextual factors influence the manifestation of AI-driven leadership skills.

Second, this study does not capture the power dynamics and political considerations that shape the implementation of AI and the development of AI leadership skills within organizations. AI adoption is not only a technical or skills-based challenge but also a political process that often involves significant resource allocation decisions, shifts in power structures, and potential job displacement, all of which create tensions that influence leadership effectiveness. These dynamics can determine when and why certain leadership skills become critical in specific contexts. Future research should therefore investigate how political agendas, organizational coalitions, and struggles over authority condition the enactment of AI leadership skills, offering a more nuanced understanding of the institutional and political terrain in which AI initiatives unfold.

Third, the study represents a temporal snapshot of a rapidly evolving technological landscape. AI systems and their organizational applications are advancing at an unprecedented rate, meaning the skills required of leaders today may differ substantially from those needed as AI becomes more autonomous, interpretable, and integrated into decision-making processes. For example, the AI strategic co-thinker skill may evolve from a relatively basic interpretation of outputs to more sophisticated forms of human–AI collaboration. Similarly, the AI open mindset may transition from encouraging experimentation to ensuring the quality of knowledge and managing epistemic risks. The multi-level connector may evolve into an ecosystem architect role, coordinating data sharing, partnerships, and governance across organizations. Ethics risk management may develop from a focus on high-level policy-setting into continuous assurance practices that integrate dynamic compliance and real-time monitoring. Future research should explicitly examine how these skills transform alongside the technological trajectory of AI, capturing not only current demands but also the emergent competencies that new generations of AI systems may require.

Addressing these limitations through comparative and longitudinal research designs would enable future studies to build on the present framework and offer a more comprehensive, empirically validated perspective on AI-enabled strategic leadership. This would further advance scholarly theory and managerial practice in a domain where clarity and foresight are increasingly critical.

CRediT authorship contribution statement

Simone Bevilacqua: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Alberto Ferraris:** Writing – review & editing, Validation, Supervision, Methodology, Conceptualization. **Kurt Matzler:** Writing – review & editing, Validation, Supervision. **Michal Kuděj:** Writing – review & editing.

Data availability

The data that has been used is confidential.

References

AlNuaimi, B. K., Singh, S. K., Ren, S., Budhwar, P., & Vorobyev, D. (2022). Mastering digital transformation: The nexus between leadership, agility, and digital strategy. *Journal of Business Research, 145*, 636–648. https://doi.org/10.1016/j.jbusres.2022.03.038

Andrews, K. R., & David, D. K. (1987). *The concept of corporate strategy* (Vol. 3). Homewood, IL: Irwin.

Agle, B. R., Nagarajan, N. J., Sonnenfeld, J. A., & Srinivasan, D. (2006). Does CEO charisma matter? An empirical analysis of the relationships among organizational performance, environmental uncertainty, and top management team perceptions of CEO charisma. *Academy of Management Journal, 49*(1), 161–174. https://doi.org/10.5465/amj.2006.20785800

Avery, D. R., Tonidandel, S., Griffith, K. H., & Quinones, M. A. (2003). The impact of multiple measures of leader experience on leader effectiveness: New insights for leader selection. *Journal of Business Research, 56*(8), 673–679. https://doi.org/10.1016/S0148-2963(01)00312-5

Bass, B. M., & Avolio, B. J. (1996). Multifactor leadership questionnaire. *Western Journal of Nursing Research.* https://doi.org/10.1037/t03624-000

Bass, B. M., & Riggio, R. E. (2006). *Transformational leadership.* Psychology Press, 10.4324/9781410617095.

Bevilacqua, S., Masárová, J., Perotti, F. A., & Ferraris, A. (2025a). Enhancing top managers' leadership with artificial intelligence: Insights from a systematic literature review. *Review of Managerial Science, 1–37.* https://doi.org/10.1007/s11846-025-00836-7

Bevilacqua, S., Ferraris, A., Kozel, R., & Vincurova, Z. (2025b). Exploring the artificial intelligence integration in top management team decision-making: An empirical analysis. *Business Process Management Journal.* https://doi.org/10.1108/BPMJ-07-2024-0659

Boal, K. B., & Hooijberg, R. (2000). Strategic leadership research: Moving on. *The Leadership Quarterly, 11*(4), 515–549. https://doi.org/10.1016/S1048-9843(00)00057-6

Boal, K. B., & Schultz, P. L. (2007). Storytelling, time, and evolution: The role of strategic leadership in complex adaptive systems. *The Leadership Quarterly, 18*(4), 411–428. https://doi.org/10.1016/j.leaqua.2007.04.008

Bock, T., & von der Oelsnitz, D. (2025). Leadership-competences in the era of artificial intelligence–a structured review. *Strategy & Leadership, 53*(3), 235–255. https://doi.org/10.1108/SL-09-2024-0100

Boehm, S. A., Dwertmann, D. J., Bruch, H., & Shamir, B. (2015). The missing link? Investigating organizational identity strength and transformational leadership climate as mechanisms that connect CEO charisma with firm performance. *The Leadership Quarterly, 26*(2), 156–171. https://doi.org/10.1016/j.leaqua.2014.07.012

Buyl, T., Boone, C., Hendriks, W., & Matthyssens, P. (2011). Top management team functional diversity and firm performance: The moderating role of CEO characteristics. *Journal of Management Studies, 48*(1), 151–177. https://doi.org/10.1111/j.1467-6486.2010.00932.x

Carmeli, A., & Tishler, A. (2006). The relative importance of the top management team's managerial skills. *International Journal of Manpower, 27*(1), 9–36. https://doi.org/10.1108/01437720610652817

Carpenter, M. A., Geletkanycz, M. A., & Sanders, W. G. (2004). Upper echelons research revisited: Antecedents, elements, and consequences of top management team composition. *Journal of Management, 30*(6), 749–778. https://doi.org/10.1016/j.jm.2004.06.001

Carter, S. M. (2006). The interaction of top management group, stakeholder, and situational factors on certain corporate reputation management activities. *Journal of Management Studies, 43*(5), 1145–1176. https://doi.org/10.1111/j.1467-6486.2006.00632.x

Carter, S. M., & Greer, C. R. (2013). Strategic leadership: Values, styles, and organizational performance. *Journal of Leadership & Organizational Studies, 20*(4), 375–393. https://doi.org/10.1177/1548051812471724

Chadwick, C., Super, J. F., & Kwon, K. (2015). Resource orchestration in practice: CEO emphasis on SHRM, commitment-based HR systems, and firm performance. *Strategic Management Journal, 36*(3), 360–376. https://doi.org/10.1002/smj.2217

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis.* Sage.

Charmaz, K., & Thornberg, R. (2021). The pursuit of quality in grounded theory. *Qualitative Research in Psychology, 18*(3), 305–327. https://doi.org/10.1080/14780887.2020.1780357

Chatterjee, S., Chaudhuri, R., & Vrontis, D. (2022). AI and digitalization in relationship management: Impact of adopting AI-embedded CRM system. *Journal of Business Research, 150*, 437–450. https://doi.org/10.1016/j.jbusres.2022.06.033

Chen, J. X., Sharma, P., Zhan, W., & Liu, L. (2019). Demystifying the impact of CEO transformational leadership on firm performance: Interactive roles of exploratory innovation and environmental uncertainty. *Journal of Business Research, 96*, 85–96. https://doi.org/10.1016/j.jbusres.2018.10.061

Chowdhury, S., Budhwar, P., & Wood, G. (2024). Generative artificial intelligence in business: Towards a strategic human resource management framework. *British Journal of Management, 35*(4), 1680–1691. https://doi.org/10.1111/1467-8551.12824

Corbin, J., & Strauss, A. (2014). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage Publications.

Daily, C. M., McDougall, P. P., Covin, J. G., & Dalton, D. R. (2002). Governance and strategic leadership in entrepreneurial firms. *Journal of Management, 28*(3), 387–412. https://doi.org/10.1016/S0149-2063(02)00133-2

Datta, S., & Iskandar-Datta, M. (2014). Upper-echelon executive human capital and compensation: Generalist vs specialist skills. *Strategic Management Journal, 35*(12), 1853–1866. https://doi.org/10.1002/smj.2267

DeChurch, L. A., Hiller, N. J., Murase, T., Doty, D., & Salas, E. (2010). Leadership across levels: Levels of leaders and their levels of impact. *The Leadership Quarterly, 21*(6), 1069–1085. https://doi.org/10.1016/j.leaqua.2010.10.009

Elenkov, D. S., Judge, W., & Wright, P. (2005). Strategic leadership and executive innovation influence: An international multi-cluster comparative study. *Strategic Management Journal, 26*(7), 665–682. https://doi.org/10.1002/smj.469

Enholm, I. M., Papagiannidis, E., Mikalef, P., & Krogstie, J. (2022). Artificial intelligence and business value: A literature review. *Information Systems Frontiers, 24*(5), 1709–1734. https://doi.org/10.1007/s10796-021-10186-w

Fernandez-Vidal, J., Perotti, F. A., Gonzalez, R., & Gasco, J. (2022). Managing digital transformation: The view from the top. *Journal of Business Research, 152*, 29–41. https://doi.org/10.1016/j.jbusres.2022.07.020

Ferraris, A., Erhardt, N., & Bresciani, S. (2019). Ambidextrous work in smart city project alliances: Unpacking the role of human resource management systems. *The International Journal of Human Resource Management, 30*(4), 680–701. https://doi.org/10.1080/09585192.2017.1291530

Finkelstein, S., Hambrick, D. C., & Cannella, A. A. (2009). *Strategic leadership: Theory and research on executives, top management teams, and boards*. USA: Oxford University Press.

Firk, S., Gehrke, Y., Hanelt, A., & Wolff, M. (2022). Top management team characteristics and digital innovation: Exploring digital knowledge and TMT interfaces. *Long Range Planning, 55*(3), Article 102166. https://doi.org/10.1016/j.lrp.2021.102166

Foss, N. J., & Mazzelli, A. (2025). Bringing managers and management back into strategy: Interfaces and dynamic managerial capabilities. *Journal of Business Research, 186*, Article 114947. https://doi.org/10.1016/j.jbusres.2024.114947

Gehman, J., Glaser, V. L., Eisenhardt, K. M., Gioia, D., Langley, A., & Corley, K. G. (2018). Finding theory–method fit: A comparison of three qualitative approaches to theory building. *Journal of Management Inquiry, 27*(3), 284–300. https://doi.org/10.1177/1056492617706029

Georgakakis, D., Heyden, M. L., Oehmichen, J. D., & Ekanayake, U. I. (2022). Four decades of CEO–TMT interface research: A review inspired by role theory. *The Leadership Quarterly, 33*(3), Article 101354. https://doi.org/10.1016/j.leaqua.2019.101354

Gilli, K., Lettner, N., & Guettel, W. (2024). The future of leadership: New digital skills or old analog virtues? *Journal of Business Strategy, 45*(1), 10–16. https://doi.org/10.1108/JBS-06-2022-0093

Gioia, D. (2021). A systematic methodology for doing qualitative research. *The Journal of Applied Behavioral Science, 57*(1), 20–29. https://doi.org/10.1177/0021886320982715

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational Research Methods, 16*(1), 15–31. https://doi.org/10.1177/1094428112452151

Glaser, B., & Strauss, A. (2017). Discovery of grounded theory: Strategies for qualitative research. *Routledge*.

Gumusluoglu, L., & Ilsev, A. (2009). Transformational leadership, creativity, and organizational innovation. *Journal of Business Research, 62*(4), 461–473. https://doi.org/10.1016/j.jbusres.2007.07.032

Hambrick, D. C. (2007). Upper echelons theory: An update. *Academy of Management Review, 32*(2), 334–343. https://doi.org/10.5465/amr.2007.24345254

Hambrick, D. C., Humphrey, S. E., & Gupta, A. (2015). Structural interdependence within top management teams: A key moderator of upper echelons predictions. *Strategic Management Journal, 36*(3), 449–461. https://doi.org/10.1002/smj.2230

Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review, 9*(2), 193–206. https://doi.org/10.5465/amr.1984.4277628

Hambrick, D. C., & Wowak, A. J. (2021). Strategic leadership. *Strategic Management: State of the Field And Its Future*, 337–353.

Hautamäki, P., & Heikinheimo, M. (2025). Fully leveraging AI in B2B sales: Exploring sales managers' capabilities and organizational knowledge processes. *Journal of Business Research, 194*, Article 115396. https://doi.org/10.1016/j.jbusres.2025.115396

Hennink, M., Bailey, A., & Hutter, I. (2020). Qualitative research methods.

Herrmann, P., & Datta, D. K. (2005). Relationships between top management team characteristics and international diversification: An empirical investigation. *British Journal of Management, 16*(1), 69–78. https://doi.org/10.1111/j.1467-8551.2005.00429.x

Heyden, M. L., Fourné, S. P., Koene, B. A., Werkman, R., & Ansari, S. (2017). Rethinking 'top-down'and 'bottom-up'roles of top and middle managers in organizational change: Implications for employee support. *Journal of Management Studies, 54*(7), 961–985. https://doi.org/10.1111/joms.12258

Hougaard, R., Carter, J., & Stembridge, R. (2024). The best leaders can't be replaced by AI. *Harvard Business Review*.

Jain, N. (2021). Survey versus interviews: Comparing data collection tools for exploratory research. *The Qualitative Report, 26*(2), 541–554.

Jorzik, P., Yigit, A., Kanbach, D. K., Kraus, S., & Dabić, M. (2023). Artificial intelligence-enabled business model innovation: Competencies and roles of top management. *IEEE Transactions on Engineering Management, 71*, 7044–7056. https://doi.org/10.1109/TEM.2023.3275643

Jorzik, P., Klein, S. P., Kanbach, D. K., & Kraus, S. (2024). AI-driven business model innovation: A systematic review and research agenda. *Journal of Business Research, 182*, Article 114764. https://doi.org/10.1016/j.jbusres.2024.114764

Kanbach, D. K., Heiduk, L., Blueher, G., Schreiter, M., & Lahmann, A. (2024). The GenAI is out of the bottle: Generative artificial intelligence from a business model innovation perspective. *Review of Managerial Science, 18*(4), 1189–1220. https://doi.org/10.1007/s11846-023-00696-z

Kiss, A. N., Cortes, A. F., & Herrmann, P. (2022). CEO proactiveness, innovation, and firm performance. *The Leadership Quarterly, 33*(3), Article 101545. https://doi.org/10.1016/j.leaqua.2021.101545

Klus, M. F., & Müller, J. (2021). The digital leader: What one needs to master today's organisational challenges. *Journal of Business Economics, 91*(8), 1189–1223. https://doi.org/10.1007/s11573-021-01040-1

Kraus, S., Ferraris, A., & Bertello, A. (2023). The future of work: How innovation and digitalization re-shape the workplace. *Journal of Innovation & Knowledge, 8*(4), Article 100438. https://doi.org/10.1016/j.jik.2023.100438

Langley, A., & Abdallah, C. (2015). Templates and turns in qualitative studies of strategy and management. In *Research Methods for Strategic Management* (pp. 137–166). Routledge.

Li, L., Tang, W., Zhou, H., & Yang, S. (2023). Digitalization and firm performance: The moderating role of top management team attributes. *IEEE Transactions on Engineering Management*. https://doi.org/10.1109/TEM.2023.3242766

Liu, L. (2016). Using generic inductive approach in qualitative educational research: A case study analysis. *Journal of Education and Learning, 5*(2), 129–135.

Luciano, M. M., Nahrgang, J. D., & Shropshire, C. (2020). Strategic leadership systems: Viewing top management teams and boards of directors from a multiteam systems perspective. *Academy of Management Review, 45*(3), 675–701. https://doi.org/10.5465/amr.2017.0485

Magnani, G., & Gioia, D. (2023). Using the Gioia Methodology in international business and entrepreneurship research. *International Business Review, 32*(2), Article 102097. https://doi.org/10.1016/j.ibusrev.2022.102097

Mikalef, P., & Gupta, M. (2021). Artificial intelligence capability: Conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. *Information & Management, 58*(3), Article 103434. https://doi.org/10.1016/j.im.2021.103434

Mikalef, P., Islam, N., Parida, V., Singh, H., & Altwaijry, N. (2023). Artificial intelligence (AI) competencies for organizational performance: A B2B marketing capabilities perspective. *Journal of Business Research, 164*, Article 113998. https://doi.org/10.1016/j.jbusres.2023.113998

Müller, S. D., Konzag, H., Nielsen, J. A., & Sandholt, H. B. (2024). Digital transformation leadership competencies: A contingency approach. *International Journal of Information Management, 75*, Article 102734. https://doi.org/10.1016/j.ijinfomgt.2023.102734

Mumford, T. V., Campion, M. A., & Morgeson, F. P. (2007). The leadership skills strataplex: Leadership skill requirements across organizational levels. *The Leadership Quarterly, 18*(2), 154–166. https://doi.org/10.1016/j.leaqua.2007.01.005

Murphy, W. H., & Anderson, R. E. (2020). Transformational leadership effects on salespeople's attitudes, striving, and performance. *Journal of Business Research, 110*, 237–245. https://doi.org/10.1016/j.jbusres.2020.01.023

Perotti, F. A., Dhir, A., Ferraris, A., & Kliestik, T. (2024). Investigating digital technologies' implementation in circular businesses: Evidence from the going circular path. *Journal of Management & Organization, 30*(3), 421–451. https://doi.org/10.1017/jmo.2023.60

Quigley, T. J., & Hambrick, D. C. (2012). When the former CEO stays on as board chair: Effects on successor discretion, strategic change, and performance. *Strategic Management Journal, 33*(7), 834–859. https://doi.org/10.1002/smj.1945

Robertson, J., Botha, E., Oosthuizen, K., & Montecchi, M. (2025). Managing change when integrating artificial intelligence (AI) into the retail value chain: The AI implementation compass. *Journal of Business Research, 189*, Article 115198. https://doi.org/10.1016/j.jbusres.2025.115198

Roy, S. K., Tehrani, A. N., Pandit, A., Apostolidis, C., & Ray, S. (2025). Ai-capable relationship marketing: Shaping the future of customer relationships. *Journal of Business Research, 192*, Article 115309. https://doi.org/10.1016/j.jbusres.2025.115309

Samimi, M., Cortes, A. F., Anderson, M. H., & Herrmann, P. (2022). What is strategic leadership? developing a framework for future research. *The Leadership Quarterly, 33*(3), Article 101353. https://doi.org/10.1016/j.leaqua.2019.101353

Schmidt, D. H., van Dierendonck, D., & Weber, U. (2023). The data-driven leader: Developing a big data analytics leadership competency framework. *Journal of Management Development, 42*(4), 297–326. https://doi.org/10.1108/JMD-12-2022-0306

Schiuma, G., Schettini, E., Santarsiero, F., & Carlucci, D. (2022). The transformative leadership compass: Six competencies for digital transformation entrepreneurship. *International Journal of Entrepreneurial Behavior & Research, 28*(5), 1273–1291. https://doi.org/10.1108/IJEBR-01-2021-0087
Schwarzmüller, T., Brosi, P., Duman, D., & Welpe, I. M. (2018). How does the digital transformation affect organizations? Key themes of change in work design and leadership. *Management Revue, 29*(2), 114–138.
Shah, P., Dhir, A., Joshi, R., & Tripathy, N. (2023). Opportunities and challenges in food entrepreneurship: In-depth qualitative investigation of millet entrepreneurs. *Journal of Business Research, 155*, Article 113372. https://doi.org/10.1016/j.jbusres.2022.113372
Singh, Anna, & Hess, Thomas (2017). How chief digital officers promote the digital transformation of their companies. *MIS Quarterly Executive, 16*(1). Article 5. Available at: https://aisel.aisnet.org/misqe/vol16/iss1/5.
Singh, A., Lim, W. M., Jha, S., Kumar, S., & Ciasullo, M. V. (2023). The state of the art of strategic leadership. *Journal of Business Research, 158*, Article 113676. https://doi.org/10.1016/j.jbusres.2023.113676
Strauss, A., & Corbin, J. (1998). Basics of qualitative research techniques.
Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation, 27*(2), 237–246. https://doi.org/10.1177/1098214005283748
Uhl-Bien, M., & Arena, M. (2018). Leadership for organizational adaptability: A theoretical synthesis and integrative framework. *The Leadership Quarterly, 29*(1), 89–104. https://doi.org/10.1016/j.leaqua.2017.12.009
Vera, D., & Crossan, M. (2004). Strategic leadership and organizational learning. *Academy of Management Review, 29*(2), 222–240. https://doi.org/10.5465/amr.2004.12736080
Volkmar, G., Fischer, P. M., & Reinecke, S. (2022). Artificial Intelligence and Machine Learning: Exploring drivers, barriers, and future developments in marketing management. *Journal of Business Research, 149*, 599–614. https://doi.org/10.1016/j.jbusres.2022.04.007
White, J. V., & Borgholthaus, C. J. (2022). Who's in charge here? A bibliometric analysis of upper echelons research. *Journal of Business Research, 139*, 1012–1025. https://doi.org/10.1016/j.jbusres.2021.10.028
Wowak, A. J., Mannor, M. J., Arrfelt, M., & McNamara, G. (2016). Earthquake or glacier? How CEO charisma manifests in firm strategy over time. *Strategic Management Journal, 37*(3), 586–603. https://doi.org/10.1002/smj.2346
Wrede, M., Velamuri, V. K., & Dauth, T. (2020). Top managers in the digital age: Exploring the role and practices of top managers in firms' digital transformation. *Managerial and Decision Economics, 41*(8), 1549–1567. https://doi.org/10.1002/mde.3202
Yukl, G. (2012). Effective leadership behavior: What we know and what questions need more attention. *Academy of Management perspectives, 26*(4), 66–85. https://doi.org/10.5465/amp.2012.0088
Zaccaro, S. J. (2001). *The nature of executive leadership: A conceptual and empirical analysis of success. American Psychological Association.* https://doi.org/10.1037/10398-000
Zaccaro, S. J., Rittman, A. L., & Marks, M. A. (2001). Team leadership. *The Leadership Quarterly, 12*(4), 451–483. https://doi.org/10.1016/S1048-9843(01)00093-5
Zaccaro, S. J., & Bader, P. (2003). E-leadership and the challenges of leading e-teams: Minimizing the bad and maximizing the good. *Organizational Dynamics*. https://doi.org/10.1016/S0090-2616(02)00129-8

Simone Bevilacqua is a PhD Candidate in Business and Management at the University of Turin in Italy and the University of Innsbruck in Austria. He contributes to conducting research in highly ranked journals on the topics of strategic leadership, artificial intelligence, and top management teams. He actively publishes scientific articles in international journals and is a reviewer of some academic journals. Besides doing research dissemination at conferences and seminars in Europe, he also delivers lectures related to his research topics to bachelor's and master's students. In addition, he is also a member of research groups of national and international interest. is the corresponding author and can be contacted at: simone.bevilacqua@unito.it

Alberto Ferraris, Ph.D in Business and Management, Full Professor and Coordinator of the Ph.D. in Business & Management, Department of Management "Valter Cantino" - University of Torino – Italy. He is Fellow (F-EMAB) and an active member of the EuroMed Research Business Institute as well as of Gnosis Research Center at the University of Nicosia. He is author of more than 100 academic and scientific articles as well as he serves as Guest Editor or he is in the Editorial Board in several prestigious international journals, such as Journal of International Management, Journal of Business Research, Journal of Intellectual Capital. He is also the Co-Editor in Chief of British Food Journal.

Kurt Matzler is a professor of Strategic Management at the University of Innsbruck, Austria. He is the academic director of the Executive MBA program at MCI in Innsbruck and partner of IMP, an international consulting firm. He has published numerous academic papers and several books, among others he is co-author of the "Open Strategy" (MIT Press, 2021) and author of "The High Performance Mindset" (2023). He is a passionate cyclist and a solo finisher of the Race Across America 2022 and 2025.

Michal Kuděj, PhD, graduated from the Prague University of Economics and Business, where he received his engineering and doctoral degrees. In practice, he specializes in corporate finance and restructuring processes. He is a founding partner of the consulting company TARPAN Partners, where he has worked since 2010. Since 2016, he has been a member of the scientific board of the Harry Pollak Centre for Restructuring and Insolvency at the Faculty of Business Administration of the Prague University of Economics and Business, where he focuses on the issues of corporate crisis and bankruptcy and their resolution. He is involved in teaching the minor in Turnaround Management and the course Managerial Finance. He holds the position of Research Associate at the European Centre for Business Research in Prague.