



# Enhancing top managers' leadership with artificial intelligence: insights from a systematic literature review

Simone Bevilacqua<sup>1</sup> · Jana Masárová<sup>2</sup> · Francesco Antonio Perotti<sup>1,3</sup> · Alberto Ferraris<sup>1,4,5</sup>

Received: 24 May 2024 / Accepted: 2 January 2025  
© The Author(s) 2025

## Abstract

In the contemporary landscape of digital transformation (DT), the wave of artificial intelligence (AI) is radically restructuring the managerial processes of organizations. As a result, the influence of top managers is emerging as a determining factor in the effectiveness of business strategies related to AI innovation. Academics have provided a large body of literature on this topic, drawing on upper echelons theory, which states that top managers' leadership influences companies' strategic decisions and performance. Leaders have revolutionized their roles and skills to exploit the full potential of AI and integrate it into the business decision-making process effectively. However, given the fragmented nature of existing studies, a systematic literature review is needed to consolidate and clarify how AI impacts top managers' leadership. This paper presents findings involving bibliometric and content analysis tools, examining 63 articles from 31 highly ranked academic journals. Three research clusters emerge: (1) AI-driven skills of top managers' leadership; (2) factors driving top managers' decision to adopt AI in organizations; and (3) the strategic use of AI. The article contributes to upper echelons theory, providing a holistic perspective on top managers' leadership in the AI era and a guidance framework for successfully integrating AI in businesses. Finally, the study offers scholars avenues for future research and provides practical insights for top managers seeking to harness AI technologies to enhance their strategic leadership in organizations.

**Keywords** Artificial intelligence · Top managers · Leadership · Upper echelons theory · Digital transformation

**JEL Classification** M12 · O32

---

Extended author information available on the last page of the article

## 1 Introduction

Digital transformation (DT), led by the rise of digital technologies, has embodied a revolutionary change affecting all sectors and companies (Bresciani et al. 2021; Ferreira et al. 2019; Leso et al. 2023). According to several studies, DT refers to the use of emerging digital technologies for enhancing business processes, such as improving customer experience, optimizing operations, or creating new business models (Fitzgerald et al. 2014; Kraus et al. 2021; Vlačić et al. 2021). This concept has emerged as a response to the rapid evolution of digital technologies and the increasing demand for innovative solutions from consumers (Calderon-Monge and Ribeiro-Soriano 2023; Kraus et al. 2023; Verhoef et al. 2021). DT has consequently led to the introduction of a range of technological tools and processes, such as artificial intelligence (AI), machine learning, blockchain, and data analytics, which have become indispensable for businesses that want to succeed in an increasingly competitive and dynamic landscape (Chowdhury et al. 2023; Di Prima et al. 2024; Kraus et al. 2021). Several studies highlight the importance of understanding how AI disrupts organizational dynamics (Haenlein and Kaplan 2019; Kanbach et al. 2023; Naem et al. 2024; Santana and Díaz-Fernández 2023). AI is the cornerstone of DT, offering unprecedented capabilities to analyze vast amounts of data, discover insights, and make data-driven decisions with accuracy and speed across industries (Åström et al. 2022; Berente et al. 2021; Kaplan and Haenlein 2019; Mikalef and Gupta 2021). In order to harness the potential of AI in strategic decisions within the organization, the leadership of top managers plays a crucial role in its implementation and use (Heyden et al. 2017; Ruokonen and Ritala 2023; Wrede et al. 2020). Indeed, according to a recent Harvard Business Review study, interviews with 600 organizations engaged in DT indicate a high level of confidence in how AI can be an excellent tool in supporting top managers' leadership (Hougaard et al. 2024). Top managers are the companies' key decision-makers, whose leadership plays a pivotal role in the DT process (Georgakakis et al. 2022; Heyden et al. 2017; Li and Shao 2023). The relevance of top managers was first highlighted by the theorists of upper echelons theory (UET), according to which the leaders' background, characteristics, and choices significantly influence strategy, decision-making, and organizational outcomes (Hambrick 2007; Hambrick and Mason 1984). Prior studies have also established noteworthy correlations between top executives and strategic corporate change (Hambrick et al. 1993; Wiersema and Bantel 1992). Moreover, several scholars propose that top managers influence organizations' innovation endeavors (Damanpour 1991; Smith and Tushman 2005; Wrede and Dauth 2020). Accordingly, firms' leaders play a critical role in addressing DT, promoting a digital culture, allocating resources effectively, and managing human resources (Avolio et al. 2000, 2014; Fernandez-Vidal et al. 2022; Gupta et al. 2023). Some recent studies conducted systematic literature reviews (SLRs) to examine the role of leadership in the context of DT (Lin 2024; McCarthy et al. 2022; Rêgo et al. 2021). Lin (2024) focused on the competencies that digital leaders need for leading DT, unveiling how top managers adapt technologically and provide leadership in digitalization. On the same line, McCarthy et al. (2022) investigate digital leadership by implementing advanced technologies, emphasizing a broader scope that includes managing digital infrastructure and supporting decision-

making via information and communication technology. Furthermore, Rêgo et al. (2021) explore how corporate strategies evolve in response to DT, emphasizing the pivotal role of top managers. However, such systematic reviews leave an open gap. While they address DT and the role of top managers, these studies only touch on AI superficially, without making it a central focus. Thus, previous SLRs largely overlooked the disruptive influence of AI on leadership at the top manager level and its potential to drive a paradigm shift. When some studies emphasized the role of AI in business, they analyzed the impact of AI on managers' skills, managerial decision-making processes, and functions (Deepa et al. 2024; Kaushal et al. 2023). As a result, the available studies are too general and broad, as they do not go into the specifics of how AI affects the leadership of top managers.

Empirical research by Wrede et al. (2020) and Fernandez-Vidal et al. (2022) has begun to explore the new challenges that top managers face in the AI era, highlighting the importance of strategic foresight. Similarly, Jorzik et al. (2023) emphasize the critical role of top management in driving innovation through AI technologies, highlighting the influence of leadership on the evolution of business models. Moreover, Jorzik et al. (2024) also investigate the central role of top managers in creating new AI-driven business models. These studies make relevant contributions, exploring different topics and offering innovative ideas that enrich the existing literature. In general, such a growing literature debate appears to be fragmented, lacking a clear and cohesive vision of how AI radically transforms the leadership of top managers. This leaves a gap in the overall understanding of the topic that can be filled through an SLR.

Furthermore, UET, widely used in numerous studies to emphasize the strategic influence of top managers on business outcomes, still needs to be adequately expanded to fully consider the profound changes that AI can bring to leadership practices (Fernandez-Vidal et al. 2022; Wrede et al. 2020). This gap is particularly relevant since AI has the potential to revolutionize decision-making processes, operational strategies, and the skills needed by top managers (Jorzik et al. 2023). The advent of AI could radically alter leadership dynamics, raising questions about how leaders need to evolve and how AI could be integrated into decision-making processes to reflect new dimensions of analysis and prediction (Lin 2024; Schmidt et al. 2023; Schuster et al. 2023). In response, this article aims to provide an overview of the literature on how AI has impacted top managers' leadership.

An SLR is essential to map and analyze the topic thoroughly, identifying opportunities for future studies. Following the suggestion of Secundo et al. (2020) and Tandon et al. (2021), the SLR is conducted to address three primary research questions:

RQ1. What is the research profile of the literature on the impact of artificial intelligence on the leadership of top managers?

RQ2. Which research themes have been explored in the literature?

RQ3. What are the prospective research directions in this field?

In response to the research questions, this study seeks to present a new conceptualization, offering a comprehensive review to advance the field of study of UET. The aim is to provide new insights into how AI has transformed the leadership of top managers by employing bibliometrics and content analysis tools. We use bibliometric analysis to address RQ1, which focuses on understanding the research profile of the

literature. This method allows us to identify the most influential articles, authors, countries, keywords, and journals, providing insights into the evolution of the field. For RQ2 and RQ3, we apply content analysis to explore the specific themes related to the impact of AI on top managers' leadership and identify future research directions. As a result, three research themes emerged grouping previous contributions according to: (1) AI-driven skills of top managers' leadership; (2) factors driving top managers' decision to adopt AI in organizations; and (3) the strategic use of AI.

The study offers contributions in two main directions. Firstly, the study aims to enhance the existing research on the influence of AI on leadership by presenting a new framework that emphasizes the strategic role of top managers in AI adoption (Schmidt et al. 2023; Schuster et al. 2023). It identifies the necessary leadership skills while considering organizational, technological, and sociocultural factors that shape the integration of AI. The framework highlights how these elements influence the effectiveness of AI-driven leadership and its strategic use. It provides a comprehensive view on how top managers can successfully navigate and lead AI initiatives. The second contribution lies in enriching UET by integrating AI as a crucial variable in top managers' leadership. Until now, UET has extensively explored the role of business leaders in driving the DT process, but AI's specific impact on their ability to lead and influence organizations has not been sufficiently examined (Fernandez-Vidal et al. 2022; Wrede et al. 2020). This study proposes an extension of UET, highlighting how AI can radically transform leadership and decision-making at the executive level. This advancement enables a better understanding of how leaders can leverage AI to navigate the complexities of DT, thereby enriching the theory itself.

This study offers crucial insights for top managers looking to harness the potential of AI in their strategic and operational roles. By considering organizational and individual dimensions, it provides a holistic view of the value of AI, guiding top managers toward a more integrated understanding of AI's role in organizations.

## **2 An upper echelons perspective on top managers' role: why is it crucial in AI implementation?**

The role of top managers is a crucial issue in organizational management literature (Fernandez-Vidal et al. 2022; Georgakakis et al. 2022). Several management theories offer different perspectives on understanding top managers' decision-making processes. These include UET, the resource-based view (RBV; Barney 1991; Grant 1991), and new institutional theory (NIT; AlNuaimi et al. 2022; Biggart and Hamilton 1987; Dubey et al. 2018).

The theorists of UET first emphasized the importance of top managers. Such a theoretical cornerstone, proposed by Hambrick and Mason (1984), posits that top executives' characteristics, values, experiences, and cognitive biases significantly influence organizational outcomes and performance. It emphasizes that top executives bring their unique perspectives and cognitive frames to the decision-making process (Hambrick 2007; Hambrick and Mason 1984; Hambrick et al. 1993). Top managers encompass all executive personnel crucially involved in a company's critical strategic decisions (Li and Shao 2023; Singh et al. 2023). Moreover, top managers

are essential in defining an organization's vision, direction, and culture, significantly influencing strategic decision-making, resource allocation, and the company's success (Georgakakis et al. 2022; Samimi et al. 2022). Therefore, UET theorists suggest that by recognizing the influence of top managers on organizational outcomes, strategic management and organizational performance can be improved (Hambrick 2007; Hambrick and Mason 1984; Heyden et al. 2017).

The RBV offers a complementary perspective, focusing on the organization's internal resources and capabilities as sources of sustainable competitive advantage (Barney 1991; Grant 1991). According to the RBV, top managers are crucial in identifying, developing, and exploiting unique resources, such as technological expertise and AI-related innovation capabilities (Flood et al. 1997). On the other hand, NIT examines how external pressures, including regulatory, social, and cultural factors, influence organizational behavior and decision-making (Greenwood et al. 2008; Meyer and Rowan 1977). From this perspective, adopting AI could be seen as a response to regulatory and institutional expectations in an increasingly digitized environment (Dubey et al. 2018).

Given the study's objectives and the extensive supporting literature (Dhir et al. 2023; Georgakakis et al. 2017; Kallias et al. 2023), the most suitable theoretical lens is offered by UET. Although the RBV and NIT propose interesting complementary perspectives, UET allows for a more in-depth analysis of how leaders can understand and integrate advanced technologies such as AI. Therefore, according to previous studies (Fernandez-Vidal et al. 2022; Jorzik et al. 2023; Wrede et al. 2020), this theory provides a framework for studying the influence of top managers' leadership in strategic decisions and AI-related technological transformation.

Early research on UET focused on observable demographic variables such as age, level of education, previous work experience, length of tenure, and the composition of the management team (Hambrick 2007; Hambrick and Mason 1984; Hambrick et al. 1993). The aim was to establish correlations between these variables and strategic corporate outputs, such as innovation, strategic change, and financial performance (Certo et al. 2006). In later years, research began to consider less visible but equally relevant variables such as personality, values, perceptions, risk tolerance, and the motivations of top managers (Buyl et al. 2011; Carpenter et al. 2004). This expansion has led to a richer and more complex understanding of decision-making dynamics, highlighting how it is not only observable characteristics that influence strategic decisions but also leaders' deeper and less visible characteristics (Kallias et al. 2023; Nielsen 2010). The focus has also shifted to the context in which top managers operate (Dubey et al. 2018; Manner 2010). Organizational culture, institutional pressures, and power dynamics within the management team have become central to the UET field (Chuang et al. 2009; Dubey et al. 2018). This evolution shifted the focus from the individual characteristics of leaders to how these characteristics interact within a group of leaders, emphasizing the importance of group dynamics (Kallias et al. 2023). Leaders must balance conformity with innovation, striving to align organizational needs with external expectations and technological opportunities (Georgakakis et al. 2017). This tension between conformity and innovation is critical to top managers' decision-making processes (Dubey et al. 2018).

The study variables have broadened further with the advent of digital technologies and the increasing focus on diversity and inclusion (Fernandez-Vidal et al. 2022; Jorzik et al. 2023; Kallias et al. 2023; Wrede et al. 2020). Moreover, the impact of gender, ethnic, and functional diversity in management teams and how technologies influence leaders' decision-making processes are topics of considerable relevance (Firk et al. 2022).

Successive studies, presented in Table 1, have advanced UET, proposing that top managers' leadership is crucial for companies to successfully achieve DT (Avolio and Kahai 2003; Avolio et al. 2014; Fernandez-Vidal et al. 2022; Li and Shao 2023; Wrede et al. 2020).

Further studies grounded in UET have delineated the necessary actions and skills expected of top managers to address the DT process effectively. Wrede et al. (2020)

**Table 1** Prior articles associating top managers with Digital Transformation. Source: Authors' elaboration

Authors	Title	Leadership mediated by digital technology definition
Avolio et al. (2000, p. 617)	E-leadership: Implications for theory, research, and practice	"Stage of social change mediated by Advanced Information Technology to produce a change in attitude, emotion, thought, behavior and/or performance with individuals, groups and/or organizations."
Fisk, (2002, p. 50)	The making of a digital leader	"Digital leaders have a clear and ambitious vision, as well as well-defined strategies. They actively support and teach other members of the organization to pursue goals. They see the organization as a network rather than a hierarchy and try to be at the center of this network. They see partnerships, joint ventures, and outsourcing as ways to create connections that open new possibilities and/or extend the organization's capacity."
Zhong, L. (2017, p. 28)	Indicators of digital leadership in the context of K-12 education	"Digital leadership is about leading and inspiring digital transformation, establishing and maintaining a digital learning culture, facilitating and improving professional growth based on technology, as well as providing and maintaining a digital organization."
Cortellazzo et al. (2019)	The role of leadership in a digitalized world: A review	Leaders play an active role in fostering the growth of a digital culture by establishing connections with a wide array of stakeholders. Additionally, leaders must facilitate cooperation within intricate settings, all the while bearing in mind the crucial ethical dimensions involved
Schiama et al. (2021)	The transformative leadership compass: six competencies for digital transformation entrepreneurship	Competencies and skills that leaders must cultivate in the contemporary digital age
Peng, (2021)	Digital leadership: State governance in the era of digital technology	In the era of digital technology, individuals or entities possess the capacity to lead teams, entire organizations, or employees toward embracing digital mindset, utilizing digital knowledge, making digital decisions, implementing digital strategies, and providing digital guidance to achieve their objectives
Li and Shao, (2023)	How do top management team characteristics affect digital orientation? Exploring the internal driving forces of firm digitalization	Top managers are the company's key decision-makers and play a decisive role in the company's digital transformation process

identified three essential actions that top managers must undertake: understanding digitization, establishing a structured framework for DT, and guiding change. Furthermore, Fernandez-Vidal et al. (2022) identified, through a top-down approach involving interviews with top managers, four critical capabilities required by managers to excel in the digitalization and integration of new technologies into current or new businesses: driving business transformation; adeptly navigating fluid and flexible organizational structures; managing complex talent dynamics; and prioritizing continuous learning.

However, a closer examination of these reveals that although they have explored how DT impacted top managers' leadership in business, they have not considered the challenges and opportunities presented by the integration of AI (Cortellazzo et al. 2019; Doornenbal et al. 2022; Firk et al. 2022; Schiuma et al. 2021). This gap in the literature is particularly striking given the increasing prominence of AI technologies in organizational contexts (Arias-Pérez and Vélez-Jaramillo 2022; Kraus et al. 2023; Koechling et al. 2023; Ulrich et al. 2024). Based on the definitions provided by previous papers, AI is defined as a computer with human-like capabilities, enabling it to perform tasks that conventionally require human intelligence (Dwivedi et al. 2021; Kaplan and Haenlein 2019; Kolbjørnsrud et al. 2017; Lee et al. 2019; Makarius et al. 2020; Mikalef and Gupta 2021). According to several studies, AI enables companies to reduce risk and gain a competitive advantage in today's data-driven economy, as also underlined by major surveys focusing on enterprises (Agrawal et al. 2020; Chowdhury et al. 2023; Secundo et al. 2024).

Given this background, an SLR is needed to consolidate and advance UET further in the AI context. Although UET has been widely used to examine the role of top managers in DT, there is a lack of in-depth understanding of how AI integration influences top managers' leadership. Furthermore, to the best of the authors' knowledge, no other systematic literature analysis has been conducted on this topic thus far. Therefore, this study aims to address this gap by conducting an SLR to unfold a new AI-driven approach for top managers' innovation strategy for successfully integrating AI into business processes.

### 3 Methodology

As several scholars suggested (Bretas and Alon 2021; Kraus et al. 2022, 2024; Secundo et al. 2020), SLR enables researchers to conduct rigorous and reliable analyses of scientific sources. According to Hina et al. (2022) and Tandon et al. (2021), an SLR provides a structured approach to systematically collecting, critically evaluating, and synthesizing existing research, thereby ensuring transparency and reproducibility. The SLR approach also serves as a strategic tool for exploring the current state of the literature within a specific research domain while also identifying existing gaps to inspire future studies and advancements in knowledge (Kraus et al. 2022; Sauer and Seuring 2023; Tranfield et al. 2003). This structured approach allows the SLR process to minimize bias and produce replicable results, which is essential for the robustness of the methodology (Enholm et al. 2022; Saratchandra and Shrestha 2022; Thomas and Gupta 2022). More specifically, this research employs bibliometric and



content analysis to investigate the research questions advanced in the introduction. On the one hand, bibliometric analysis is a quantitative approach involving statistical methods in analyzing large volumes of scientific data (Zupic and Čater 2015). This method provides a mapping to examine the detailed structure, dynamics, and relationships of scientific fields of interest (Donthu et al. 2021; Zupic and Čater 2015). Employing bibliometric analysis to address RQ1 allows an in-depth exploration of the evolutionary nuances and the emerging areas in that field, including articles, authors, countries, keywords, and journals. On the other hand, content analysis is instrumental for RQ2 and RQ3 in systematizing literature trends by identifying developed areas (hot spots) and underdeveloped topics (blind spots) within the literature (Gaur and Kumar 2018). It also enhances the comprehension of the reviewed articles, suggesting future research directions (Neuendorf 2002).

In line with Bretas and Alon (2021) and Massaro et al. (2016), and as applied by Secundo et al. (2020), the researchers adopted a structured approach consisting of three methodological steps to explore the literature on AI's impacts on top managers' leadership.

1. Defining RQs and designing a review protocol
2. Defining the research sample and developing the coding framework
3. Analyzing and discussing the results

### 3.1 Defining RQs and designing a review protocol

Formulating research questions, as Enholm et al. (2022) and Massaro et al. (2016) suggested, is the initial step in conducting an SLR. As mentioned in the introduction, this study identified three research questions.

After outlining the research questions, the research protocol is defined. This step is crucial to ensure that future evaluations are precise, reproducible, and verifiable (Enholm et al. 2022). The investigation follows the guidelines outlined by various previous studies, detailing the critical steps taken to conduct the review (Kraus et al. 2024; Sauer and Seuring 2023). Figure 1 summarizes the researchers' search phases, indicating no results meeting the criteria for a meta-analysis. The scientific database used to extract articles was Scopus instead of Web of Science (WoS) due to the limited coverage provided by WoS. According to Okolis's (2015) observations, Scopus was used to measure source quality as it offers a broad spectrum of indexed journals that exceeds the coverage provided by Web of Science. For the data analysis and visualization, the Bibliometrix package in R (Aria and Cuccurullo 2017) and VOS-viewer version 1.6.19 were used (Van Eck and Waltman 2010).

### 3.2 Defining the research sample and developing the coding framework

The third phase of an SLR regards searching and selecting articles to include in the research. The search string used to identify articles suitable for inclusion in this study was first identified by querying a set of relevant keywords. The material search in the Scopus database phase was conducted in January 2024 using keywords related to



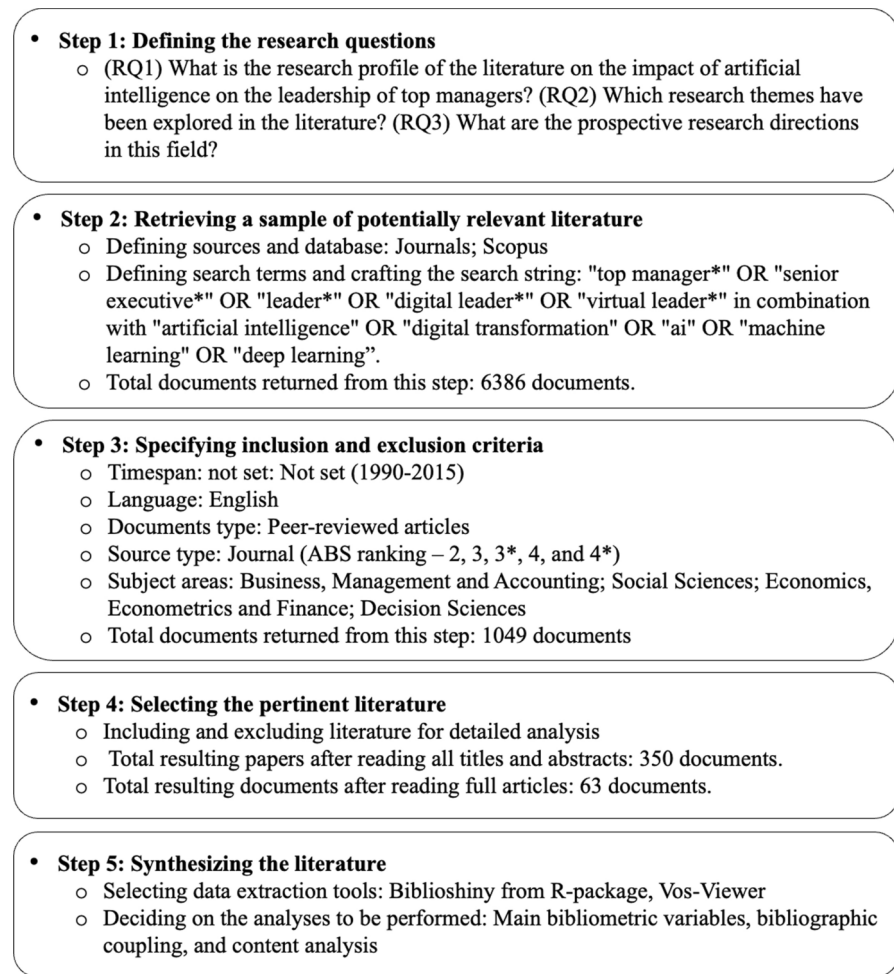


Fig. 1 The steps of the SLR process. Source: Authors' elaboration

the Boolean operator. Below is the string used for the search, which identified 6,386 papers.

"Top manager\*" OR "Senior executive\*" OR "Leader\*" OR "Digital leader\*" OR "Virtual leader\*" AND "Artificial intelligence" OR "Digital transformation" OR "Ai" OR "Machine learning" OR "Deep learning"

The asterisk following the keywords has been implemented to ensure the inclusion of all relevant documents in the search process (Secundo et al. 2020). The search field was restricted to only peer-reviewed journal articles (ABS ranking– 2, 3, 3\*, 4, and 4\*) in English to ensure more reliable and relevant results (Massaro et al. 2016; Secinaro et al. 2022). Other types of sources, such as books, book chapters, and conference papers, are excluded from consideration as they are not usually subjected

to the same rigorous review process as conceptual, empirical, and review articles published in journals (Bretas and Alon 2021; Keupp et al. 2012). Furthermore, only articles published between 2016 and 2023 were selected, as this time frame provided a more robust data set, given the negligible number of publications before 2016 and the continuous nature of 2024. This period marks the beginning of a growing academic interest in the influence of AI on strategic decisions and top managers' leadership, opening new research perspectives on integrating these technologies into the decision-making processes of top executives. Finally, as applied in previous studies, only articles from the research areas of business, management, and accounting; social sciences; economics, econometrics, and finance; and decision sciences were considered (Loureiro et al. 2020; Tigre et al. 2023). After applying these filters, 1,049 documents resulted from the research.

Then, a detailed and in-depth analysis of the selected articles was performed. All articles irrelevant to the search or duplicates within the Scopus database were removed. Subsequently, we reviewed the quality of the remaining articles by reading their titles and abstracts. We excluded studies outside the business management domain. Additionally, we dismissed any research focused on the mathematical aspects of AI and its IT components, as technical descriptions of the technologies were not relevant to the research questions (Schwaeke et al. 2024).

This review process identified 350 papers focused on AI and top managers' leadership. After reading the full texts, we applied more stringent inclusion and exclusion criteria to ensure that only the most relevant studies were retained. Specifically, we excluded papers lacking substantial theoretical contributions to understanding AI's impact on top managers' leadership. We also removed articles that did not provide sufficient data or analysis relevant to the business context and those that were off topic after reading the full article.

As a result of this evaluation process, the final sample was refined to 63 articles from the Scopus database deemed most pertinent to the research objectives.

The fourth phase of the coding framework is designed to delineate the specific components slated for analysis within the selected articles. In this study, the following items have been identified for coding:

- *Publication timelines*
- *Most relevant articles, authors, countries, keywords, and journals*
- *Bibliographic coupling analysis*
- *Relevant topics*

### **3.3 Analyzing and discussing the results**

The final research phase is the articles' analysis and discussion, where implications and future research trends will be identified. Bibliometrix in the R package (Aria and Cuccurullo 2017) and VOSviewer software version 1.6.19 (Van Eck and Waltman 2010) were used for data analysis and visualization. R software enabled bibliometric citation analysis to detect the most relevant articles, authors, countries, keywords, and journals (Aria and Cuccurullo 2017). VOSviewer allows researchers to cluster and analyze the relationships among papers through bibliographic coupling analy-

sis (Van Eck and Waltman 2010). Bibliographic coupling analysis is used to establish similarity between two documents written in the same field of research (Kessler 1963). For instance, papers A and B are bibliographically coupled if they have cited document C (Zupic and Čater 2015). The frequency with which other authors cite authors determines the intensity of the connection between them (Donthu et al. 2020). Finally, a content analysis was performed on each cluster paper to identify emerging research areas, research gaps, and issues for future directions (Duriiau et al. 2007; Gaur and Kumar 2018; Neuendorf 2002). To ensure the transparency and reliability of the results, the authors conducted the content analysis independently and subsequently discussed the themes and results. This approach reduces the potential for biased interpretations and increases the robustness of the study.

The primary evidence coming from the SRL is presented in the next section.

## 4 Bibliometric analysis

### 4.1 Overview of sample articles

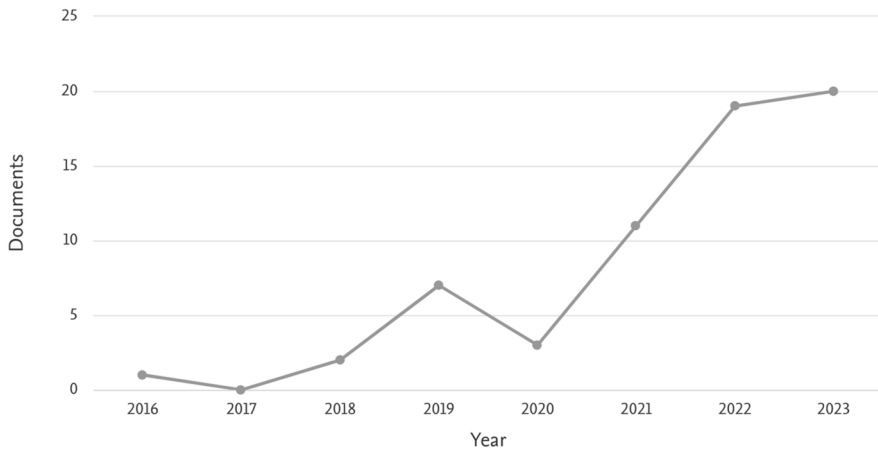
The final number of documents is 63, written by 216 authors and published by 31 sources. A structured methodology for data analysis led to the development of an analytical framework (Table 2).

Figure 2 presents the general trend of publications between 2016 and 2023. On the Y-axis is the number of articles produced, and on the X-axis is the years. Figure 2 shows an annual growth rate of 53.41%, indicating a growing field of research. As shown in the figure below, there was a rapid growth in the number of publications with the arrival of the COVID-19 pandemic in early 2020. This phenomenon encour-

**Table 2** Main information about the data. Source: Authors' elaboration

Description	Results
Timespan	2016:2023
Sources	31
Documents	63
Annual Growth Rate %	53.41%
Document Average Age	2.51
Average citations per doc	66.33
References	5542
Document contents	
Keywords Plus (ID)	148
Author's Keywords (DE)	253
Authors	
Authors	216
Authors of single-authored docs	1
Authors collaboration	
Single-authored docs	1
Co-Authors per Doc	3.63
International co-authorships %	57.14
Document types	
article	63

## Documents by year



**Fig. 2** Annual scientific production (number of articles per year). Source: Authors' elaboration using Biblioshiny package in R

**Table 3** Ranking of the 10 most relevant articles (sorted by citations). Source: Authors' elaboration using Biblioshiny package in R

Rank	Author and year	TGC
1	Warner et al. (2019)	951
2	Ferreira et al. (2019)	306
3	De Mauro et al. (2018)	207
4	Brock et al. (2019)	187
5	Schwarz Müller et al. (2018)	187
6	Chatterjee et al. (2021)	175
7	Alnuaimi et al. (2022)	139
8	Larson & DeChurch, (2020)	125
9	Tekic et al. (2019)	113
10	Guinan et al. (2019)	99

aged researchers to look more closely at this topic to solve the adverse work dynamics that did not allow for direct contact and face-to-face interaction (Enholm et al. 2022).

#### 4.2 Most relevant bibliometric variables (articles, authors, countries, keywords, and journals)

The bibliometric citation analysis revealed the most relevant articles, authors, journals, keywords, and countries.

Table 3 reports the ten most relevant articles about top managers' leadership and AI. Warner et al. (2019), published in *Long Range Planning*, is the most influential paper in terms of total global citations (TGCs). The article explores, through the experience of top managers, how companies develop dynamic capabilities to address the DT process successfully.

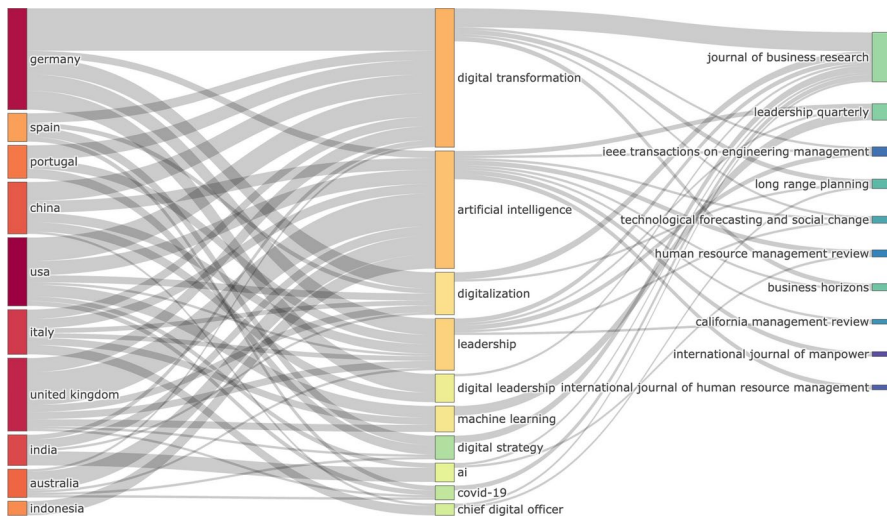
Table 4 presents the most impactful authors in the field in terms of the number of publications. The authors are also classified in terms of impact (h-index). The h-index is an index proposed in 2005 by physicist Hirsch (2005) of the University of California, San Diego. The aim is to quantify an author's prolificacy and the impact of their publications since it is based on the number of publications and citations received. The indicator determines the number of published articles with at least N citations each. Chatterjee and Chaudhuri are the authors with the highest number of publications. These authors are recognized as those who have contributed most substantially to a deeper understanding of how digitalization has influenced organizational structure, particularly the role of top managers.

In Fig. 3, a three-field plot based on a Sankey diagram illustrates the interconnections between countries, keywords, and journals. Since the size of the boxes correlates with the frequency of occurrences, Germany stands out with the highest number of publications in this domain, and its scholars publish more on "digital transformation", "artificial intelligence", "digitalization", "leadership", and "digital leadership". The "digital transformation" concept has been published mainly in the *Journal of Business Research*. The keyword "artificial intelligence" is popular among United Kingdom and Australian scholars, and the published articles are equally distributed among the journals. One of the reasons could be that the interdisciplinary nature of AI research may encourage scholars from diverse academic backgrounds to contribute to the field, thereby increasing the likelihood of publication in various journals.

In summary, these bibliometric analyses highlight the growth of AI and leadership studies and underline the importance of understanding which countries, journals, and

**Table 4** The 10 most relevant authors (sorted by publications). Source: Authors' elaboration using Biblioshiny package in R

Rank	Author	Current affiliations	Publications	h-index	Total citations
1	Chatterjee, S	Indian Institute of Technology Kharagpur, West Bengal, India	4	4	300
2	Chaudhuri, R	Léonard de Vinci Pôle Universitaire, Paris La Défense, France	3	3	114
3	Bhattacharya, S	Aston Business School, Department of Work and Organisation, Birmingham, United Kingdom	2	2	171
4	Budhwar, P	Aston Business School, Birmingham, United Kingdom	2	2	222
5	Doornenbal, B.M	Vrije Universiteit Amsterdam, Netherlands	2	2	38
6	Kraus, S	Faculty of Economics & Management, University of Bozen-Bolzano, Bolzano, Italy	4	2	22
7	Spisak, B.R	Harvard University, Cambridge, United States	2	2	38
8	Van Der Laken, P.A	Independent researcher	2	2	38
9	Vrontis, D	School of Business, University of Nicosia, Cyprus	2	2	44
10	Kanbach, D.K	HHL Leipzig Graduate School of Management, Leipzig, Germany	2	1	7



**Fig. 3** A three-field plot illustrating the network among countries (left), keywords (middle), and journals (right). Source: Authors' elaboration using Biblioshiny package in R

authors are conducting research. This information can be crucial in identifying dominant trends and critical contributions in the field, offering insights into where future research will likely focus (Kraus et al. 2024; Sauer and Seuring 2023). For example, the high publication rate in Germany and the relevance of specific journals suggest that these regions are becoming leading knowledge hubs on the topic. Scholars and practitioners wishing to deepen their expertise or contribute to this growing field can use this information to align their work with high-impact and rapidly evolving areas. Furthermore, understanding which authors are most prolific and frequently cited helps inform collaborations and define how the field is developing its theoretical and practical approaches to the influence of AI on top managers' leadership. These findings highlight the need for focused research in unexplored areas and help define future research agendas.

### 4.3 Bibliographic coupling analysis

Bibliographic coupling analysis, introduced by Kessler in 1963 (Kessler 1963), refers to two documents that cite a common third work in their bibliographies. Bibliographic coupling focuses on the correlation between documents that share at least one common bibliographic source, even if they are not directly cited by each other (Zupic and Čater 2015). It assumes that the same bibliographic source in multiple documents may indicate a significant relationship between them (Donthu et al. 2020, 2021). Such an investigation serves to illuminate the scholarly networks and collaborative dynamics within the field while also providing insights into the prominence and impact of individual contributors (Alon et al. 2020). The proximity and thickness of the lines connecting the authors indicate the frequency with which they appear together, while the node size corresponds to the frequency with which they are cited (Van Eck and Waltman 2010).

This technique identified three search clusters representing predominant topics of interest, which will be analyzed in the content analysis. Figure 4 illustrates the relationships between the authors in the selected articles.

The first cluster, in red, has been named "AI-driven skills of top managers' leadership". The documents in this cluster focus on defining how the role of leaders has evolved with the introduction of digital technologies (Fernandez-Vidal et al. 2022; Porfirio et al. 2021; Wrede et al. 2020). Following an analysis of the articles belonging to this cluster, three characteristics of top managers' leadership in an AI-driven world have been identified: data-driven decision-making (Schuster et al. 2023; Schwarzmüller et al. 2018), agility (Porfirio et al. 2021; Wrede et al. 2020), and emotional and social intelligence (Fernandez-Vidal et al. 2022; Vaidya et al. 2020).

The second cluster, designated in blue, examines the factors influencing top managers' decisions regarding adopting AI within organizations. Organizational, technological, and sociocultural factors act as critical determinants influencing top managers' decisions regarding implementing AI in their organizations (Brock and Von Wangenheim 2019; Larson and DeChurch 2020). Elements such as organizational culture, the availability of high-quality data, and social acceptance of AI must be considered together, as each contributes differently to facilitating or hindering AI adoption (Bhatia et al. 2022; Furr et al. 2022; Watson et al. 2021). These factors represent the necessary conditions that top managers must assess and manage to integrate AI into business processes successfully (Varma et al. 2023; Watson et al. 2021).

In the final cluster, denoted by green, the examination revolves around how top managers can attain organizational advantage within the market and over competitors through the implementation of AI (Chatterjee et al. 2022a; Ferreira et al. 2019). Furthermore, it addresses the pivotal role of AI as a technological tool for enhancing business performance, introducing new roles such as the Chief Digital Officer (CDO; Firk et al. 2022; Kunisch et al. 2022).

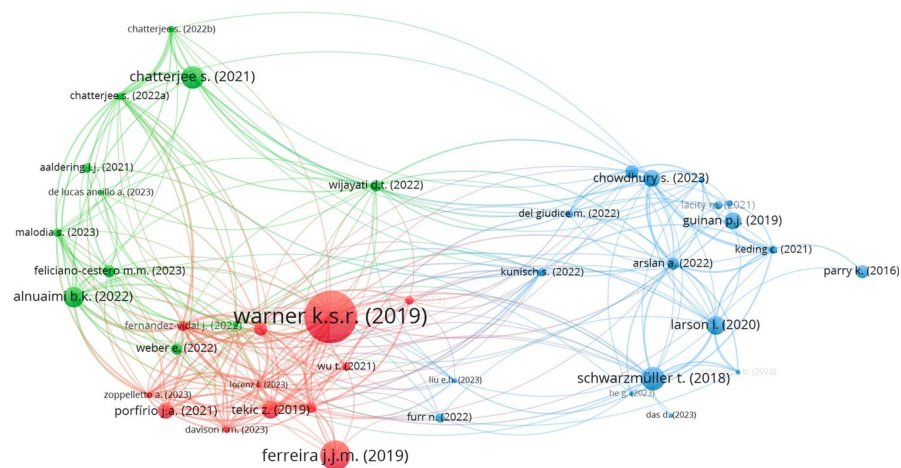


Fig. 4 Bibliographic Coupling. Source: Authors' elaboration using VosViewer



## 5 Content analysis

The following content analysis examines and classifies the collected articles to identify the main themes and emerging trends in top managers' AI-driven leadership. An in-depth text analysis aims to provide a comprehensive overview of the recurring concepts and ideas found in the considered documents. As mentioned above, this study outlines three distinct clusters: (1) AI-driven skills of top managers' leadership; (2) factors driving top managers' decision to adopt AI in organizations; and (3) the strategic use of AI. Based on previous studies (Alon et al. 2020; Bargoni et al. 2023; Secinaro et al. 2022), the clusters were labeled according to the content of the articles, the similarity of topics, and the context, and each was delineated by specific thematic categories and subcategories as outlined below.

### 5.1 AI-driven skills of top managers' leadership

The intricate nature of the DT process and the integration of AI requires top business managers to formulate a well-defined strategy that furnishes them with a clear blueprint to direct their endeavors (Brock and Von Wangenheim 2019; Schwarzmüller et al. 2018; Warner and Wäger 2019). Consequently, the role of leadership becomes paramount in securing the success of organizations (Schmidt et al. 2023). Top managers are responsible for steering and harmonizing the myriad organizational and operational changes stemming from adopting novel digital technologies (Porfirio et al. 2021). AI-driven leadership among top managers entails not merely the utilization of digital techniques and tools but a comprehensive overhaul of skills (Fernandez-Vidal et al. 2022). Therefore, top managers must comprehensively understand emerging technologies to enhance decision-making processes, strategy formulation, and organizational performance (Wrede et al. 2020). There appears to be some academic consensus on several key skills required of top managers in the era of AI (Fernandez-Vidal et al. 2022; Schiuma et al. 2021; Schuster et al. 2023; Wrede et al. 2020): data-driven decision-making, agility, and emotional and social intelligence. Based on UET (Hambrick and Mason 1984), according to which the characteristics of top managers affect organizational outcomes, this study highlights how the skills of top managers profoundly shape their approach to AI integration. These individual attributes influence how they perceive and respond to the challenges and opportunities presented by AI, thus affecting the strategic direction of their organizations (Fernandez-Vidal et al. 2022; Wrede et al. 2020).

Several studies indicate that top managers must clearly understand the underlying principles of AI to make decisions and effectively lead their organization (Schmidt et al. 2023; Watson et al. 2021). AI can indeed support business leaders in the decision-making process by providing in-depth analysis and data-driven recommendations rapidly and efficiently (Schmidt et al. 2023; Schuster et al. 2023). This can help mitigate risks and enhance the accuracy of strategic business decisions, enabling companies to achieve better financial and operational outcomes (Parry et al. 2016). According to Doornenbal et al. (2022), the ability to analyze data critically and accurately, extract relevant insights, and translate them into strategic actions is crucial for top managers' leadership. However, each manager's background, such as education,

previous experience with technology, and openness to innovation, determines the effectiveness of using AI as a strategic tool (Georgakakis et al. 2022). Therefore, while AI provides the data, a top manager's unique cognitive framework turns these data into actionable strategies.

According to several studies, the second crucial skill for a leader is agility, which is the ability of a top manager to identify unexpected changes in the environment and respond quickly and efficiently by using and reconfiguring internal resources (AlNuaimi et al. 2022; Weber and Tarba 2014). More precisely, agility is attained when top managers can transform their organization's adverse circumstances and ineffective strategic choices into more pragmatic, efficient, and responsive outcomes (Warner and Wäger 2019). This entails making quick and flexible decisions in response to new information or changing market conditions (Porfírio et al. 2021). In line with UET, the capacity for organizational agility is deeply rooted in top managers' personal traits and experiences, such as their risk tolerance, adaptability, and previous exposure to dynamic environments (Jorzik et al. 2023; Schuster et al. 2023). Numerous studies suggest that agility is even more crucial in the AI era, as it provides top managers with real-time insights that align with their intrinsic strategic inclinations, enabling them to respond more effectively to external changes (Fernandez-Vidal et al. 2022; Jorzik et al. 2023; Schmidt et al. 2023; Wrede et al. 2020). Hence, AI-driven leadership is critical for continuously improving processes, adapting to business situations, and reversing unfruitful strategic decisions (AlNuaimi et al. 2022). Top managers must proactively anticipate market opportunities and adapt quickly to technological changes (Wrede et al. 2020).

Finally, the third skill is emotional and social intelligence. Emotional intelligence is the ability to identify, manage, and leverage one's and others' emotions, fully understanding how everyone's emotional sphere can influence thinking (Goleman 2004, 2021). Social intelligence has been defined as the ability to "manage other's emotions and build and maintain healthy relationships with others" (Goleman 2006, p. 14). These capacities are even more crucial for today's top managers, as the introduction of AI revolutionizes how people work and interact (Fernandez-Vidal et al. 2022; Vaidya et al. 2020). Studies also suggest that a top manager's emotional intelligence is crucial for navigating social-emotional complexities, particularly for maintaining team cohesion and guiding collective efforts toward organizational goals (Fernandez-Vidal et al. 2022; Vaidya et al. 2020). While AI enhances the cognitive aspects of leadership, a top manager's social intelligence ensures that these technologies are integrated in a human-centred and ethically sound way (Cortellazzo et al. 2019). Indeed, since AI often requires the work of multidisciplinary teams, leaders need to develop and maintain positive relationships with their employees, providing support and encouragement (Fernandez-Vidal et al. 2022). Although such digital technologies optimize the decision-making process, a top manager's success in a disruptive environment requires technical skills and intense mental and emotional management skills to formulate strategic decisions that exceed the capabilities of the available technological means (Cortellazzo et al. 2019; Vaidya et al. 2020).

## 5.2 Factors driving top managers' decision to adopt AI in organizations

In an era of ever-faster technological innovation, AI is emerging as a critical transformative force for organizations in every sector (Enholm et al. 2022). Indeed, its adoption is a complex strategic decision influenced by multiple interconnected organizational factors (Pereira et al. 2023; Varma et al. 2023). This analysis is based on the interaction of UET with the RBV and NIT. The RBV emphasizes the role of organizational resources and capabilities as sources of competitive advantage (Dubey et al. 2018). The RBV suggests that unique and difficult-to-imitate resources, such as advanced skills, corporate culture, and innovative technologies, can generate and sustain competitive advantage in the long term (Barney 1991; Grant 1991). AI represents a strategic resource that, if harnessed effectively, can differentiate companies in a competitive landscape by improving operational efficiency and innovating the products and services offered (Enholm et al. 2022). NIT explains how organizations engage with their environment to thrive and succeed in competition and challenges (Greenwood and Hinings 1996; Greenwood et al. 2008). It investigates organizational change related to adopting advanced technologies by analyzing external pressures or factors in managerial practices and cultures (AlNuaimi et al. 2022; Greenwood et al. 2008). However, managing AI requires technological resources, adaptation to the external environment, and managerial skills, which are crucial for converting resources into lasting competitive advantages (AlNuaimi et al. 2022; Enholm et al. 2022; Mikalef and Gupta 2021). Therefore, from the analysis of articles within this cluster, three categorizations of factors driving AI adoption emerge: organizational, technological, and sociocultural factors.

Organizational factors include digital culture, digital strategy, and human resource and talent management. Organizational culture represents an organization's social and behavioral fabric, encompassing its members' shared values, norms, beliefs, and practices. As is often heard, "culture is what happens when the leader leaves the room" (Westerman et al. 2019, p. 60). In the context of AI adoption, top managers must foster a data-driven corporate culture, where data analysis and utilization are integral parts of the decision-making process throughout the organization (Chowdhury et al. 2023). A digital culture that encourages values such as empowerment, shared learning, and flexibility has proven more effective in tackling DT (Brock and Von Wangenheim 2019). Studies also show that a risk-taking culture and openness to innovation tend to embrace advanced technologies, like AI, more readily, encouraging new solutions and experimenting with emerging technologies (Brock and Von Wangenheim 2019; Enholm et al. 2022; Jorzik et al. 2023). Conversely, organizations with a conservative culture resistant to change may encounter obstacles in adopting AI (Alrasheedi et al. 2022).

According to UET, top managers are the primary source of defining and shaping an organization's strategy. In times of transformation, particularly in the AI era, leaders are expected to proactively drive change and innovation, as their strategic orientation significantly influences the success of digital initiatives (Enholm et al. 2022; Wrede et al. 2020). According to several studies, the adoption of AI involves substantial changes in organizational arrangements, necessitating the support and vision of top managers to develop a flexible digital strategy (Chowdhury et al. 2023;

Jorzik et al. 2023; Mikalef and Gupta 2021). The digital strategy should define business objectives, opportunities, and challenges related to AI and outline the plans and resources needed to successfully implement AI-related initiatives (AlNuaimi et al. 2022; Porfirio et al. 2021; Tekic and Koroteev 2019).

Current research on AI in top managers' leadership has provided valuable insights into how AI can affect human resources and talent management (Chatterjee et al. 2022a; Chowdhury et al. 2023; De Mauro et al. 2018; He et al. 2023). Some studies highlight that one of the critical concerns for organizations revolves around having a team equipped with the necessary skills to utilize and manage AI-based systems effectively (Chowdhury et al. 2023; Guinan et al. 2019; Zoppelletto et al. 2023). Additionally, creating a work environment that fosters collaboration and knowledge sharing is essential for maximizing the value of AI (Keding and Meissner 2021). Indeed, according to Larson and DeChurch (2020), leaders who effectively articulate the capabilities of AI to their employees and demonstrate proficiency in interacting with such technologies will foster team efficiency and encourage proactive adherence to performance standards.

Technological factors are fundamental in determining AI adoption and successful implementation within organizations. Central to this process is data availability and quality, which serve as the foundational input for AI model training and performance (Enholm et al. 2022; Mikalef and Gupta 2021). High-quality, diverse, and voluminous datasets empower organizations to leverage AI to generate more accurate, reliable, and predictive outcomes (Furr et al. 2022). From the RBV perspective, data availability and quality constitute critical organizational resources that, when effectively managed, bolster firms' dynamic capabilities and secure a competitive advantage in the digital landscape (Dubey et al. 2018). Adopting AI also necessitates continuous advancements in digital competencies and skill upgrading across the workforce (Zoppelletto et al. 2023). According to several studies, the increasing complexity of AI technologies demands that top managers and their teams develop robust digital know-how and adaptive learning strategies to harness the full potential of data-driven systems (Watson et al. 2021; Weber et al. 2022). Furthermore, the continuous enhancement of machine learning algorithms represents a key technological enabler of AI adoption (Bhatia et al. 2022; Enholm et al. 2022). Recent developments in these algorithms have significantly improved AI applications' precision, reliability, and scalability, facilitating more sophisticated data-driven decision-making processes (Lee et al. 2022; Spisak et al. 2019). As machine learning algorithms evolve, organizations are increasingly equipped to extract actionable insights, optimize operations, and drive innovation (Doornenbal et al. 2022).

Finally, sociocultural factors that influence the adoption of AI in organizations are identified. Several studies indicate that managers must consider stakeholder engagement and adopt ethical practices in using AI to maintain society's trust and support (Varma et al. 2023; Watson et al. 2021). NIT highlights how societal norms and ethical considerations impose external pressures on organizations to adopt socially responsible practices, including those related to AI usage. Thus, top managers must ensure that AI adoption aligns with societal expectations and ethical standards to maintain legitimacy and public trust (Jorzik et al. 2023). Indeed, according to several authors (Enholm et al. 2022; Mikalef and Gupta 2021; Newstead et al. 2023), the main obsta-

cles hindering the implementation and efficient utilization of AI encompass concerns about security, privacy, ethical considerations, regulatory compliance, and economic viability. The issue of social acceptance of AI concerns people's perceptions and attitudes toward this technology (Newstead et al. 2023). Social acceptance depends on various factors, including understanding AI and its potential, cultural biases, and ethical concerns (Mikalef and Gupta 2021). Biases can also influence AI technologies in the data used to train models and consequently affect business decisions, hiring, and human resource management, perpetuating inequalities and limiting the full potential of AI (Jorzik et al. 2023; Watson et al. 2021). Therefore, top managers must judiciously employ AI and implement measures to ensure ethical and inclusive use (Newstead et al. 2023).

### 5.3 The strategic use of AI

In an era characterized by the exponential growth in the speed and volume of data facilitated by AI technologies (Davenport and Bean 2018), top managers need to adopt a data-driven approach as a central pillar for strategy formulation and achieving competitive advantage. As conceptualized by Rogers et al. (2014), competitive advantage arises when technological advancements deliver superior value and benefits to organizations, enabling them to differentiate from competitors and enhance their market positioning. Integrating AI within strategic decision-making frameworks gives top managers unique opportunities to generate actionable insights, facilitating more informed, efficient, and evidence-based decisions (Chatterjee et al. 2021; Enholm et al. 2022).

Firstly, adopting AI can be motivated by the need to remain competitive in the market (Chatterjee et al. 2022a). Ferreira et al. (2019) demonstrate that embracing digital technologies enhances companies' competitive edge, improves operational efficiency, optimizes decision-making processes, and reduces costs. AI offers the opportunity to automate repetitive and routine tasks, freeing up human resources for high-value-added activities and enabling organizations to provide better and more competitive products and services in the market (Enholm et al. 2022; Mikalef and Gupta 2021). From the perspective of UET, top managers' propensity to automate routine tasks through AI reflects their strategic orientation toward innovation and efficiency (Jorzik et al. 2023). Leaders prioritizing operational agility and digital transformation are more likely to exploit AI to differentiate their organizations from competitors (Schuster et al. 2023).

Furthermore, several studies highlight that AI enables organizations to customize solutions tailored to specific customer needs and anticipate and react to market trends (Enholm et al. 2022; Jackson and Dunn-Jensen 2021; Schuster et al. 2023). According to Malodia et al. (2023), the uptake of such digital technologies proves highly advantageous for companies, enhancing their capacity to capture future trends and tailoring their strategies to address societal demands. Here, UET underscores the importance of the cognitive framework of top managers, which shapes their ability to anticipate industry trends and capitalize on them using AI (Schuster et al. 2023). Because AI enables easy access to information, technology and information sharing have become standard tools for top managers to evaluate business performance (Chat-

terjee et al. 2022b). According to Chatterjee et al. (2022a), increased information flow improves the organization's business performance and offers significant benefits such as employee involvement in management, effective decision-making, reduced information loss, prevention of error repetition, and encouragement of innovation.

The role of top managers becomes particularly crucial when organizations undergo structural transformations to integrate AI into their core processes (Enholm et al. 2022; Jorzik et al. 2023). To improve performance, top managers must redefine their company roles and responsibilities (Schuster et al. 2023). According to several studies, this redefinition involves structural changes and introducing digital functions at individual and team levels (Davison et al. 2023; Zoppelletto et al. 2023). This transition is reflected in the organizational structure, moving towards flatter hierarchies and introducing roles and teams dedicated to digitalization (Firk et al. 2022). At the top manager level, roles such as the Chief Digital Officer (CDO) are created to integrate digitalization within the company (Kunisch et al. 2022; Zoppelletto et al. 2023). From the perspective of UET, creating roles like the CDO underscores how top managers' strategic priorities shape organizational structure and culture (Fernandez-Vidal et al. 2022). The CDO is responsible for identifying areas where AI can create business value and developing strategies for AI adoption (Davison et al. 2023). In this sense, the CDO acts as an extension of the top manager's strategic vision for digital integration, and the success of this role is mainly contingent on the top manager's ability to align AI initiatives with broader organizational goals (Lorenz and Buchwald 2023; Zoppelletto et al. 2023). Top managers with a future-oriented mindset and a digital vision will leverage the CDO role to facilitate AI adoption and continuously refine the organization's approach to innovation, ensuring that AI serves as a dynamic, evolving tool rather than a static technological implementation (Davison et al. 2023; Fernandez-Vidal et al. 2022).

## 6 Discussion and framework development

The analysis of the above clusters represents an innovative step towards an in-depth understanding of the growing research field on the influence of AI on top managers' leadership. Through this detailed analysis, the study has comprehensively mapped out the various dimensions and dynamics characterizing this emerging field. Each cluster, delineated based on the articles in the sample, revealed a series of categories and subcategories that offer a detailed overview of the topics addressed. Based on these results, the research developed a framework that synthesizes the main conclusions drawn from the content analysis, providing a clear and organized structure for understanding how previous studies have addressed this topic. In Fig. 5, the framework also serves as a starting point for future studies to further explore how AI revolutionizes top managers' leadership.

The figure indicates that the strategic use of AI requires an integrated approach, combining top managers' leadership skills with organizational, technological, and sociocultural factors (Georgakakis et al. 2022). This represents an evolution of UET in the current technological context, expanding the theory's focus to include new dimensions related to AI (Fernandez-Vidal et al. 2022; Hambrick 2007). This

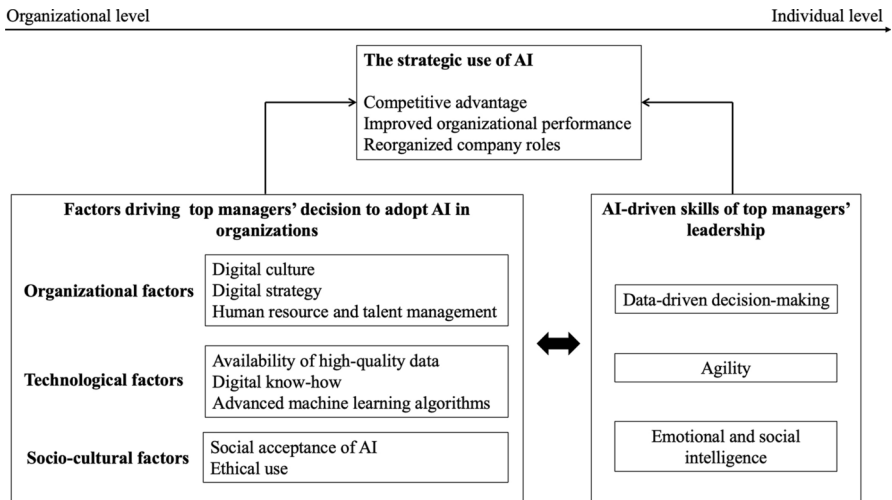


Fig. 5 Top managers' leadership AI-driven framework. Source: Authors' elaboration

advancement is significant as it recognizes that, in the DT era, technological skills and the ability to navigate complex contexts become increasingly crucial (Jorzik et al. 2023; Wrede et al. 2020). Previous studies through UET have considered factors such as age, educational background, and professional experience indicators of leaders' ability to make strategic decisions (Certo et al. 2006; Hambrick and Mason 1984). However, integrating AI into business decisions requires a different skill set, such as the ability to analyze data, agility in responding quickly to technological change, and emotional and social intelligence to drive organizational change in an often uncertain and complex environment (Jorzik et al. 2023; Wrede et al. 2020). As highlighted in the content analysis, these new skills can be extensions of the psychological characteristics already analyzed through UET (Hambrick 2007; Kallias et al. 2023).

A further significant aspect highlighted by the figure and cluster analysis is the interaction between the individual characteristics of leaders and organizational, technological, and sociocultural factors (Dubey et al. 2018; Georgakakis et al. 2017). According to UET, strategic choices result from a complex interaction between the characteristics of top managers and the context in which they operate (Dubey et al. 2018; Hambrick and Mason 1984). In the age of AI, this interaction becomes particularly evident (Fernandez-Vidal et al. 2022; Jorzik et al. 2023). The digital culture and strategy of an organization can amplify or mitigate the impact of the individual characteristics of leaders (AlNuaimi et al. 2022; Georgakakis et al. 2022). An organization with a solid digital culture may facilitate AI adoption, even if leaders lack direct experience with such technologies (Wrede et al. 2020). Similarly, the availability of high-quality data and advanced machine learning algorithms can influence leaders' strategic decisions (Jorzik et al. 2024; Kallias et al. 2023).

According to the articles reviewed, this interaction between the individual characteristics of top managers and organizational factors can be analyzed through a lens that integrates UET with NIT and the RBV (AlNuaimi et al. 2022; Barney 1991). This perspective highlights how strategic decisions, such as AI adoption, are influ-



enced not only by the characteristics of leaders but also by the internal resources and institutional pressures that shape an organization's operating environment, thus extending the traditional understanding of UET into the digital age (Fernandez-Vidal et al. 2022; Jorzik et al. 2023). In particular, NIT emphasizes the role of institutions, norms, and cultures in shaping organizational decisions (Greenwood et al. 2008; Meyer and Rowan 1977). The findings suggest that sociocultural factors such as social acceptance of AI and the ethical use of such technologies influence the decision of top managers to adopt AI (Dubey et al. 2018; Enholm et al. 2022). Moreover, according to NIT, top managers' use of AI is related to gaining a competitive advantage and aligning with external norms and expectations, thereby responding to the pressures of their operating environment (AlNuaimi et al. 2022). In parallel, the RBV emphasizes the importance of internal resources, such as high-quality data and technological infrastructure, highlighting how leaders leverage these resources to generate and sustain competitive advantage through AI (Barney 1991; Flood et al. 1997; Grant 1991).

Therefore, this holistic perspective aims to enrich the discussion on UET by offering a framework that considers the characteristics of leaders and the resources and infrastructures available within organizations to gain a competitive advantage in the target market (Fernandez-Vidal et al. 2022; Georgakakis et al. 2022).

## 7 Future research avenues

To answer the third research question, the study presents an extensive agenda for future research, delineating several promising future research questions (FRQs) based on the gaps in the articles. Table 5 summarizes the identified opportunities for future research concerning the correlation between top managers' leadership and AI, focusing on addressing knowledge gaps and highlighting particularly stimulating areas for further exploration.

These proposed future research avenues focus on how AI has influenced top managers' leadership, a critical area that requires further exploration. Our SLR revealed that most studies examine these variables from organizational, individual, and strategic perspectives. Consequently, we identified several research gaps in the articles in the SLR and proposed specific FRQs that could significantly enhance the understanding of this topic.

Recent studies have highlighted strategic leadership as a critical area for future research, especially regarding AI-driven innovation (Samimi et al. 2022; Singh et al. 2023). Strategic leadership is focused on achieving strategic outcomes for various economic, environmental, or social organizations, including multinationals and SMEs (Carter and Greer 2013; Vera et al. 2022). It is more comprehensive than a single leadership style (e.g., transformational, transactional, or servant leadership) or a specific set of values (e.g., self-centered or other-centered). Strategic leadership refers to the functions the top management team carries out that aim to impact the organization strategically (Samimi et al. 2022). Therefore, future research could examine such leadership styles and analyze how they relate to AI innovation in companies (Singh et al. 2023). Future research avenues could also explore leadership strategies that

**Table 5** Directions for future research based on the SLR. Source: Authors' elaboration

Research gap themes in SLR articles	Future research questions (FRQs)
Strategic leadership in the AI era	<p><i>FRQ1</i>: How do different strategic leadership styles (e.g., transformational, transactional, servant leadership) influence the adoption and innovation of artificial intelligence in organizations?</p> <p><i>FRQ2</i>: What strategies can top managers adopt to manage resistance to change and secure employee buy-in during digital transformation?</p> <p><i>FRQ3</i>: How can leadership promote a culture of innovation and experimentation, encouraging out-of-the-box thinking and calculated risk-taking?</p>
Organizational structure and integration of various structural forms	<p><i>FRQ1</i>: How can top managers create an environment that fosters collaboration and knowledge sharing among different organizational structures?</p> <p><i>FRQ2</i>: How can the organizational structure be designed to promote agility and adaptability to changing market conditions?</p>
Soft and hard skills required for top managers strategic leadership	<p><i>FRQ1</i>: How has artificial intelligence affected the skills required of top managers?</p> <p><i>FRQ2</i>: What are the best practices for designing and implementing effective training programs that enable reskilling and upskilling of employees?</p> <p><i>FRQ3</i>: What is the role of top managers in creating a corporate culture that promotes continuous learning and skill updating?</p> <p><i>FRQ4</i>: How can top managers identify and adopt emerging digital skills in the market?</p>
Collaboration with external ecosystems and talent development	<p><i>FRQ1</i>: What are the strategic advantages of collaborating with external ecosystems in the era of artificial intelligence?</p> <p><i>FRQ2</i>: How can companies identify and attract talents from external sources such as startups, universities, or other organizations?</p> <p><i>FRQ3</i>: What are the challenges and opportunities in managing talents from external ecosystems and how can they be addressed?</p>
Responsible AI, algorithmic biases and mitigations and ethical AI	<p><i>FRQ1</i>: How can organizations integrate ethical evaluations into day-to-day decision-making related to AI development and implementation?</p> <p><i>FRQ2</i>: How has artificial intelligence affected top managers' decision-making process under an ethical lens?</p> <p><i>FRQ3</i>: How can organizations implement bias mitigation strategies without compromising the efficiency of AI systems?</p> <p><i>FRQ4</i>: How can companies create internal ethics committees that are effective in monitoring and evaluating the use of AI within the organization?</p>

address resistance to AI adoption, focusing on frameworks that integrate strategic vision and emotional and social intelligence. Furthermore, the role of leadership in cultivating a culture of innovation remains underdeveloped, with few studies exploring how calculated risk-taking and experimentation can be encouraged in a digitally transforming environment (Singh et al. 2023; Wrede et al. 2020). The research also highlights that leadership in the AI era must go beyond traditional models of top-down communication (He et al. 2023; Newstead et al. 2023). Instead, leaders must navigate complex, digitally enabled environments where hierarchical barriers are minimized and foster a shared digital culture, which is essential for achieving sustainable competitive advantage (Fernandez-Vidal et al. 2022). This invites further exploration into leadership strategies that combine emotional and social intelligence with technological fluency to drive change.

The second research gap emerges from the challenges associated with integrating diverse organizational structures— traditional, hierarchical, and network-based— into a cohesive whole capable of responding dynamically to market shifts. Organizations

face increasing pressure to be agile and resilient in the face of uncertainty, yet the structural designs that promote this duality remain insufficiently understood (AlNuaimi et al. 2022). Recent studies have suggested that hybrid organizational forms, which integrate functional silos with flatter, decentralized decision-making processes, may offer solutions (Chowdhury et al. 2023; Davison et al. 2023; Fernandez-Vidal et al. 2022). However, how these structures can be effectively implemented to foster cross-functional collaboration and knowledge sharing remains unanswered. This gap in the literature is critical, as failure to optimize structural alignment could impede the flexibility needed to adapt to rapid changes in technology and customer demands (Schwarz Müller et al. 2018).

We identified a significant research gap in empirical investigations of the skills required by top managers, particularly in balancing the development of hard (technical) and soft (interpersonal) skills in the AI age. While many studies focus on the technical competencies required for AI integration, few address the importance of complementary soft skills for strategic leadership in the AI context (Fernandez-Vidal et al. 2022; Samimi et al. 2022; Schmidt et al. 2023; Singh et al. 2023). The gap also lies in how top managers can assess the existing AI skills within their teams and identify the areas where upskilling or reskilling is necessary. Moreover, there is limited research on the design and implementation of training programs that effectively bridge the gap between outdated skills and emerging technological requirements (Schuster et al. 2023; Singh et al. 2023). A related concern is how top managers can foster a culture of continuous learning within their organization, particularly as digital skill requirements evolve at an accelerated pace (Wrede et al. 2020). This gap is exacerbated by the rapid obsolescence of specific technical skills and the growing importance of hybrid skills that combine technical know-how with creative and strategic thinking. Research must delve deeper into how organizations can structure adaptive learning ecosystems in response to the skill demands of the digital economy.

A further research gap arises from the need to understand better the strategic benefits and challenges associated with collaborating with external ecosystems, such as startups, academic institutions, and other external organizations, in AI development. While several studies highlight the potential for innovation and growth through such collaborations, there is a lack of empirical evidence on how companies can effectively identify, attract, and integrate talent from these external ecosystems (AlNuaimi et al. 2022; Chowdhury et al. 2023; Varma et al. 2023). Furthermore, managing external talent, particularly regarding maintaining alignment with internal organizational culture and goals, presents a largely unexplored area (Fernandez-Vidal et al. 2022). The challenges of talent integration, retention, and development within AI-driven ecosystems are further compounded by this sector's rapidly shifting skill requirements (Odugbesan et al. 2023). Exploring the dynamics of external partnerships and how they can be leveraged for innovation and talent acquisition is critical. Further research should investigate the long-term impacts of such collaborations on organizational performance, focusing on the co-evolution of internal and external talent strategies. This includes not only talent acquisition but also the governance structures that support sustained partnerships.

The last research gap focuses on the ethical implications of AI, particularly regarding algorithmic biases and the need for responsible AI practices. Although ethical

concerns regarding AI are gaining traction in academic and professional discourse, many organizations struggle to integrate ethical evaluations into their everyday decision-making processes related to AI (Parry et al. 2016; Varma et al. 2023). The role of the top manager becomes pivotal in this context, as they are responsible for shaping the organizational culture and governance structures that can effectively address these ethical concerns (Watson et al. 2021). The tension between fostering AI innovation and adhering to ethical norms without stifling technological progress is an area that warrants deeper investigation (Jorzik et al. 2023; Wrede et al. 2020). Top managers are at the heart of this tension (Larson and DeChurch 2020). Addressing it demands strategic foresight and the courage to make decisions that may delay immediate technological advancements in favor of long-term sustainability and ethical integrity (Schiuma et al. 2021). This responsibility extends beyond technical aspects, but it requires top managers to cultivate an environment where ethical dialogue is encouraged, and employees feel empowered to raise concerns about potential biases or unethical outcomes in AI systems (Parry et al. 2016). Therefore, future research could focus on developing a framework to illustrate how AI influences top managers' decision-making through an ethical lens. As AI becomes increasingly embedded in decision-making processes, top managers must navigate complex ethical dilemmas that impact their organization at multiple levels (Larson and DeChurch 2020). Their ability to make informed, principled decisions will be a defining factor in the success of responsible AI adoption.

Moreover, an integrated inductive-deductive approach can be pursued by combining qualitative and quantitative research endeavors. This methodology analyzes mediating and moderating factors influencing AI-driven leadership among top managers and explores how these can be leveraged to create sustainable competitive advantages. Finally, the study could be validated and enriched by examining the insights in different cultural or organizational contexts.

## 8 Conclusions and implications of the study

This SLR examines how AI has revolutionized top business managers' leadership using bibliometric and content analysis techniques. The study reveals connections between countries, keywords, and journals and identifies the field's most relevant authors and articles. It also offers guidance for future researchers by identifying three clusters in which this topic can be analyzed: (1) AI-driven skills of top managers' leadership; (2) factors driving top managers' decision to adopt AI in organizations; (3) the strategic use of AI. Finally, the study proposes a top managers' leadership AI-driven framework for successfully integrating AI in businesses.

### 8.1 Theoretical contributions

Our analysis and the resulting framework contribute to the literature in several ways.

Firstly, the study contributes to the existing literature on the impact of AI on top managers' leadership by proposing a new relational framework that integrates organizational, technological, and sociocultural factors with the skills necessary to lead

the strategic adoption of AI (Fernandez-Vidal et al. 2022; Georgakakis et al. 2022). While previous research focused on the role of top managers in the AI integration process, our study goes further by not only identifying the critical skills required but also exploring broader dynamics influencing AI adoption (Enholm et al. 2022; Mikalef and Gupta 2021; Wrede et al. 2020). The proposed framework emphasizes the strategic use of AI. This requires top managers to balance technical skills with the ability to handle organizational and sociocultural factors. Moreover, it suggests that the successful adoption of AI is not dependent solely on the individual characteristics of leaders but also on their ability to integrate AI into existing technological infrastructures while leveraging digital technologies to enhance the company's competitiveness. Finally, the study recognizes the influence of the sociocultural context, such as social perceptions and regulations regarding AI, which can either facilitate or hinder AI adoption at the organizational level (Dubey et al. 2018; Greenwood et al. 2008). Considering many interconnected factors, this framework's integrated and systemic approach helps understand how top managers can strategically use AI to transform their organizations (Jorzik et al. 2023; Wrede et al. 2020).

The second theoretical contribution offered by our study is the enrichment of UET by Hambrick and Mason (1984) through integrating new dimensions related to AI adoption. Traditionally, UET has focused on top managers' demographic and psychological characteristics, such as age, education, and professional background, to explain their strategic decisions (Certo et al. 2006; Hambrick and Mason 1984). However, in the digital era, these characteristics alone are insufficient to fully grasp the complexity of leadership in AI adoption (Jorzik et al. 2023; Wrede et al. 2020). Our study introduces new AI-related skills, such as data-driven decision-making, agility, and emotional and social intelligence. Including AI within UET adds depth to the theory, highlighting how AI adoption is shaped by demographic characteristics and leaders' ability to adapt to new technological challenges and strategically leverage digital resources (Fernandez-Vidal et al. 2022; Jorzik et al. 2023). Specifically, our study shows that the successful adoption of AI requires a mix of traditional skills and new ones, such as data-driven decision-making and the capacity to lead innovation in uncertain and complex environments.

Finally, our study stands out for its integrated approach, combining UET with the RBV and NIT. This combination provides a holistic view of the dynamics of AI adoption, analyzing the interaction between top managers' characteristics, internal resources, and institutional pressures (AlNuaimi et al. 2022; Dubey et al. 2018). The RBV emphasizes the role of internal resources, such as data quality and technological infrastructure, in influencing leaders' ability to adopt and strategically use AI to gain a competitive advantage (Barney 1991; Dubey et al. 2018; Grant 1991). Leveraging advanced technological resources becomes critical in creating innovation and distinguishing an organization in the market (Fernandez-Vidal et al. 2022; Georgakakis et al. 2022). On the other hand, NIT introduces the importance of institutional, social, and regulatory pressures (AlNuaimi et al. 2022; Greenwood et al. 2008; Meyer and Rowan 1977). Our analysis has shown that top managers' decisions regarding AI adoption are also influenced by external factors such as regulations, normative expectations, and the social acceptance of AI technologies. Thus, strategic decisions by

managers are determined not solely by their characteristics but also by organizational, institutional, and cultural dynamics.

This multi-theoretical approach provides a more comprehensive framework for understanding the challenges and opportunities of top managers' adoption of AI, showing how strategic choices result from a complex interaction between internal resources and external pressures.

## 8.2 Practical implications

This article provides insights and recommendations for practice.

First, the research underscores the pivotal role of top managers in driving and overseeing the DT efforts within their organizations. By highlighting the importance of their involvement, the study presents a clear argument that these leaders are not just facilitators but essential architects of digital strategy. They are responsible for recognizing the broader implications of AI for their organization, setting a coherent strategic direction, and establishing an environment conducive to successful digitization. Their ability to influence organizational culture, allocate resources, and align technological advancements with business objectives ensures that AI initiatives are implemented effectively and deliver sustainable value. The study emphasizes that while middle managers and other stakeholders play supportive roles, the commitment and leadership of top managers are critical to overcoming barriers and driving the successful and timely adoption of AI technologies.

Second, the proposed framework is a practical tool for top managers to approach AI innovation systematically. Using this framework, they can thoroughly assess their organization's current capabilities and identify areas that require development. This process includes the technical skills needed to operate AI systems and the organizational culture and social dynamics that influence AI integration. The framework encourages top managers to evaluate the readiness of their workforce, the adequacy of data infrastructures, and the alignment of AI initiatives with ethical standards and societal expectations. By identifying strengths and areas for improvement, top managers can prioritize investments and training programs that bolster their organization's ability to leverage AI as a strategic tool, ensuring that all aspects of the organization are aligned with the goals of DT.

Finally, this study provides top managers with a strategic roadmap to navigate the complexities of the AI era in a globally competitive environment. It equips them with a comprehensive understanding of the emerging challenges and opportunities associated with AI, enabling them to make informed decisions that sustain their organization's competitive edge. By understanding the nuances of AI-driven market shifts, top managers can anticipate changes, innovate proactively, and position their companies to capitalize on new business models and technologies. This proactive approach not only aids in maintaining relevance in a rapidly evolving market but also positions the organization as a leader in digital innovation, capable of adapting to and shaping future industry trends.

### 8.3 Limitations

This section outlines the limitations of the study.

One primary limitation is that the research exclusively considers peer-reviewed journal articles published in English and ranked according to the ABS ranking system (2, 3, 3\*, 4, and 4\*), which inherently narrows the scope of the review to a selective segment of the academic literature. Additionally, the study is confined to five main disciplinary areas: social sciences; business, management, and accounting; psychology; computer science; and economics, econometrics, and finance. This disciplinary focus may exclude relevant insights from other fields that intersect with AI-driven leadership but fall outside these categories.

Another significant limitation is the exclusion of articles published in 2024. Given the rapid pace of research in this area, these articles could introduce new and relevant contributions to the literature. The exclusion of these recent studies may result in an incomplete understanding of the latest developments and trends in AI-driven leadership.

Furthermore, while this study identifies growing interest in AI-driven leadership among top managers, it is crucial to recognize that this area of research is still evolving and has not yet reached maturity. As such, the study's findings should be viewed as part of an ongoing discourse rather than as definitive conclusions. The authors acknowledge that the dynamic nature of the field means that future research will likely yield new insights and perspectives, contributing to a more nuanced and comprehensive understanding of the role of AI in top managers' leadership.

Given these limitations, the authors hope this study catalyzes further discussion and investigation, encouraging scholars to continue exploring this challenging and increasingly important area of research. By recognizing these limitations, future studies can build on this work to provide a more complete and refined analysis of AI-driven top managers' leadership.

**Acknowledgments** According to the standardized CRediT taxonomy, the authors acknowledge each contribution to the article as follows. Simone Bevilacqua: conceptualization, project administration, methodology, data curation, formal analysis, visualization, writing– original draft, writing– review and editing. Jana, Masárová: resources; review and editing (critical review and commentary). Francesco Antonio Perotti: conceptualization, methodology, resources, supervision, validation, review, and editing (critical review and commentary). Alberto Ferraris: conceptualization, supervision, validation, financial support, review, and editing (critical review and commentary).

**Funding** Open access funding provided by Università degli Studi di Torino within the CRUI-CARE Agreement.

**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.



## References

- Agrawal S, De Smet A, Poplawski P, Reich A (2020) Beyond hiring: How companies are reskilling to address talent gaps. McKinsey Global Institute <https://www.mckinsey.com/business-functions/organization/our-insights/beyond-hiring-how-companies-are-reskilling-to-address-talent-gaps>. Accessed 18 October 2023
- AlNuaimi BK, Singh SK, Ren S, Budhwar P, Vorobyev D (2022) Mastering digital transformation: The nexus between leadership, agility, and digital strategy. *J Bus Res* 145:636–648. <https://doi.org/10.1016/j.jbusres.2022.03.038>
- Alon I, Apriliyanti ID, Parodi MCH (2020) A systematic review of international franchising. *Multinatl Bus Rev* 29(1):43–69. <https://doi.org/10.1108/MBR-01-2020-0019>
- Alrasheedi NS, Sammon D, McCarthy S (2022) Understanding the characteristics of workforce transformation in a digital transformation context. *J Decis Systems* 31(sup1):362–383. <https://doi.org/10.80/12460125.2022.2073636>
- Aria M, Cuccurullo C (2017) Bibliometrix: An R-tool for comprehensive science mapping analysis. *J Informet* 11(4):959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Arias-Pérez J, Vélez-Jaramillo J (2022) Understanding knowledge hiding under technological turbulence caused by artificial intelligence and robotics. *J Knowl Manage* 26(6):1476–1491. <https://doi.org/10.1108/JKM-01-2021-0058>
- Åström J, Reim W, Parida V (2022) Value creation and value capture for AI business model innovation: a three-phase process framework. *Rev Manag Sci* 16(7):2111–2133. <https://doi.org/10.1007/s11846-022-00521-z>
- Avolio BJ, Kahai SS (2003) Adding the “E” to E-leadership: How it may impact your leadership. *Organ Dyn* 31(4):325–338
- Avolio BJ, Kahai S, Dodge GE (2000) E-leadership: Implications for theory, research, and practice. *Leadersh Q* 11(4):615–668. [https://doi.org/10.1016/S1048-9843\(00\)00062-X](https://doi.org/10.1016/S1048-9843(00)00062-X)
- Avolio BJ, Sosik JJ, Kahai SS, Baker B (2014) E-leadership: Re-examining transformations in leadership source and transmission. *Leadersh Q* 25(1):105–131. <https://doi.org/10.1016/j.leaqua.2013.11.003>
- Bargoni A, Alon I, Ferraris A (2023) A systematic review of family business and consumer behaviour. *J Bus Res* 158:113698. <https://doi.org/10.1016/j.jbusres.2023.113698>
- Barney J (1991) Firm resources and sustained competitive advantage. *J Manag* 17(1):99–120. <https://doi.org/10.1177/014920639101700108>
- Berente N, Gu B, Recker J, Santhanam R (2021) Managing artificial intelligence. *MIS Quart.* 45(3).
- Bhatia S, Olivola CY, Bhatia N, Ameen A (2022) Predicting leadership perception with large-scale natural language data. *Leadersh Q* 33(5):101535. <https://doi.org/10.1016/j.leaqua.2021.101535>
- Biggart NW, Hamilton GG (1987) An institutional theory of leadership. *J Appl Behav Sci* 23(4):429–441. <https://doi.org/10.1177/002188638702300401>
- Bresciani S, Ferraris A, Romano M, Santoro G (2021) Digital leadership. In: Bresciani S, Ferraris A, Romano M, Santoro G (eds.) *Digital transformation management for agile organizations: a compass to sail the digital world*. Emerald Publishing Limited, pp 97–115. <https://doi.org/10.1108/978-1-80043-171-320211006>
- Bretas VP, Alon I (2021) Franchising research on emerging markets: Bibliometric and content analyses. *J Bus Res* 133:51–65. <https://doi.org/10.1016/j.jbusres.2021.04.067>
- Brock JKU, Von Wangenheim F (2019) Demystifying AI: What digital transformation leaders can teach you about realistic artificial intelligence. *California Manag Rev* 61(4):110–134. <https://doi.org/10.1177/1536504219865226>
- Bui HT, Zeng Y, Higgs M (2017) The role of person-job fit in the relationship between transformational leadership and job engagement. *J Manag Psychol* 32(5):373–386. <https://doi.org/10.1108/JMP-05-2016-0144>
- Buyl T, Boone C, Hendriks W, Matthyssens P (2011) Top management team functional diversity and firm performance: The moderating role of CEO characteristics. *J Manag Stud* 48(1):151–177. <https://doi.org/10.1111/j.1467-6486.2010.00932.x>
- Calderon-Monge E, Ribeiro-Soriano D (2023) The role of digitalization in business and management: a systematic literature review. *RMS*. <https://doi.org/10.1007/s11846-023-00647-8>
- Carpenter MA, Geletkanycz MA, Sanders WG (2004) Upper echelons research revisited: antecedents, elements, and consequences of top management team composition. *J Manag* 30(6):749–778. <https://doi.org/10.1016/j.jm.2004.06.001>

- Carter SM, Greer CR (2013) Strategic leadership: Values, styles, and organizational performance. *J Leader Organ Studies* 20(4):375–393. <https://doi.org/10.1177/1548051812471724>
- Certo ST, Lester RH, Dalton CM, Dalton DR (2006) Top management teams, strategy and financial performance: A meta-analytic examination. *J Manag Stud* 43(4):813–839. <https://doi.org/10.1111/j.1467-6486.2006.00612.x>
- Chatterjee S, Rana NP, Dwivedi YK, Baabdullah AM (2021) Understanding AI adoption in manufacturing and production firms using an integrated TAM-TOE model. *Technol Forecast Soc Change* 170:120880. <https://doi.org/10.1016/j.techfore.2021.120880>
- Chatterjee S, Chaudhuri R, Vrontis D (2022a) AI and digitalization in relationship management: Impact of adopting AI-embedded CRM system. *J Bus Res* 150:437–450. <https://doi.org/10.1016/j.jbusres.2022.06.033>
- Chatterjee S, Chaudhuri R, Vrontis D, Jabeen F (2022b) Digital transformation of organization using AI-CRM: From micro foundational perspective with leadership support. *J Bus Res* 153:46–58. <https://doi.org/10.1016/j.jbusres.2022.08.019>
- Chowdhury S, Dey P, Joel-Edgar S, Bhattacharya S, Rodriguez-Espindola O, Abadie A, Truong L (2023) Unlocking the value of artificial intelligence in human resource management through AI capability framework. *Hum Resource Manage Rev* 33(1):100899. <https://doi.org/10.1016/j.hrmr.2022.100899>
- Chuang TT, Nakatani K, Zhou D (2009) An exploratory study of the extent of information technology adoption in SMEs: an application of upper echelon theory. *J Enterpr Inf Manag* 22(1–2):183–196. <https://doi.org/10.1108/17410390910932821>
- Cortellazzo L, Bruni E, Zampieri R (2019) The role of leadership in a digitalized world: A review. *Front Psychol* 10:1938. <https://doi.org/10.3389/fpsyg.2019.01938>
- Damanpour F (1991) Organizational innovation: A meta-analysis of effects of determinants and moderators. *Acad Manage J* 34(3):555–590. <https://doi.org/10.5465/256406>
- Davenport TH, Bean R (2018) Big companies are embracing analytics, but most still don't have a data-driven culture. *Harvard Bus Rev* 6:1–4
- Davison RM, Wong LH, Peng J (2023) The art of digital transformation as crafted by a chief digital officer. *Int J Inf Manag* 69:102617. <https://doi.org/10.1016/j.ijinfomgt.2022.102617>
- Deepa R, Sekar S, Malik A, Kumar J, Attri R (2024) Impact of AI-focussed technologies on social and technical competencies for HR managers—A systematic review and research agenda. *Technol Forecast Soc Change* 202:123301. <https://doi.org/10.1016/j.techfore.2024.123301>
- De Mauro A, Greco M, Grimaldi M, Ritala P (2018) Human resources for Big Data professions: A systematic classification of job roles and required skill sets. *Information Processing & Management* 54(5):807–817. <https://doi.org/10.1016/j.ipm.2017.05.004>
- Dhir A, Khan SJ, Islam N, Peter Ractham N (2023) Drivers of sustainable business model innovations. An upper echelon theory perspective. *Tech Forecast Social Change* 191:122409. <https://doi.org/10.1016/j.techfore.2023.122409>
- Di Prima C, Cepel M, Kotaskova A, Ferraris A (2024) Help me help you: how HR analytics forecasts foster organizational creativity. *Technol Forecast Soc Change* 206:123540. <https://doi.org/10.1016/j.techfore.2024.123540>
- Donthu N, Kumar S, Pattnaik D (2020) Forty-five years of journal of business research: a bibliometric analysis. *J Bus Res* 109:1–14. <https://doi.org/10.1016/j.jbusres.2019.10.039>
- Donthu N, Kumar S, Mukherjee D, Pandey N, Lim WM (2021) How to conduct a bibliometric analysis: an overview and guidelines. *J Bus Res* 133:285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Doornenbal BM, Spisak BR, Van der Laken PA (2022) Opening the black box: uncovering the leader trait paradigm through machine learning. *Leadersh Q* 33(5):101515. <https://doi.org/10.1016/j.leaqua.2021.101515>
- Dubey R, Gunasekaran A, Childe SJ, Papadopoulos T, Hazen BT, Roubaud D (2018) Examining top management commitment to TQM diffusion using institutional and upper echelon theories. *Int J Production Res* 56(8):2988–3006. <https://doi.org/10.1080/00207543.2017.1394590>
- Duriau VJ, Reger RK, Pfarrer MD (2007) A content analysis of the content analysis literature in organization studies: research themes, data sources, and methodological refinements. *Organ Res Methods* 10(1):5–34. <https://doi.org/10.1177/1094428106289252>
- Dwivedi YK, Hughes L, Ismagilova E et al (2021) Artificial Intelligence (AI): multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. *Int J Inf Manag* 57:101994. <https://doi.org/10.1016/j.ijinfomgt.2019.08.002>
- Enholm IM, Papagiannidis E, Mikalef P, Krogstie J (2022) Artificial intelligence and business value: a literature review. *Inf Syst Front* 24(5):1709–1734. <https://doi.org/10.1007/s10796-021-10186-w>

- Fernandez-Vidal J, Perotti FA, Gonzalez R, Gasco J (2022) Managing digital transformation: the view from the top. *J Bus Res* 152:29–41. <https://doi.org/10.1016/j.jbusres.2022.07.020>
- Ferreira JJ, Fernandes CI, Ferreira FA (2019) To be or not to be digital, that is the question: firm innovation and performance. *J Bus Res* 101:583–590. <https://doi.org/10.1016/j.jbusres.2018.11.013>
- Firk S, Gehrke Y, Hanelt A, Wolff M (2022) Top management team characteristics and digital innovation: exploring digital knowledge and TMT interfaces. *Long Range Plan* 55(3):102166. <https://doi.org/10.1016/j.lrp.2021.102166>
- Fisk P (2002) The making of a digital leader. *Bus Strat Review* 13(1):43–50. <https://doi.org/10.1111/1467-8616.00201>
- Fitzgerald M, Kruschwitz N, Bonnet D, Welch M (2014) Embracing digital technology: a new strategic imperative. *MIT Sloan Manag Rev* 55(2):1
- Flood PC, Fong CM, Smith KG, O'Regan P, Moore S, Morley M (1997) Top management teams and pioneering: a resource-based view. *Int J Hum Resour Manag* 8(3):291–306. <https://doi.org/10.1080/095851997341658>
- Frankwick GL, Ward JC, Hutt MD, Reingen PH (1994) Evolving patterns of organizational beliefs in the formation of strategy. *J Market* 58(2):96–110. <https://doi.org/10.1177/002224299405800208>
- Furr N, Ozcan P, Eisenhardt KM (2022) What is digital transformation? Core tensions facing established companies on the global stage. *Glob Strateg J* 12(4):595–618. <https://doi.org/10.1002/gsj.1442>
- Gaur A, Kumar M (2018) A systematic approach to conducting review studies: an assessment of content analysis in 25 years of IB research. *J World Bus* 53(2):280–289. <https://doi.org/10.1016/j.jwb.2017.11.003>
- Georgakakis D, Greve P, Ruigrok W (2017) Top management team faultlines and firm performance: examining the CEO-TMT interface. *Leadership Q* 28(6):741–758. <https://doi.org/10.1016/j.leaqua.2017.03.004>
- Georgakakis D, Heyden ML, Oehmichen JD, Ekanayake UI (2022) Four decades of CEO-TMT interface research: a review inspired by role theory. *Leadersh Q* 33(3):101354. <https://doi.org/10.1016/j.leaqua.2019.101354>
- Goleman D (2004) What Makes a Leader? *Harvard Business Review*. <https://hbr.org/2004/01/what-make-s-a-leader>. Accessed 15 November 2023
- Goleman D (2006) *Social Intelligence: The new science of human relationships*. Bantam Books.
- Goleman D (2021) *Leadership: The power of emotional intelligence*. More Than Sound, LLC.
- Grant RM (1991) The resource-based theory of competitive advantage: implications for strategy formulation. *California Manag Rev* 33(3):114–135. <https://doi.org/10.2307/41166664>
- Greenwood R, Hinings CR (1996) Understanding radical organizational change: bringing together the old and the new institutionalism. *Acad Manage Rev* 21(4):1022–1054. <https://doi.org/10.5465/amr.1996.9704071862>
- Greenwood R, Oliver C, Suddaby R, Sahlin-Andersson K (2008) *The SAGE handbook of organizational institutionalism*. SAGE, New York
- Guinan PJ, Parise S, Langowitz N (2019) Creating an innovative digital project team: levers to enable digital transformation. *Bus Horiz* 62(6):717–727. <https://doi.org/10.1016/j.bushor.2019.07.005>
- Gupta S, Tuunanen T, Kar AK, Modgil S (2023) Managing digital knowledge for ensuring business efficiency and continuity. *J Knowl Manag* 27(2):245–263. <https://doi.org/10.1108/JKM-09-2021-0703>
- Haenlein M, Kaplan A (2019) A brief history of artificial intelligence: on the past, present, and future of artificial intelligence. *California Manag Rev* 61(4):5–14. <https://doi.org/10.1177/0008125619864925>
- Hambrick DC (2007) Upper echelons theory: an update. *Acad Manage Rev* 32(2):334–343. <https://doi.org/10.5465/amr.2007.24345254>
- Hambrick DC, Mason PA (1984) Upper echelons: the organization as a reflection of its top managers. *Acad Manage Rev* 9(2):193–206. <https://doi.org/10.5465/amr.1984.4277628>
- Hambrick DC, Geletkanycz MA, Fredrickson JW (1993) Top executive commitment to the status quo: Some tests of its determinants. *Strateg Manag J* 14(6):401–418. <https://doi.org/10.1002/smj.4250140602>
- He G, Liu P, Zheng X, Zheng L, Hewlin PF, Yuan L (2023) Being proactive in the age of AI: exploring the effectiveness of leaders' AI symbolization in stimulating employee job crafting. *Manage Decis* 61(10):2896–2919. <https://doi.org/10.1108/MD-10-2022-1390>
- Herrmann P, Datta DK (2005) Relationships between top management team characteristics and international diversification: an empirical investigation. *Br J Manage* 16(1):69–78. <https://doi.org/10.1111/j.1467-8551.2005.00429.x>

- Heyden ML, Fourné SP, Koene BA, Werkman R, Ansari S (2017) Rethinking “top-down” and “bottom-up” roles of top and middle managers in organizational change: Implications for employee support. *J Manag Stud* 54(7):961–985. <https://doi.org/10.1111/joms.12258>
- Hina M, Chauhan C, Kaur P, Kraus S, Dhir A (2022) Drivers and barriers of circular economy business models: Where we are now, and where we are heading. *J Clean Prod* 333:130049. <https://doi.org/10.1016/j.jclepro.2021.130049>
- Hirsch JE (2005) An index to quantify an individual's scientific research output. *Proc Natl Acad Sci* 102(46):16569–16572. <https://doi.org/10.1073/pnas.0507655102>
- Hougaard R, Carter J, Stenbridge R (2024) The best leaders can't be replaced by AI. *Harvard Business Review*. <https://hbr.org/2024/01/the-best-leaders-cant-be-replaced-by-ai>. Accessed 30 Jan 2024
- Jackson NC, Dunn-Jensen LM (2021) Leadership succession planning for today's digital transformation economy: Key factors to build for competency and innovation. *Bus Horiz* 64(2):273–284. <https://doi.org/10.1016/j.bushor.2020.11.008>
- Jorzik P, Yigit A, Kanbach DK, Kraus S, Dabić M (2023) Artificial intelligence-enabled business model innovation: Competencies and roles of top management. *IEEE Trans Eng Manage* 71:7044–7056. <https://doi.org/10.1109/TEM.2023.3275643>
- Jorzik P, Klein SP, Kanbach DK, Kraus S (2024) AI-driven business model innovation: a systematic review and research agenda. *J Bus Res* 182:114764. <https://doi.org/10.1016/j.jbusres.2024.114764>
- Kallias A, Kallias K, Tsalkamas I, Zhang S (2023) One size does not fit all: the conditional role of CEO education on IPO performance. *J Bus Res* 157:113560. <https://doi.org/10.1016/j.jbusres.2022.113560>
- Kanbach DK, Heiduk L, Blueher G, Schreiter M, Lahmann A (2023) The GenAI is out of the bottle: generative artificial intelligence from a business model innovation perspective. *RMS*. <https://doi.org/10.1007/s11846-023-00696-z>
- Kaplan A, Haenlein M (2019) Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Bus Horiz* 62(1):15–25. <https://doi.org/10.1016/j.bushor.2018.08.004>
- Kaushal N, Kaurav RPS, Sivathanu B, Kaushik N (2023) Artificial intelligence and HRM: identifying future research Agenda using systematic literature review and bibliometric analysis. *Manage Rev Quart* 73(2):455–493. <https://doi.org/10.1007/s11301-021-00249-2>
- Keding C, Meissner P (2021) Managerial overreliance on AI-augmented decision-making processes: How the use of AI-based advisory systems shapes choice behavior in R&D investment decisions. *Technol Forecast Soc Change* 171:120970. <https://doi.org/10.1016/j.techfore.2021.120970>
- Kessler MM (1963) Bibliographic coupling between scientific papers. *Am Doc* 14(1):10–25. <https://doi.org/10.1002/asi.5090140103>
- Keupp MM, Palmié M, Gassmann O (2012) The strategic management of innovation: a systematic review and paths for future research. *Int J Manag Rev* 14(4):367–390. <https://doi.org/10.1111/j.1468-2370.2011.00321.x>
- Koechling A, Wehner MC, Warkocz J (2023) Can I show my skills? Affective responses to artificial intelligence in the recruitment process. *RMS* 17(6):2109–2138. <https://doi.org/10.1007/s11846-021-00514-4>
- Kolbjørnsrud V, Amico R, Thomas RJ (2017) Partnering with AI: how organizations can win over skeptical managers. *Strategy Leader* 45(1):37–43. <https://doi.org/10.1108/SL-12-2016-0085>
- Kraus S, Jones P, Kailer N, Weinmann A, Chaparro-Banegas N, Roig-Tierno N (2021) Digital transformation: An overview of the current state of the art of research. *SAGE Open* 11(3):1–15. <https://doi.org/10.1177/21582440211047576>
- Kraus S, Breier M, Lim WM, Dabić M, Kumar S, Kanbach D, Mukherjee D, Corvello V, PiñeiroChousa J, Liguori E, Palacios-Marqués D, Schiavone F, Ferraris A, Fernandes C, Ferreira JJ (2022) Literature reviews as independent studies: guidelines for academic practice. *RMS* 16(8):2577–2595. <https://doi.org/10.1007/s11846-022-00588-8>
- Kraus S, Ferraris A, Bertello A (2023) The future of work: How innovation and digitalization re-shape the workplace. *J Innov Knowl* 8(4):100438. <https://doi.org/10.1016/j.jik.2023.100438>
- Kraus S, Bouncken RB, Yela Aránega A (2024) The burgeoning role of literature review articles in management research: an introduction and outlook. *RMS* 18(2):299–314. <https://doi.org/10.1007/s11846-024-00729-1>
- Kunisch S, Menz M, Langan R (2022) Chief digital officers: An exploratory analysis of their emergence, nature, and determinants. *Long Range Plan* 55(2):101999. <https://doi.org/10.1016/j.lrp.2020.101999>
- Larson L, DeChurch LA (2020) Leading teams in the digital age: four perspectives on technology and what they mean for leading teams. *Leadersh Q* 31(1):101377. <https://doi.org/10.1016/j.leaqua.2019.101377>

- Lee J, Suh T, Roy D, Baucus M (2019) Emerging technology and business model innovation: the case of artificial intelligence. *J Open Innov Technol Market Complex* 5(3):44. <https://doi.org/10.3390/joitmc5030044>
- Lee A, Inceoglu I, Hauser O, Greene M (2022) Determining causal relationships in leadership research using Machine Learning: the powerful synergy of experiments and data science. *Leadersh Q* 33(5):101426. <https://doi.org/10.1016/j.leaqua.2020.101426>
- Leso BH, Cortimiglia MN, Ghezzi A, Minatogawa V (2023) Exploring digital transformation capability via a blended perspective of dynamic capabilities and digital maturity: a pattern matching approach. *RMS*. <https://doi.org/10.1007/s11846-023-00692-3>
- Li G, Shao Y (2023) How do top management team characteristics affect digital orientation? Exploring the internal driving forces of firm digitalization. *Technol Soc* 74:102293. <https://doi.org/10.1016/j.techsoc.2023.102293>
- Lin Q (2024) Digital leadership: a systematic literature review and future research agenda. *Eur J Innov Manag*. <https://doi.org/10.1108/EJIM-07-2023-0522>
- Lorenz F, Buchwald A (2023) A perfect match or an arranged marriage? How chief digital officers and chief information officers perceive their relationship: a dyadic research design. *Eur J Inf Syst* 32(3):372–389. <https://doi.org/10.1080/0960085X.2023.2178742>
- Loureiro SMC, Romero J, Bilro RG (2020) Stakeholder engagement in co-creation processes for innovation: A systematic literature review and case study. *J Bus Res* 119:388–409. <https://doi.org/10.1016/j.jbusres.2019.09.038>
- Makarius EE, Mukherjee D, Fox JD, Fox AK (2020) Rising with the machines: a sociotechnical framework for bringing artificial intelligence into the organization. *J Bus Res* 120:262–273. <https://doi.org/10.1016/j.jbusres.2020.07.045>
- Malodia S, Mishra M, Fait M, Papa A, Dezi L (2023) To digit or to head? Designing digital transformation journey of SMEs among digital self-efficacy and professional leadership. *J Bus Res* 157:113547. <https://doi.org/10.1016/j.jbusres.2022.113547>
- Manner MH (2010) The impact of CEO characteristics on corporate social performance. *J Bus Ethics* 93:53–72. <https://doi.org/10.1007/s10551-010-0626-7>
- Massaro M, Dumay J, Guthrie J (2016) On the shoulders of giants: undertaking a structured literature review in accounting. *Acc Audit Acc J* 29(5):767–801. <https://doi.org/10.1108/AAAJ-01-2015-1939>
- McCarthy P, Sammon D, Alhassan I (2022) Digital transformation leadership characteristics: a literature analysis. *J Decis Systems* 32(1):79–109. <https://doi.org/10.1080/12460125.2021.1908934>
- Meyer JW, Rowan B (1977) Institutionalized organizations: formal structure as myth and ceremony. *Am J Sociol* 83(2):340–363. <https://doi.org/10.1086/226550>
- Mikalef P, Gupta M (2021) Artificial intelligence capability: conceptualization, measurement calibration, and empirical study on its impact on organizational creativity and firm performance. *Info Manag* 58(3):103434. <https://doi.org/10.1016/j.im.2021.103434>
- Naeem R, Kohtamäki M, Parida V (2024) Artificial intelligence enabled product–service innovation: past achievements and future directions. *RMS*. <https://doi.org/10.1007/s11846-024-00757-x>
- Neuendorf KA (2002) *The content analysis guidebook*. Sage Publications, London
- Newstead T, Eager B, Wilson S (2023) How AI can perpetuate—or help mitigate—gender bias in leadership. *Org Dyn* 52(4):100998. <https://doi.org/10.1016/j.orgdyn.2023.100998>
- Nielsen S (2010) Top management team diversity: A review of theories and methodologies. *Int J Manag Rev* 12(3):301–316. <https://doi.org/10.1111/j.1468-2370.2009.00263.x>
- Odugbesan JA, Aghazadeh S, Al Qaralleh RE, Sogeke OS (2023) Green talent management and employees' innovative work behavior: the roles of artificial intelligence and transformational leadership. *J Knowl Manage* 27(3):696–716. <https://doi.org/10.1108/JKM-08-2021-0601>
- Okoli C (2015) A guide to conducting a standalone systematic literature review. *Commun Assoc Information Syst*. <https://doi.org/10.17705/1CAIS.03743>
- Parry K, Cohen M, Bhattacharya S (2016) Rise of the machines: A critical consideration of automated leadership decision making in organizations. *Group Org Manag* 41(5):571–594. <https://doi.org/10.1177/1059601116643442>
- Peng B (2021) Digital leadership: State governance in the era of digital technology. *Cultures Sci*. <https://doi.org/10.1177/2096608321989835>
- Pereira V, Hadjielias E, Christofi M, Vrontis D (2023) A systematic literature review on the impact of artificial intelligence on workplace outcomes: A multi-process perspective. *Hum Resource Manage Rev* 33(1):100857. <https://doi.org/10.1016/j.hmr.2021.100857>

- Porfírio JA, Carrilho T, Felício JA, Jardim J (2021) Leadership characteristics and digital transformation. *J Bus Res* 124:610–619. <https://doi.org/10.1016/j.jbusres.2020.10.058>
- Rêgo BS, Jayantilal S, Ferreira JJ, Carayannis EG (2021) Digital transformation and strategic management: A systematic review of the literature. *J Knowl Econ* 13(4):3195–3222. <https://doi.org/10.1007/s13132-021-00853-3>
- Rogers EM, Singhal A, Quinlan MM (2014) Diffusion of innovations. In: Rogers EM, Singhal A, Quinlan MM (2nd ed) *An integrated approach to communication theory and research*. Routledge, pp 432–448
- Ruokonen M, Ritala P (2023) How to succeed with an AI-first strategy? *J Bus Strateg*. <https://doi.org/10.1108/JBS-08-2023-0178>
- Samimi M, Cortes AF, Anderson MH, Herrmann P (2022) What is strategic leadership? Developing a framework for future research. *Leadersh Q* 33(3):101353. <https://doi.org/10.1016/j.leaqua.2019.101353>
- Santana M, Díaz-Fernández M (2023) Competencies for the artificial intelligence age: visualisation of the state of the art and future perspectives. *RMS* 17(6):1971–2004. <https://doi.org/10.1007/s11846-022-00613-w>
- Saratchandra M, Shrestha A (2022) The role of cloud computing in knowledge management for small and medium enterprises: a systematic literature review. *J Knowl Manage* 26(10):2668–2698. <https://doi.org/10.1108/JKM-06-2021-0421>
- Sauer PC, Seuring S (2023) How to conduct systematic literature reviews in management research: a guide in 6 steps and 14 decisions. *RMS* 17(5):1899–1933. <https://doi.org/10.1007/s11846-023-00668-3>
- Schiuma G, Schettini E, Santarsiero F, Carlucci D (2021) The transformative leadership compass: six competencies for digital transformation entrepreneurship. *Int J Entrep Behav Res* 28(5):1273–1291. <https://doi.org/10.1108/IJEBR-01-2021-0087>
- Schmidt DH, Van Dierendonck D, Weber U (2023) The data-driven leader: developing a big data analytics leadership competency framework. *J Manage Dev* 42(4):297–326. <https://doi.org/10.1108/JMD-12-2022-0306>
- Schuster T, Brunner TJ, Schneider MH, Lehmann C, Kanbach DK (2023) Leading in the digital age: conceptualising digital leadership and its influence on service innovation performance. *Int J Innov Manage*. <https://doi.org/10.1142/S1363919623500317>
- Schwaeke J, Peters A, Kanbach DK, Kraus S, Jones P (2024) The new normal: the status quo of AI adoption in SMEs. *J Small Bus Manage*. <https://doi.org/10.1080/00472778.2024.2379999>
- Schwarz Müller T, Brosi P, Duman D, Welpel IM (2018) How does the digital transformation affect organizations? Key themes of change in work design and leadership. *Manage Revue* 29(2):114–138
- Secinaro S, Calandra D, Lanzalonga F, Ferraris A (2022) Electric vehicles' consumer behaviours: mapping the field and providing a research agenda. *J Bus Res* 150:399–416. <https://doi.org/10.1016/j.jbusres.2022.06.011>
- Secundo G, Ripa P, Cerchione R (2020) Digital Academic Entrepreneurship: a structured literature review and avenue for a research agenda. *Technol Forecast Soc Change* 157:120118. <https://doi.org/10.1016/j.techfore.2020.120118>
- Secundo G, Spilotro C, Gast J, Corvello V (2024) The transformative power of artificial intelligence within innovation ecosystems: a review and a conceptual framework. *RMS*. <https://doi.org/10.1007/s11846-024-00828-z>
- Singh A, Lim WM, Jha S, Kumar S, Ciasullo MV (2023) The state of the art of strategic leadership. *J Bus Res* 158:113676. <https://doi.org/10.1016/j.jbusres.2023.113676>
- Smith WK, Tushman ML (2005) Managing strategic contradictions: a top management model for managing innovation streams. *Organ Sci* 16(5):522–536. <https://doi.org/10.1287/orsc.1050.0134>
- Spisak BR, Van der Laken PA, Doornenbal BM (2019) Finding the right fuel for the analytical engine: Expanding the leader trait paradigm through machine learning? *Leadersh Q* 30(4):417–426. <https://doi.org/10.1016/j.leaqua.2019.05.005>
- Tandon A, Kaur P, Mäntymäki M, Dhir A (2021) Blockchain applications in management: A bibliometric analysis and literature review. *Technol Forecast Soc Change* 166:120649. <https://doi.org/10.1016/j.techfore.2021.120649>
- Tekic Z, Koroteev D (2019) From disruptively digital to proudly analog: a holistic typology of digital transformation strategies. *Bus Horiz* 62(6):683–693. <https://doi.org/10.1016/j.bushor.2019.07.002>
- Thomas A, Gupta V (2022) Tacit knowledge in organizations: bibliometrics and a framework-based systematic review of antecedents, outcomes, theories, methods and future directions. *J Knowl Manage* 26(4):1014–1041. <https://doi.org/10.1108/JKM-01-2021-0026>
- Tigre FB, Curado C, Henriques PL (2023) Digital leadership: A bibliometric analysis. *J Leadersh Organ Stud* 30(1):40–70. <https://doi.org/10.1177/15480518221123132>



- Tranfield D, Denyer D, Smart P (2003) Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British J Manage* 14(3):207–222
- Ulrich K, Guijarro-García M, Pagán-Castaño E, Nieto-Alemán P (2024) Drivers of decision-making towards for digital transformation. *RMS*. <https://doi.org/10.1007/s11846-024-00752-2>
- Vaidya DR, Prasad DK, Mangipudi DMR (2020) Mental and emotional competencies of leader's dealing with disruptive business environment-A conceptual review. *Int J Manage* 11(5):366–375. <https://doi.org/10.34218/IJM.11.5.2020.036>
- Van Eck N, Waltman L (2010) Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics* 84(2):523–538. <https://doi.org/10.1007/s11192-009-0146-3>
- Varma A, Dawkins C, Chaudhuri K (2023) Artificial intelligence and people management: a critical assessment through the ethical lens. *Hum Resource Manage Rev* 33(1):100923. <https://doi.org/10.1016/j.hmr.2022.100923>
- Vera D, Bonardi JP, Hitt MA, Withers MC (2022) Extending the boundaries of strategic leadership research. *Leadersh Q* 33(3):101617. <https://doi.org/10.1016/j.leaqua.2022.101617>
- Verhoef PC, Broekhuizen T, Bart Y, Bhattacharya A, Dong JQ, Fabian N, Haenlein M (2021) Digital transformation: a multidisciplinary reflection and research agenda. *J Bus Res* 122:889–901. <https://doi.org/10.1016/j.jbusres.2019.09.022>
- Vlačić B, Corbo L (2021) The evolving role of artificial intelligence in marketing: A review and research agenda. *J Bus Res* 128:187–203. <https://doi.org/10.1016/j.jbusres.2021.01.055>
- Warner KS, Wäger M (2019) Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Plan* 52(3):326–349. <https://doi.org/10.1016/j.lrp.2018.12.001>
- Watson GJ, Desouza KC, Ribiere VM, Lindić J (2021) Will AI ever sit at the C-suite table? The future of senior leadership. *Bus Horiz* 64(4):465–474. <https://doi.org/10.1016/j.bushor.2021.02.011>
- Weber Y, Tarba SY (2014) Strategic agility: A state of the art introduction to the special section on strategic agility. *California Manag Rev* 56(3):5–12. <https://doi.org/10.1525/cm.2014.56.3.5>
- Weber E, Büttgen M, Bartsch S (2022) How to take employees on the digital transformation journey: An experimental study on complementary leadership behaviors in managing organizational change. *J Bus Res* 143:225–238. <https://doi.org/10.1016/j.jbusres.2022.01.036>
- Westerman G, Soule DL, Eswaran A (2019) Building digital-ready culture in traditional organizations. *MIT Sloan Manag Rev* 60(4).
- Wiersema MF, Bantel KA (1992) Top management team demography and corporate strategic change. *Acad Manag J* 35(1):91–121. <https://doi.org/10.5465/256474>
- Wrede M, Dauth T (2020) A temporal perspective on the relationship between top management team internationalization and firms' innovativeness. *Manage Decis Econ* 41(4):542–561. <https://doi.org/10.1002/mde.3119>
- Wrede M, Velamuri VK, Dauth T (2020) Top managers in the digital age: exploring the role and practices of top managers in firms' digital transformation. *Manage Decis Econ* 41(8):1549–1567. <https://doi.org/10.1002/mde.3202>
- Zhong L (2017) Indicators of digital leadership in the context of K-12 education. *J Educat Technol Dev Exchange*. <https://doi.org/10.18785/jetde.1001.03>
- Zoppelletto A, Orlandi LB, Zardini A, Rossignoli C, Kraus S (2023) Organizational roles in the context of digital transformation: a micro-level perspective. *J Bus Res* 157:113563. <https://doi.org/10.1016/j.jbusres.2022.113563>
- Zupic I, Čater T (2015) Bibliometric methods in management and organization. *Organ Res Methods* 18(3):429–472. <https://doi.org/10.1177/1094428114562629>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

## Authors and Affiliations

Simone Bevilacqua<sup>1</sup>  · Jana Masárová<sup>2</sup>  · Francesco Antonio Perotti<sup>1,3</sup>  · Alberto Ferraris<sup>1,4,5</sup> 

✉ Alberto Ferraris



alberto.ferraris@unito.it

Simone Bevilacqua  
simone.bevilacqua@unito.it

Jana Masárová  
jana.masarova@tnuni.sk

Francesco Antonio Perotti  
francescoantonio.perotti@unito.it

- <sup>1</sup> Department of Management “Valter Cantino”, University of Turin, Turin, Italy
- <sup>2</sup> Faculty of Social and Economic Relations, Alexander Dubcek University of Trenčín, Trenčín, Slovakia
- <sup>3</sup> Department of Management and Innovation, School of Business and Law, University of Agder, Kristiansand, Norway
- <sup>4</sup> Mediterranean Institute for Management Science, School of Business, University of Nicosia, 2417 Nicosia, Cyprus
- <sup>5</sup> Corvinus Institute for Advanced Studies (CIAS), Corvinus University of Budapest, Budapest, Hungary