*Journal of Management & Organization* (2025), **31**, 420–442
doi:10.1017/jmo.2025.6

EDITORIAL

# Hot management trends

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**Abstract**
Management practices are constantly changing amid intense competitive global pressure. This can put a strain on managers in terms of adapting to new challenges that arise from rapid transformations. While there is an emphasis on timely transformations in order to increase efficiency and productivity gains, there can also be a relaxation when managers have reached their pinnacle and achieved their goals. The goal of this editorial is to focus on hot management trends which is an important topic given the ever shifting business environment. Well-known academics were asked to write about what they see as the main management trends affecting society at the current time period. They each have diverse views based on their area of expertise and thought processes. For the Journal of Management & Organization, it is critical that we look into management trends in order to inform practice but also to enrichen theory. It is exciting times with many things happening regarding management that makes it exciting to read about what may occur in the future.

## Geopolitics and business management

Vanessa Ratten and Marthin Nanere

Geopolitics is becoming increasingly evident in management and organizational practices in the global business environment. Much of the reason for this is due to new political parties emerging and politicians focusing on international issues. This makes it more important for businesses to focus on politics both from an internal and external perspective. Internally politics between people, other organizations and institutions can influence business growth. This means it is critical to take a stakeholder perspective regarding collaboration and engagement. External politics mean focusing on changes in regulation and policy perspectives regarding business management practices. This is apparent particularly with new political parties gaining prominence and altering existing conditions.

Regional trading blocs including the European Union are reassessing the impacts of the changes in political parties in terms of business management. This is evident with alterations in international policy from President Trump in the United States with regard to foreign trade. The Ukraine/Russia conflict has affected how businesses strategize in the marketplace and United States policy recently has changed regarding how to deal with this situation (Ratten, 2023). This is the same with tariff policies based on country agreements with this having the potential to fuel inflation and contracting labor supply. Concurrently with the changes in economic policy is the emphasis on artificial intelligence with Elon Musk and Sam Altman being evident in geopolitical business decisions. There is a

race to become a leader for many countries in artificial intelligence with business managers trying to strategize about potential changes.

Diversity, equity, and inclusion practices have altered with regard to President Trump's policies stemming from the United States but affecting global business management. Social equity practices are changing with regard to previously mandated policies and rollbacks of these changes. As a consequence, there has been a big shift in how managers regulate their business. This has influenced social media pages and the dominance of some country's political parties and institutions.

Due to the COVID-19 pandemic occurring some years ago, there has been an increase in digital nomads living in different countries. Working from home practices have changed resulting in altering business practices. The cost of living issues have further altered how people assess geopolitics. This is influenced by gender distribution and the outcome of political decisions on business. The implications are that businesses need to clarify their policies regarding a range of issues that are relevant to their employees and customers.

Managers need to consider how geopolitics affects climate change with regard to policies. The United Nations Sustainable Development Goals have made it a necessity for businesses to adhere to certain objectives. Changing geopolitics seems to have reduced emphasis on environmental issues to a refocus on competitiveness. As a consequence, there has been some uncertainty regarding geopolitics but with the election of new governments this has somewhat been clarified with regard to socioeconomic shifts.

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## Management challenges from outer space

Miguel Pina e Cunha

The United States Space Force's motto reads like 'Space is closer than you think'. The same is valid for organizations: space is getting closer than we often think. The emergence of New Space, the shift toward the involvement of business firms in activities of space exploration and exploitation, is expanding organizational possibilities, as it moves from exploratory to commercial presence in space. The sector is 'in the midst of a revolution' (Weinzierl & Rosseau, 2025, p. 1). Hence the proposal that organizations need to incorporate space in their strategic processes (Weinzierl et al., 2022). These are broad spectrum technologies, impacting sectors as distinct as agriculture (Cunha et al., 2023) or space synthetic biology (Vora et al., 2024).

In this trend, we consider six management and organization (M&O) challenges from outer space. First, M&O studies may take *new space* into account. M&O has approached space, namely its main actors such as NASA. The explosion of the Challenger and Columbia shuttle disasters has been subject of scrutiny (e.g., Starbuck & Farjoun, 2005) but with the emergence of New Space, private players are changing the field. These companies offer new services with a business orientation. Space is becoming a competitive business market with an ecosystem of new players.

This change brings important *legal issues*, namely regarding rights and jurisdiction. As Butler (2017) asked, who owns the moon? As companies compete in the upstream or downstream sectors they are entering a territory with limited regulation. As its importance and access evolve, so will the need to fine-tune the regulatory aspects of the sector.

The regulation of the space sector will involve the reconsideration of the *relationship between public and the private sectors*. The recent enthusiasm for 'new space' should not lead us to downplay the role of the state in the evolution of the sector (Heitor et al., 2024). States are still the major players, which means that spacepreneurs need to carefully consider national interests and state intervention, namely in face of military interest.

M&O may importantly contribute to promote *dialogue between the fields of science and management*. Space is 'becoming an ever-more-important site of value creation for businesses across industries and for society as a whole' (Weinzierl & Rosseau, 2025) but how can technological inventions be translated into viable business models? How can entrepreneurs create and capture value in this nascent market? How can new space companies gain the attention of the corporate (Ocasio, 1997), namely of mature sectors which often think about the state as a distant domain?

Space can be treated as the *next frontier of expansion*, a new international market. Instead of seeing it as the domain of astronomy, physics, or engineering, M&O scholars may consider this 'final economic frontier' (Weinzierl, 2025) in their internationalization plans.

Finally, in face of climate change and other grand challenges, space – old and new – can be critical to address the threats ahead. As discussed by Clegg et al. (2024), the possibilities afforded by new space technologies may offer critical information to respond to Sustainable Development Goals. Access to rich information may inform better decision-making and innovative solutions to human problems.

These promises come a number of challenges. Technologies that we can use to construct can be used to destruct. The human activity in space risks to expand our species' footprint in the form of, for example, space debris. And the potential to protect the planet (e.g., with asteroid mining) may create new galactic battles. Regardless of the way we use these technologies, one thing seems clear: M&O should pay attention to this new domain of organizational action.

**Acknowledgements.** Miguel Pina e Cunha acknowledges support from the Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2019, UIDB/00124/2020 and Social Sciences DataLab, PINFRA/22209/2016), POR Lisboa and POR Norte (Social Sciences DataLab, PINFRA/22209/2016).

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## The future of DEI in management: Beyond controversy, toward integration

Yuka Fujimoto

Diversity, equity, and inclusion (DEI) – also known as equality, diversity, and inclusion (EDI) – has faced growing resistance, particularly in the United States. Critics argue that DEI fosters division or imposes unnecessary regulations, while others claim that equality has already been achieved, making DEI efforts redundant. In this evolving landscape, the key question remains: What is DEI and how should DEI evolve to remain a vital force in management?

At its core, DEI has always been about social justice, embracing diverse perspectives, and fostering workplaces that equitably reflect and serve society. As articulated by the Academy of Management's (AOM) DEI Division (Academy of Management: DEI Division, 2025), DEI is not about favoring one group over another or compromising competency. Instead, it emphasizes the value of diverse contributions and perspectives to enhance decision-making and societal impact (Bernstein et al., 2020).

Organizations that actively promote inclusion benefit from continuous learning within organizational and societal contexts, address systemic power imbalances, and create environments where employees feel engaged and perform at their best (Randel, 2025).

Moreover, DEI's influence extends beyond corporate policies into the broader environment in which businesses operate. Inclusion efforts must align with the most pressing societal and environmental needs, reinforcing the idea that sustainable organizations mirror societies that value both human and planetary well-being (Fujimoto, Azmat, & Uddin, 2024). Global frameworks such as the United Nations' Sustainable Development Goals provide a crucial common aspiration for businesses, organizations, and nations by fostering inclusion, encouraging transnational collaboration, and leveraging diverse perspectives to develop innovative solutions for global challenges.

Given this context, business and management research must continue to position DEI's core principles – justice and diverse perspectives – as a strategic imperative for creating sustainable, thriving, and psychologically safe workplaces that advance sustainable development. To further this agenda, I propose the following research directions that move beyond DEI's current controversies and instead emphasize its fundamental principles of social justice, integrative learning, and strategic decision-making to address critical societal challenges.

## Key research directions for DEI in management

### *Demographic diversity and organizational outcomes*

*How does demographic diversity – reflecting broader societal representation – impact key organizational outcomes such as creativity, commitment, and performance?* (Fujimoto, Ferdous & Wali, 2023; Kaczmarek & Nyuur, 2022; King et al., 2011; Proudfoot et al., 2024). The United States, for example, is one of the world's most demographically diverse nations, shaped by immigration and cultural exchange. According to the U.S. Census Bureau (2021), 57.8% of the population identifies as White (non-Hispanic), 18.7% as Hispanic or Latino, 12.1% as Black, 6.0% as Asian, and 10.2% as multiracial. However, socioeconomic disparities persist, with the top 20% of households earning over half of total income, while Black and Hispanic households report lower median incomes than White and Asian households (U.S. Census Bureau, 2022). Given the realities of growing global migration, it is logical for workplaces in the United States and other nations to reflect increasing demographic diversity (Groutsis et al., 2023). Management research plays a crucial role in examining the processes and impacts of demographic diversity in driving organizational and societal prosperity.

### *Inclusive decision-making for societal goals*

*How can workplaces establish more inclusive decision-making processes that embrace diverse perspectives while advancing common goals (e.g., migration management, reducing inequality, and environmental sustainability)?* For example, corporate efforts to reduce ocean pollution can be significantly improved by integrating multiple viewpoints, ensuring more effective and inclusive solutions (cf. Mor Barak & Cherin, 1998; Nishii, 2013). Rather than centering DEI efforts on one dominant perspective, organizations must prioritize the integration of diverse viewpoints for more effective decision-making (Ely & Thomas, 2001; Fujimoto & Härtel, 2017) to address challenges beyond business performance alone. Management research has a critical role in developing innovative approaches that enhance the contributions of employees from all backgrounds, empowering them to shape key decision-making processes that address grand challenges beyond business performance (cf. Fujimoto & Cheah, 2025; Fujimoto & Uddin, 2023; Gagnon et al., 2021; Roberson & Scott, 2022).

## Conclusion

The next phase of DEI should prioritize practical solutions that align inclusion with broader societal objectives, reinforcing its role as an essential force in shaping sustainable and equitable workplaces.

Ultimately, the goal is not just diverse organizations but a world where inclusive decision-making fosters stronger communities, transformative innovations, and sustainable solutions that benefit both society and the planet.

By doing so, demographic divisions will diminish, paving the way for a more integrated and equitable future.

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## Paradigm shift in the AI-augmented era

Ali Intezari

### AI in management

The increasing integration of artificial intelligence (AI) in management and organizations is fundamentally transforming traditional decision-making processes, from strategic planning to real-time decisions. AI's enormous capabilities have led many organizations across industries to leverage AI-driven systems to enhance competitive advantage, streamline operations, and improve decision accuracy (Choudhury et al., 2020). Experts in various fields, such as medicine, psychological

counselling, human resource management, banking, science, transportation, public administration, and legal counselling, increasingly rely on AI in critical decision situations (Shresta et al., 2019).

As AI technology matures, its role in management extends beyond simple automation to sophisticated cognitive assistance. For example, by integrating sentiment analysis and psychological profiling, AI can provide decision-makers with nuanced recommendations tailored to human behavioral patterns (Huang & Rust, 2021). Additionally, reinforcement learning techniques allow AI models to adapt dynamically based on observed decision-making trends, which can further enhance their predictive accuracy (Agrawal, Gans, & Goldfarb, 2019). Predictive analytics help forecast market trends, customer behavior, and operational risks, which allows businesses to proactively adapt strategies. Machine learning models enhance efficiency, optimize resource allocation, and provide deeper strategic insights (Brynjolfsson & McElheran, 2016).

This integration of AI in highly cognitive management decision-making necessitates far more than updates in processes and structures. The shift in traditional decision-making frameworks, which rely on hierarchical authority and experience-based judgment, challenges the conventional philosophy of and long-held assumptions about management. Organizations will inevitably need to embrace a new paradigmatic shift in the role of managers.

## A paradigmatic shift in management philosophy

The most foundational philosophy underpinning the role of a manager in an organization can be argued to be rooted in teleological and ethical frameworks (Moore, 2017; Beadle & Knight, 2012). Drawing from philosophical concepts of purpose and duty (Audi, 2012), a manager's role fundamentally exists to guide collective action toward a defined organizational purpose or telos. This perspective, echoing Aristotelian thought, posits that organizations, like any entity, are created with an intended end goal, be it profit, societal contribution, or innovation (Grant & Parker, 2009). The manager, therefore, is not merely an administrator but an orchestrator tasked with aligning individual efforts and resources to effectively and ethically realize this overarching purpose (Mintzberg, 2009; Tsoukas, 2018). This perspective inherently carries an ethical dimension, as the manager is also responsible for ensuring that the pursuit of organizational goals is conducted in a morally sound manner, considering the well-being and rights of stakeholders, reflecting deontological principles of duty and responsibility.

Expanding on this, the managerial role is framed as a practice of rational ordering and ethical stewardship. Inspired by enlightenment ideals of reason and social contract theory, managers are entrusted with establishing and maintaining order within the complex social system of an organization (Donaldson & Dunfee, 1994). This involves rationally designing structures, processes, and systems to facilitate efficient and productive collaboration. For this reason, traditional management theories emphasize hierarchical structures, where decisions flow from top-level executives downward.

In practice, this rational ordering, however, is not purely mechanistic. Drawing from humanist and virtue ethics, the manager is also ethically responsible for the 'stewardship' of human capital. A manager should create an environment where individuals can contribute meaningfully, develop their potential, and find purpose within the organizational context (Deci & Ryan, 2000). Thus, the foundational philosophy positions the manager as a figure who balances the rational pursuit of organizational goals with a profound ethical responsibility for the individuals and the wider societal impact within their sphere of influence, bridging the practicalities of organizational life with broader philosophical considerations of purpose, order, and ethical conduct (Intezari & Pauleen, 2018).

This foundational philosophy of management, however, is being fundamentally disrupted and reconfigured in several ways because of the integration of AI into organizations. While the core tenets of teleology, ethics, rational ordering, and stewardship remain relevant, AI introduces critical shifts and challenges to their interpretation and application.

AI's capacity for autonomous decision-making challenges the manager as the primary orchestrator of purpose. If AI algorithms can autonomously define, pursue, and even redefine organizational goals based on data and predictive analysis, the manager's role shifts from directive architect to potentially a curator of AI-driven purpose. This necessitates a re-evaluation of management teleology, where the 'purpose' itself might become a dynamic interplay between human intention and AI-driven practice.

Additionally, while today's AI-related concerns are focused on matters such as algorithmic bias (Soleimani et al., 2022), job displacement, and data privacy (e.g., Mittelstadt et al., 2016), AI is profoundly impacting the very nature of human value within organizations. Managerial roles may resemble those of AI ethicists and data strategists, to focus on governance, accountability, and alignment between AI applications and organizational values (Daugherty & Wilson, 2018). The rational ordering facilitated by AI risks becoming purely mechanistic and optimized for efficiency, potentially overshadowing the humanist view of organizations if managers fail to consciously redefine their philosophy about this vulnerability of human value in an augmented environment.

It is, therefore, important to re-anchor management in a robust and pragmatic framework that ensures that the pursuit of organizational telos remains human-centered.

To this end, managers will be in the role of social strategists. They will need meta-competences (Pauleen & Intezari, 2023; Intezari & Pauleen, 2013) that take managers' roles beyond human coordination to existential leadership based on meta-ethical navigation. With the emergence of humanoid AI (Tong, Liu, & Zhang, 2024), managers need to navigate organizations through the radical ambiguity of AI's role in society and organizations and reevaluate human values to determine the unique value of human contribution when AI surpasses human capabilities in many cognitive tasks. They should be able to address questions about AI's rights and responsibilities, as well as the unprecedented challenges of AI personhood. They need to focus on overseeing AI-driven processes, interpreting AI insights, and ensuring that human values remain embedded in decision-making (Brynjolfsson, Rock, & Syverson, 2016). Managers need to lead the reflection of human purpose and worth in work, which requires them to go beyond productive metrics.

Managers, in their new pressing social strategist role, need to understand and navigate emergent and self-organizing systems where AI agents interact with each other and with humans in unpredictable ways. They should know how to design an environment where human and AI strengths are mutually amplified. This entails developing meta-competencies (see Pauleen & Intezari, 2023; Intezari & Pauleen, 2013) for continuous self-reflection, questioning the fundamental assumptions, values, and purpose in light of AI's impact.

Such reflection should lead to an existential self-awareness at the organizational level and beyond. Therefore, an effective humanist view of management in an autonomous AI-powered world lies in a very critical skill: how to craft existential narratives to inspire a sense of meaningful contribution beyond mere productivity. Managers will be storytellers and meaning-weavers, who tell compelling narratives about human purpose and organizational identity in an environment where most of the tasks are done by AI.

## Conclusion

As AI becomes more autonomous, the role of managers will also undergo a significant transformation. While AI literacy may facilitate our transition to AI-augmented management, it will merely position us as AI followers – reactive to and constrained by the urgency of leveraging AI for efficiency. The integration of AI, as an autonomous decision-maker, into management practice is transforming the philosophy and long-held assumptions about the role of managers. We are experiencing a transition from traditional hierarchical decision-making to a radically redefined role where managers act as sense-givers in an AI-dominated decision landscape, orchestrating human-AI symbiosis. The future of AI-augmented management lies in managers' ability to craft existential narratives.

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## Hot management trends in sport management

Jerónimo García-Fernández

Sports management is evolving, driven by digitalization, innovation, and the need to optimize resources in a competitive environment (Chao et al., 2024). Research in this field is essential to understanding the transformations affecting organizations, clubs, federations, and events, allowing for the adoption of more efficient and sustainable strategies. Emerging technologies such as artificial intelligence, data analysis, and automation are redefining decision-making and user experience. Exploring these trends not only improves organizational management but also ensures the sector's adaptation to future challenges. Among the trends shaping research in sports management, several stand out due to their impact on the sector's transformation and their potential to redefine how sports activities are organized, administered, and developed.

First, digitalization has become a fundamental pillar in the evolution of sports organizations. Research in this area should analyze how entities adopt technologies to improve their operations, from administrative management to fan interaction. The study of digital transformation models, the integration of sports management software, and the use of automated platforms to optimize internal processes has become a necessity to offer practical implications for sports managers (Thompson et al., 2024).

Second, and linked to the previous point, the use of artificial intelligence is revolutionizing decision-making. Research in this field should focus on the application of predictive algorithms for resource optimization, improving organizational performance, and personalizing the user experience. From virtual assistants to real-time data analysis tools, artificial intelligence enhances efficiency in areas such as sports event planning, human resource management, and the optimization of sports infrastructure maintenance. Its adoption is driving changes in the job market and, consequently, in the management of sports organizations (Glebova et al., 2024).

Third, focusing on consumer and sports fan management, it is essential to recognize that their consumption habits, expectations, and relationships with clubs, leagues, and sports brands have changed (Noh & Ahn, 2025). Digitalization, hyperconnectivity, and personalization have driven the need to transform sports management to adapt to these new demands. Research should therefore focus on how to enhance the fan experience, build loyalty among followers, and develop innovative strategies to monetize their interaction with the sports ecosystem. Fans are no longer just spectators; they seek digital experiences that allow them to interact with their favorite teams and competitions anytime and anywhere. Research in this area should analyze how clubs are implementing digital strategies to improve relationships with their supporters through mobile apps, membership platforms, and immersive experiences. It should also examine the impact of digitalization on fan loyalty, exploring the use of technologies such as non-fungible tokens (NFTs) for acquiring exclusive content and social media engagement as a key connection element with new generations. Furthermore, it is crucial to understand that the way users access sports services – ranging from gyms to outdoor activities – and their perception of these services has changed (Mao, 2025). Research in this area should examine the impact of digital platforms on class reservations, the automation of administrative processes, and the personalization of sports offerings. Flexible subscription models, mobile applications enabling self-management of training, and artificial intelligence-driven tools that adapt user experiences based on their goals and consumption habits should be explored.

Finally, there is an emerging trend in analyzing sustainability in sports management. This research field should focus on how sports organizations can reduce their environmental impact through energy efficiency strategies, responsible resource use, and ecological management policies. The adoption of renewable energy in sports facilities, the implementation of sustainable materials in sporting events, and the optimization of fan transportation to minimize the carbon footprint should be studied. Additionally, the role of sustainability as a decision-making factor for consumers and its impact on the reputation of clubs and sports entities should be analyzed.

Moreover, sustainability in sports management goes beyond environmental concerns to include social responsibility and governance (ESG criteria). Research in this area should explore how clubs, federations, and sports events can integrate inclusion, accessibility, and community well-being programs into their strategies. Initiatives such as waste reduction in large sporting events, carbon offset programs, and the promotion of responsible practices in merchandising and sports equipment consumption should be examined. These actions will not only strengthen the sports sector's commitment to sustainable development but also influence consumer perception and loyalty in sports.

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## Workplace psychosocial hazards

Subas P. Dhakal

### What is workplace psychosocial hazard (WPH)?

WPHs mean many things in many contexts. WPH has been considered as being 'related to the psychological and social conditions of the workplace rather than just the physical conditions, including but not limited to stress, fatigue, bullying, violence, aggression, harassment, and burnout, which can be harmful to the health of workers and compromise their well-being' (Commission for Occupational Safety and Health, Psychosocial Hazards in the Workplace 2022, p. 2). In a nutshell, WPH refers to the operating environment of an organization that can instigate anxiety, tension, or interpersonal difficulties for the employees.

### Why does WPH matter?

A recent global survey carried out in 121 nations found that nearly a quarter (23%) of 74,000 respondents had faced some violence or harassment in their workplace (International Labour Organization (ILO), 2022). WPH has gained global currency and become a policy priority within the United Nations (UN) 2030 Agenda. For instance, Sustainable Development Goal # 8, which aims to promote decent work, has a specific target (8.8) of 'protecting labour rights and promoting safe and secure working environments for all workers' (UN, 2025, para 8). WPH is often costly and a significant management challenge for organizations in socioeconomic terms. For example, the New South Wales (NSW) Government (2024) in Australia estimated that workplace-related mental health issues cost businesses $39 billion annually because of decreased participation and productivity (para 5). On the one hand, Safe Work Australia (2022) puts the median cost associated with compensation for mental stress claims at $46,400. On the other hand, Deloitte (2019) estimated that strategic management interventions to address WPH could save Australian businesses $4.5 billion annually. Appropriate identification of WPH and subsequent management interventions geared toward mitigating or minimizing WPH in the workplace can yield double dividends for organizations and employees.

### How have policies and scholars approached WPH-related issues?

National policy bodies across developed economies have relied on survey instruments and online tools to capture WPH. For example, 'The European Framework for Psychosocial Risk Management at the Workplace' (PRIMA-EF) was developed in 2008 as a tool to advance WPH-related government policies and workplace practices (Leka et al., 2011). Safe Work Australia (2025) has developed 'The People at Work' – an online assessment tool that can help identify, assess, and take remedial actions on WPH.

In terms of scholarly outputs, high-impact journals, for example, ABDC-listed journals, have paid increasing attention to WPH-related topics. For example, the *Journal of Industrial Relations* published a Special Issue on – Workplace Psychosocial Hazards: Employment Relations Frameworks and Implications for Workers' Health and Safety – in 2024. In addition, the *Journal of Management and Organization* has published over 100 articles related to WPH in the past 3 years alone. Although WPH-related studies often emphasize the dynamic nature of the work, workers, and workplaces (Quinlan, 2023), in a recent scientometrics analysis of the WPH literature spanning the past three decades, Dhakal and Mahmood (2025) unraveled two clear trends. First, the scholarly research on WPH literature was found to be fragmented, with skewed importance given to established themes such as 'occupational health', 'psychosocial', and 'stress' at the expense of emerging topics such as 'policy assessment', 'sustainable development', and 'shift work' that are either associated with WPH or contribute toward (p. 84). Second, the authors also demonstrated that scholarly outputs on WPH

were being produced primarily in developed economies, particularly across research institutions in Scandinavian nations. Despite the rate of work-related deaths and depression being high across developing economies in the Asia Pacific because of poor working conditions (ILO, 2021), WPH-related research from the region remains underrepresented in the literature.

## Where next?

Given that risks associated with WPH in organizations are intensified due to the prevalence of mental health illness amongst the working-age population (Schulte et al., 2024) across developed and developing economies (Chopra, 2009), and particularly in the post-COVID-19 work environment (Robinson et al., 2022), future scholarly work the following three areas are recommended. First, existing frameworks to assess WPH are limited because they are narrowly focused on intra-organizational work conditions. It is necessary to develop and evaluate future frameworks that integrate intra- and extra-organizational factors, such as workers' socioeconomic circumstances, prevention and intervention-related regulations (see Quinlan, 2023), and, more importantly, their impacts on reducing WPH. Second, in the broader context of disruptive digital technologies such as artificial intelligence and associated technologies increasingly influencing and shaping the workplace, the impacts of these technologies, such as mental stress and burnout (see Kim and Lee, 2024), need scholarly attention from a multidisciplinary perspective. Finally, as multi-institutional collaborations in cross-cultural settings have the potential to strengthen scholarly work and policy outcomes, research partnerships between developed and developing economies (see Chisholm et al., 2023) can advance WPH-related studies.

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## Hot management trends: Artificial intelligence, business ecosystems, and organizational resilience

Waleed Omri

Understanding current tendencies in management science is fundamental for both researchers and practitioners as it provides interesting insights into advanced corporate practices that are dynamically modeling the business landscape. By critically analyzing the dynamic progresses in management science, academic research might contribute to the strengthening of the theoretical frameworks that improve decision-making processes in organizations, whereas practitioners can harness this knowledge to reinforce organizational ambidexterity and competitiveness in very fast-growing markets. In current times, the field of management has experienced a great many trends ranging from the transformative impact of artificial intelligence (AI) through business ecosystems to organizational resilience, among others. These trends bring several challenges and benefits that might shape the day-to-day life and operations of any organization. Trends can also be understood as vital strategies that companies must adopt and refine to transform the ways in which companies they operate to remain competitive in an ever-evolving business environment.

Several scholars consider AI as a pivotal trend in business management, recognizing its substantial impact on various aspects of an organization's daily life (Dissanayake, Manta, Iddagoda, & Palazzo, 2024; Ratten, 2024). The integration of AI tools might transform traditional management practices, optimize the process of decision-making, and enhance the effectiveness of the resource allocation (Ayoko, 2021; Jarrahi, 2018). The advent of AI technologies has radically changed the way managers work and make decisions, resulting in improved efficiency, developed productivity, and increased business outcomes. This technological shift equips managers with strong capabilities to predict market trends, analyze vast amounts of real-time data quickly, and optimize operations (Capatina, Kachour, Lichy, Micu, Micu, & Codignola, 2020). For instance, by using of machine learning algorithms and predictive analytics, AI generates valuable knowledge that empowers managers to make data-driven decisions. As a result, there is a requirement for effective strategies to manage this technological advancement more efficiently and effectively in order to build reliability of the organizational operations.

Business ecosystems have sure been a fundamental aspect of business strategy; nevertheless, their evolution has attained unrivaled levels of dynamism and complexity in today's market landscape. Business ecosystems basically refer to the network of organizations – comprising customers, suppliers, competitors, institutions, communities, government agencies, and other stakeholders involved in the delivery of a particular product or service (Clarysse, Wright, Bruneel, & Mahajan, 2014). This system dynamically interacts through an active synergy of competition and cooperation in such a way that they collaborate to create and deliver value and, thereby, construct a sustainable competitive edge for the organization (Jacobides, Cennamo, & Gawer, 2018; Yang, Zhu, Zhang, & Yao, 2024). The success of business ecosystems in fostering productive strategic activities is determined by a variety of factors, such as positive management culture within the organization, solid business network, availability of the source fundings, along with others. Moreover, these ecosystems can supply organization with a range of both tangible and intangible advantages including access to office space, skillful talents,

funding opportunities, mentorship, and community-building (Jacobides, Cennamo, & Gawer, 2018; Spigel, 2017). These benefits contribute to enhance the organization's capacity for innovation and entrepreneurial growth. As a result, comprehend, orchestrate, and sustain business ecosystems have become increasingly essential for any organization that intent to prosper and flourish in a volatile global marketplace.

Due to the change in corporate characteristics, there are contemporary organizational capabilities that have occurred. One of these phenomena could be organizational resilience, which basically refers to the capacity of an organization to effectively cope with internal change influenced simultaneously by external pressure (Hillmann & Guenther, 2021). This coupled capacity enables firms to reconcile their internal characteristics, processes, resources, and cultures with the growing demands of the external landscape, ensuring sustained competitiveness and added value. An organization's resilience must extend beyond simply adapting to short term changes; it should also include the ability to enact profound and continuing transformations in its business models following a crisis (Li et al., 2021). Organizations must develop and reinforce their resilience capabilities when it faces high levels of uncertainty particularly in dynamic markets (Kantur & İşeri-Say, 2012; Liang & Li, 2024). In doing so, organization position themselves not just to survive in a hostile environment but to emerge more resilient and more competitive in a fast-growing marketplace. This culture is important to ensure swift and strategic responses in times of crisis. As a result, it has become important for various companies to recognize resilience as a key strategic and organizational capability essential for seize opportunities, creating unique value, and stablishing sustainable competitive edge under any circumstances.

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## Artificial intelligence and data-driven decision-making in management

José Ramón Saura

In contemporary business environments, data have evolved from an input about the ongoing business into a relevant asset that supports sustainable advantage and more precise data-based strategic

decisions (Shepherd et al., 2024). Organizations are now embracing evidence-based approaches that reduce reliance on intuition, as artificial intelligence (AI) has assumed a central place in this process. The capacity of AI algorithms to sift through large volumes of corporate information with both speed and accuracy reveals patterns that conventional methods frequently overlook (Rana et al., 2024). Likewise, rather than viewing technology as a substitute for managerial expertise, enterprises' adoption complements the judgment of leaders and specialists alike, allowing them to anticipate risks, seize opportunities, and allocate resources with greater confidence (Zechiel et al., 2024).

In this context, a relevant aspect of this evolution lies in the integration of AI-driven insights into organizational processes. Rather than focusing on advanced analytics initiatives, companies benefit from embedding these capabilities within day-to-day planning and oversight structures (Lund et al., 2025). This validation process helps reconcile data findings with the cultural and operational realities of the firm, ensuring that AI enriches established workflows instead of provoking inefficient innovations (Mariani et al., 2023). Likewise, a balanced perspective on AI's potential safeguards against overreliance on technological solutions. While advanced models reveal correlations that may be invisible to traditional analytics, real-world application necessitates a nuanced approach that weighs these correlations against other qualitative factors. Managers remain indispensable for interpreting ambiguous signals and navigating external forces such as regulatory changes or shifts in consumer sentiment that may is not fully captured in historical data. This connection between algorithmic results and human insight sets the foundation for more robust, context-aware management strategies (Kolbjørnsrud et al., 2017).

Achieving these outcomes depends on a disciplined managerial framework articulating clear AI initiative objectives. Data should be gathered, stored, and analyzed according to protocols that align with organizational goals and external regulations, preserving both the quality of insights and stakeholder trust (Bedué & Fritzsche, 2022). An effective governance model confirms that databases, analytical tools, and security measures cohere with internal policies while meeting the standards established by industry authorities globally (Ratten et al., 2024). Likewise, managers need to foster a culture of learning in which critical thinking thrives. This means guiding employees to interpret results thoughtfully rather than accepting algorithmic outputs without question. The most reliable strategies arise when experienced professionals integrate domain knowledge with the evidence AI systems generate (Ratten, 2023). Authors such as Zong and Guan (2024) indicated that AI efficiency depends on human oversight and interpretation of the data offered by automated systems. If these activities are developed correctly, data-driven decision-making could become an essential tool for the management of any company (Brynjolfsson & McElheran, 2016).

At the same time, ethical considerations and data privacy concerns arise in any industry, particularly when enterprises apply AI to sensitive areas like consumer analytics and behavior (Saura et al., 2024) or internal performance (Mehta et al., 2025). Firms must remain vigilant against potential biases embedded in algorithms and remain proactive about compliance with privacy obligations, such as the EU General Data Protection Regulation (Blind et al., 2024) or the California Consumer Privacy Act (CCPA) (Baik, 2020). Ethical guardrails are not merely formalities; they strengthen credibility and encourage enduring relationships with consumers, policymakers, and regulators (Saura et al., 2022). Transparent communication regarding the scope and limitations of AI also fortifies this credibility, reassuring stakeholders that the technology exists to enhance human decision-making. Likewise, attention to organizational behavior ensures that AI-driven transformation remains sustainable in strategic management. Changes in processes or reporting structures can provoke resistance, so leaders should deliver clear messages about how data insights will influence day-to-day responsibilities as data-driven decision-making is set in the organization. Also, upskilling programs give employees the capacity to interpret findings and question anomalies. This mindset nurtures synergy among data scientists, operational managers, and senior executives, yielding a more holistic view of opportunities and risks.

Finally, data-driven management and decision-making, reinforced by AI tools, boots a decisive shift in how organizations steer their strategies in global markets. Combining robust governance,

ethical vigilance, and a commitment to informed judgment, enterprises can adopt the power of evidence-based insights without compromising the distinctive capabilities that human expertise can offer. Adopting this balanced outlook ensures that technology accelerates organizational progress and safeguards the essential value of sound, responsible leadership, as well as promotes clear pillars for data-driven decision-making in management.

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## Methodological trends in management research

Andrei A. Lux

Management research is in the midst of a methodological renaissance, driven by growing demand for more rigorous, reliable, and contextually relevant approaches. Historically, the field has relied on cross-sectional surveys that, while valuable, have often struggled to capture the intricate dynamics of organizational behavior. As these limitations have become more apparent, researchers have increasingly sought methodologies that offer greater precision and stronger causal inference. This

shift reflects a deeper recognition that understanding the complexities of managerial and organizational behavior requires more sophisticated approaches capable of capturing subtle dynamics and uncovering meaningful causal relationships.

Central to this evolution is a renewed emphasis on addressing long-standing challenges related to measurement and validity. These methodological advancements are not only technical upgrades; they represent a fundamental rethinking of research design that empowers scholars to generate insights with enhanced accuracy and reliability. As rapid technological, economic, and social changes reshape the management landscape, ongoing methodological innovation is essential to ensure that research remains both theoretically rigorous and practically relevant (Bridoux et al., 2024). By embracing this methodological renewal, the field is better positioned to produce evidence-based insights that deepen our understanding of organizational phenomena and enhance the role of research in shaping modern management practices (Fischer, 2025).

At the same time, long-standing research methods are under new scrutiny. Practices once taken for granted, such as an exclusive focus on *p*-value significance testing and an aversion to publishing replication studies, are now being questioned. In turn, scholars are being held to higher standards of rigor and transparency to improve research quality. One outcome of this heightened scrutiny is a stronger emphasis on replication to bolster confidence in research findings. Researchers are also broadening their methodological repertoire with experimental, longitudinal, and qualitative approaches quickly gaining esteem. Collectively, these changes reflect a concerted effort to improve the credibility, relevance, and impact of management research through enhanced methodologies.

The following sections highlight the major methodological trends reshaping management research today, including emerging research designs and contextual considerations.

## Emerging research designs

### *Experimental*

In recent years, experimental research designs have gained increased prominence in management and organization studies (e.g., Dadich et al., 2024). This shift reflects a growing emphasis on methodological rigor and causal inference in the field. Scholars are more frequently employing laboratory experiments and field experiments to test theoretical propositions under controlled conditions, thereby strengthening the internal validity of their findings. The rise of experimental methods marks a departure from an earlier reliance on solely observational or cross-sectional approaches, enabling researchers to isolate key variables and examine cause-and-effect relationships with greater confidence. This methodological shift has important implications for the field: it not only improves the robustness of evidence in management research but also encourages the development of precise theories that can be tested and refined through iterative experiments. However, experiments must carefully adhere to best practice designs to reap the benefits of this approach, and an alarming amount fall short (Amari et al., 2024).

### *Longitudinal*

Another notable trend is the growing use of longitudinal research designs to study organizational phenomena over time (Ployhart et al., 2025). Management researchers increasingly recognize that many processes – such as leadership development, organizational change, or team dynamics – unfold across weeks, months, or years, which cross-sectional studies cannot capture. By collecting and analyzing data at multiple time points, longitudinal studies provide insight into temporal patterns and the direction of change, offering a more comprehensive understanding of causality and development. This shift toward temporal analysis addresses the call for more dynamic perspectives in management research. The implications for the field are significant: longitudinal designs improve the ability to observe evolution and long-term effects, enhancing external validity and practical relevance, and help scholars build theories that account for change, adaptation, and processual dynamics in organizations.

### *Qualitative*

Qualitative research methods have also seen a resurgence in prominence (Pratt, 2025), reflecting a broader move toward methodological pluralism in management research. In the past, qualitative work was sometimes underrepresented in top journals, but the recent revival of qualitative methods has led to greater acceptance of case studies, interviews, ethnographies, and other inductive approaches as valuable contributions to management knowledge. This shift is driven by the understanding that qualitative methods can uncover rich, context-specific insights and deep mechanisms underlying organizational behavior – insights that might be missed by purely quantitative designs. The increasing prominence of qualitative research has important implications for the field: it broadens the range of questions that can be explored, enhances theory building by capturing complex social and organizational processes, and often complements quantitative and experimental findings.

## Contextual considerations

### *Less 'WEIRD' samples*

Management and organization research has historically relied heavily on samples drawn from Western, educated, industrialized, rich, and democratic (WEIRD) populations. There is an increasing recognition that such samples, while convenient and well-documented, do not fully represent the diversity of global workplaces and cultures. A notable trend is the deliberate move toward diversifying research contexts and participant pools beyond these WEIRD settings (Schimmelpfennig et al., 2025). By incorporating data from non-Western or underrepresented populations, researchers can enhance the external validity of their findings and develop theories that are more universally applicable. This shift toward less WEIRD samples underscores the importance of context in management scholarship and encourages authors to critically consider the generalizability of their work.

### *Tighter use of controls*

Another important methodological development involves the tighter and more thoughtful use of control variables in research designs (Hünermund et al., 2024). Traditionally, quantitative studies in management often included numerous control variables by default to isolate the effects of key predictors. However, recent methodological critiques have highlighted that an indiscriminate use of controls can obscure true relationships and introduce statistical biases. The emerging best practice is to include control variables only when they are theoretically justified and relevant to the research question, rather than as a routine precaution. This more disciplined approach to controls improves the clarity and interpretability of results, ensuring that reported findings more accurately reflect the phenomena under investigation and are less prone to spurious effects.

### *Theorized temporal aspects*

A further contextual consideration is the increased attention to temporal aspects of research design (Bansal et al., 2025). Management phenomena frequently unfold over and with time, yet past research often relied on cross-sectional snapshots that ignore the dynamic nature of organizational processes. Contemporary scholarship emphasizes that researchers should explicitly theorize and incorporate time into their study designs. This might involve using longitudinal data, multiple waves of data collection, or clearly defining the time lags between cause and effect in a model. By aligning the temporal design with theoretical arguments – for example, specifying when effects are expected to occur or how long they endure – studies can yield stronger causal inferences. Better theorized temporal frameworks also make research more relevant to practice, as they reflect the real-time evolution of management and organizational dynamics.

## Conclusion

The methodological trends unfolding today herald a transformative future for management research. By embracing rigorous experimental, longitudinal, and qualitative designs and addressing contextual limitations, scholars can pave the way for more meaningful insights and robust theories. This evolution will strengthen the foundation of evidence-based practice and inspire new confidence in our collective ability to navigate and shape the complexities of modern management. The future of management research is bright indeed, and full of promise.

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## In pursuit of supply chain sustainability and resilience amidst crises

Aymen Sajjad

The topic of supply chain sustainability and resilience has garnered significant interest from both scholars and practitioners, particularly during times of crisis. Supply chain sustainability incorporates economic, social, and environmental criteria into supply chain management practices and decision-making processes. At the same time, while global supply chain operations have become increasingly complex and interdependent, the ability of a supply chain to survive, adapt, and restore normal operations (Gaonkar & Viswanadham, 2007) is paramount.

Global supply chains serve as the central nervous system for economic growth, technological advancement, and societal development (Ivanov, 2020). However, crises and disruptions caused by economic downturns, geopolitical tensions, natural disasters, and global health emergencies have significantly impacted supply chain operations and sustainability performance. In light of this, a scholarly consensus is building around the premise that the conventional supply chain models lack flexibility, agility, and resilience to respond effectively to demand and supply shocks and promote global supply chain sustainability. Thus, it is imperative to ensure that modern supply chains not only operate in the most efficient, effective, and sustainable manner but are also resilient enough to tackle external shocks and unplanned disruptions.

Emerging scholarship suggests diverse approaches to promote supply chain sustainability and resilience (e.g., Cherrafi et al., 2022; El-Baz & Ruel, 2024; Farrukh & Sajjad, 2024; Sajjad, 2021; Sarkis, 2020), particularly in times of crisis. However, advanced digital technologies, circular economy, and

stakeholder collaboration are the most widely discussed strategies for realizing supply chain sustainability and resilience. First, companies across supply chain networks must embrace advanced digital technologies, artificial intelligence, the Internet of things, and blockchains. Second, promoting circular business models across supply chain operations is imperative to minimize waste and pollution and enhance product circularity. Incorporating circularity in supply chain operations through regenerative practices such as maintenance, reuse, recycling and upcycling, refurbishment, remanufacture, and composting not only allows companies to strengthen crisis response capability and resilience, but also helps reduce excessive reliance on natural resources. Third, companies must reinforce collaborative relationships and knowledge sharing with both traditional supply chain actors and other relevant stakeholders, including policymakers, nongovernmental organizations, regulators, and communities, to mitigate supply chain risks, enhance resilience, and achieve sustainable business outcomes.

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## Digitalization, workforce evolution, sustainability, and economic realities

Ana Lisboa

In the ever-changing landscape of management, transformative alterations are challenging the way organizations operate, create, and deliver value to their stakeholders. Technological advancements, shifting workforce dynamics, global sustainability concerns, and new economic realities are issues that are shaping the future of the field and cannot be disregarded. This article highlights key management trends that organizations should consider and explores how management research can help navigating these transformations.

First, the digitalization phenomenon. While digitalization is not a new phenomenon, as businesses navigate the new wave of Industry 5.0, its widespread and emergence of new technologies, tools, techniques, and business models bring novel light to the management field (Calderon-Monge & Ribeiro-Soriano, 2024). Embraced by some organizations at first, the environmental shock and restrictions implemented in some countries during the pandemic forced even the more conservative firms to go digital. Further, the technological disruption and adoption of AI, automation, and big data analytics is reshaping decision-making processes and operational strategies. The use of AI for optimizing decision-making; the incorporation of machine learning to improve portfolio management or personalize consumer approaches; the automation of routine tasks; or the leverage of big data to obtain insights into market trends and proactively adjust strategies are but some examples of actions taken by organizations in this regard (Mathew, Brintha & Jappes, 2023). This management trend leads organizations to consider investing in upskilling people to work effectively with

AI tools and properly managing human-AI collaboration while addressing ethical concerns, such as data privacy, or reinforcing cybersecurity. The trend also unveils interesting research paths, such as investigating human-AI collaboration models, effective ways for integrating automation in organizations' operations, the ethical implications of these actions, and the long-term impact of the use of these tools on leadership and organizational structures.

Second, workforce evolution. The rise of remote and hybrid work models, the promotion of a more inclusive, diversified and agile work environment, and the focus on employee well-being and mental health are issues that are on the rise. Organizations are now focusing on flexibility and autonomy, allowing employees to choose when and where they work, investing in digital collaboration tools, redefining performance metrics and changing toward decentralized, cross-functional teams (Toscano, González-Romá & Zappalà, 2024). These cross-functional teams are becoming more diverse, and inclusive, so as to ensure representation and inclusivity in decision-making, and foster innovation (Ferraro, Hemsley & Sands, 2023). Such alterations in the work setting bring new needs and challenges to be addressed. On the one hand, new leadership styles – more agile and adaptive ones – are required to manage distributed and diverse teams effectively (Rialti & Filieri, 2024). On the other hand, the growing blurred lines between work and life, and awareness that employee well-being is directly linked to productivity, engagement, and retention, makes employee well-being not a mere social responsibility initiative, but a business priority (Hill et al., 2024). This management trend highlights the relevance of studies that explore the psychological and performance impact of remote and hybrid work, works that assess the effectiveness of different agile leadership styles in various organizational settings, research that investigates the relationship between employee well-being and diversity and inclusive initiatives on productivity, performance, innovation, and employee engagement.

Third, sustainability concerns. Even though sustainability is not a new trend, its prominence became clearer in recent times, given the shift from being a corporate responsibility initiative to becoming a core business strategy (Hristov & Searcy, 2025). Stakeholders increasingly hold organizations accountable for their societal impact, demanding meaningful actions of organizations on sustainability issues. Accordingly, organizations are progressively embedding environmental, social, and governance principles into their decision-making and business strategies (Huang, Surface & Zhang, 2022). Research-wise, management theories should incorporate sustainability as a core strategic factor; studies can identify strategies that successfully balance profitability with environmental and social responsibility, explore how stakeholders value sustainability efforts and their influence on purchasing and investment decisions and short-term and long-term benefits of the initiatives.

Lastly, organizations today deal with new economic realities, with the rising importance of emerging markets and their role in the new economic power dynamics, the multiple geopolitical tensions, and the nationalistic and anti-globalization movements. The growing clout of Asia, Africa, and Latin America economies contributes to a more multipolar global economy and puts the old economic hierarchy to the test (Jenkins, 2022; Nachum et al., 2022). The increasing geopolitical tensions and inherent lower stability of the global business environment evidences the importance of geopolitics and organizational strategic responses with this in mind (Kim, Kwak & Park, 2025). Additionally, the retreat from hyper-globalization, along with the advent of nationalistic movements changes the existing business setting and pressures to consider operational and strategic alternatives (Luo & Tung, 2025; Okonjo-Iweala, 2023). In what concerns this trend, research can help understanding how businesses can navigate, adapt, and lead in this rapidly transforming global and multipolar environment, namely investigate the influence of multipolar strategic management decisions, the need and effectiveness of reshaping organizational structures and business models, the management of supply chain and operations amid geopolitical disruptions or examine innovation and knowledge management in emerging markets.

Identifying and understanding key management trends is crucial for organizations aiming to remain competitive and for researchers seeking to explore evolving business dynamics. These trends

are reshaping business settings and operations, and management research has a critical role in providing empirical evidence, refining theoretical models, and developing actionable solutions.

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# The future of 4D printed food adoption: Implications for management

Clare D'Souza

## Introduction

Food printing technology is poised to overcome several inherent limitations of traditional food processing methods, particularly addressing challenges that have been difficult to resolve with conventional techniques. While offering numerous benefits, such as customization and sustainability, food printing also faces its own set of limitations. So, what does the future hold for these foods?

Food innovation has been evolving and has moved from 2D, 3D, 4D, and now 5D printing methods and is emerging rapidly due to the heightened living standards and demand for innovative food consumption (Wang et al., 2024). This process of 4D printed foods has extended to the dimension of time, allowing printed food to change shape, texture, or properties after printing by responding to an external stimuli such as temperature, moisture, pH changes, light or magnetic fields (Chakravorty & Das, 2024). While 4D printing is not new, it is slowly gaining sufficient traction.

This innovative approach toward 3D and 4D printed food has the potential to enhance the **sustainability and consumer-friendliness** of food value chains by enabling **on-demand food production**, broadening the **range of edible raw materials, reducing food waste** through more efficient use of

ingredients, and **facilitating personalized and automated food customization** to meet individual dietary preferences and nutritional needs (Gholamipur-Shirazi et al., 2020; Nachal et al., 2019; Portanguen et al., 2019).

Even though these foods can show sustainability benefits like waste reduction, packaging improvements, and prolonged shelf-life, yet there are growing health concerns about the safety of new edible polymers. Another issue is trying to convince consumers regarding the skepticism of these foods. Additionally, concerns about trying new foods such as 3D or for that matter now 4D printed foods coupled with hesitations toward novel technologies can contribute to consumer reluctance. One is fear of the unknown, anxiety regarding the safety and quality of 3D/4D printed foods, and a general aversion to unconventional food production methods all contribute to limiting consumption among certain segments of the population (D'Souza et al., 2024).

The question remains whether their strong sensory capabilities, which provide hedonic value and offer a unique and engaging experience, will lead to increased customer adoption. For instance, 4D printing can elevate the sensory experience, making it more interactive and exciting. This hedonic appeal can attract consumers seeking novelty, indulgence, and personalized dining experiences. However, despite sensory quality being considered the prime factor in food acceptance (Costell et al., 2010). Food adoption is highly dependent on what consumers need and the degree of satisfaction it brings. Costell et al. (2010) are of the opinion that several critical factors play a role in shaping consumer responses. **One important factor is how consumers would perceive the sensory characteristics of a given food.** The variation in these perceived sensory attributes directly influences how consumers evaluate and respond to the food. For example, Costell et al. suggest c**onsumer habits, attitudes, and beliefs also significantly shape hedonic ratings and purchase intentions.** In addition, **hedonic ratings are influenced by the expectations consumers form based on different types of information provided about the product.** Based on this discourse, managers will need to raise consumer awareness and educate them about 4D foods to improve their attitudes, beliefs, and adoption of the 4D technology.

**This sensory appeal is also evident in s**everal industries, including **automobile, aerospace,** and more recently, the **food industry**, which have utilized this technology to manufacture **complex and intricate components** required for their respective sectors (Mantihal et al., 2020). **Given the hedonic influence of 4D printed foods, many restaurants as well as Michelin star restaurants have succeeded in using 3D printed foods** (Lee et al., 2021). 4D foods could transform hospitality into a more experiential, personalized, sustainable, and operationally efficient industry – but adoption also requires investment, training, and careful risk management that needs consideration by managers.

Apart from its novelty, it can be perceived as beneficial for many consumers. Since 4D printed foods have superseded 3D printed foods, as they fall short of visual appeal and is attracting target consumers, more particularly dysphagia patients, whereby 4D printing provides dynamic changes in color, high quality protein and highly involving gastronomic experiences for individuals with dysphagia (Su, Wu et al., 2025). However, for it to be adopted as a mass production technology, further research and efforts are needed to address concerns about safety, quality, and consumer acceptance. With continued investment, it has the potential to transform the future of food production (Le-Bail et al., 2020).

## Managerial implications

The emergence of 4D printed food could lead to new market opportunities and business models, such as personalized food delivery or on-demand food printing services. Managers will need to stay agile, adapting their strategies to stay ahead of evolving consumer needs and technological advancements. Overall, the adoption of 4D printed food presents both challenges and opportunities for managers. Those managers who can find solutions to address the complexities of consumer acceptance, technological integration, and market dynamics will be well-positioned to capitalize on the

future of this innovative food production technology. In conclusion, 3D/4D printing offers innovative opportunities for the food industry and exciting new consumer experiences.

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**Cite this article:** Ratten, V. *et al*. (2025). Hot management trends. *Journal of Management & Organization*, 31(2), 420–442. https://doi.org/10.1017/jmo.2025.6