Sustainability, Artificial Intelligence and Human Capital: Converging Paths for the Future of Management Control Systems

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Abstract
Sustainability, artificial intelligence, and human capital are becoming increasingly important for the evolution of management control systems. Sustainability invites organisations to go beyond a traditional view of performance, by including environmental and social aspects together with economic results. In parallel, artificial intelligence, especially in its generative forms, is progressively changing business processes and decision-making practices, also introducing new challenges in terms of ethics and regulation. In this scenario, human capital represents a fundamental connection point: it is through people's competences and critical awareness that companies can integrate technological innovation with sustainability goals. Within this evolving landscape, management control systems are not only challenged to adapt, but are also called to support the integration of these forces in a coherent manner. This Special Issue of Management Control, developed from the sessions dedicated to the journal at the 2024 SIDREA National Conference, collects contributions that explore how these three elements, sometimes in combination and sometimes separately, are influencing the transformation of management control systems.

Keywords: Sustainability, Artificial intelligence, Digital transformation, Human capital, Management control systems, Evolution

1. Introduction

The 2024 SIDREA National Conference offered a valuable opportunity for scholars and professionals to reflect on the growing influence of sustainable development, artificial intelligence, and human capital on companies, their ecosystems, and the accounting profession.

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Management Control (ISSN 2239-0391, ISSNe 2239-4397), 2025, 1 – Special Issue
Doi: 10.3280/MACO2025-001-S1001

These three dimensions are no longer isolated forces, but rather intertwined trajectories of transformation that challenge established paradigms and call for a reconfiguration of both corporate practices and academic frameworks.

Sustainable development has increasingly emerged as a strategic priority for both national governments and supranational bodies, especially following the launch of the United Nations' 2030 Agenda and the European Green Deal. These initiatives have prompted a rethinking of performance that goes beyond purely financial indicators to embrace social and environmental dimensions, encouraging organisations to adopt more sustainable business models. However, this transition is anything but linear: it is still unfolding and marked by tensions, compromises, and the growing need for management tools capable of dealing with its intrinsic complexity.

At the same time, the rapid development of artificial intelligence, particularly in its generative forms, is profoundly transforming industries, professional roles, and decision-making processes. Its ability to learn, produce content, and interact through natural language is enabling new forms of automation, while also raising pressing ethical and regulatory challenges. Issues such as algorithmic opacity, data governance, and professional displacement are increasingly at the heart of the debate. In this regard, the recent approval of the Artificial Intelligence Act by the European Parliament highlights the urgency of ensuring that such technologies are safe and aligned with fundamental rights and values.

Within this evolving scenario, human capital plays a pivotal role as the point of convergence between sustainability objectives and technological innovation. On the one hand, sustainability requires people capable of designing, implementing, and managing processes that reduce environmental and social impacts. Therefore, new competences, mindsets, and values are needed. On the other hand, artificial intelligence, especially its generative forms, creates a new space for human-machine collaboration, where professional judgement and ethical aspects remain fundamental. As such, human capital is not only challenged to adapt, but also to guide these transformations: to critically engage with artificial intelligence and to ensure that technological progress supports, rather than undermines, the broader goals of sustainability. Therefore, it is precisely through the development and mobilisation of human capital that the synergies and tensions between these two major forces can be navigated.

It is in this context that the parallel sessions dedicated to the Management Control journal, held within the SIDREA National Conference, invited scholars to contribute to a deeper understanding of how management

control systems and the professions that support them are evolving in response to these challenges.

This Special Issue was conceived along these lines, aiming to capture and extend the debate initiated during the SIDREA National Conference. Its thematic focus is fully aligned with the editorial identity of the Management Control journal, which has long addressed topics related to sustainability-oriented control systems (Demartini et al., 2014; Ciccola et al., 2022; D'Onza, 2022; Buonasera et al., 2024), technological innovation in control practices (Chiucchi et al., 2012; Cesaroni and Consoli, 2015; Marchi, 2015; Montemari and Nielsen, 2021), and the evolving role of professionals in the field (Ascani et al., 2021; Ianni et al., 2022; Culasso et al., 2023). The papers included here contribute to this ongoing conversation, while also opening new avenues of inquiry at the intersection of these critical domains. What follows is a synthesis of the contributions presented in this issue.

2. Overview of the contributions

The issue opens with two contributions that investigate the intersection between artificial intelligence and human capital.

The article by Broccardo, Ballesio, Giordino and Giacosa explores the role of tools powered by artificial intelligence in supporting the management control systems of small and medium-sized enterprises. Adopting the lens of the Social Construction of Technology Theory, the authors combine a thematic analysis of nearly 300 ChatGPT-generated answers to performance ratio interpretations from 37 Italian small and medium-sized enterprises with 15 semi-structured interviews involving entrepreneurs and academics. The findings reveal two contrasting interpretative frames. On the one hand, responses generated by artificial intelligence are generally perceived as correct and comprehensive, helping formalize management control practices. On the other hand, issues related to verbosity, inconsistency, and limited conciseness raise concerns about the usability and trust in such tools, especially among non-expert users. Although stabilization of these tools has not yet occurred, ongoing technological improvements, such as the release of GPT-4o, suggest growing potential for artificial intelligence to reshape how small and medium-sized enterprises approach management control.

The study by Sentuti, Sgrò and Cesaroni offers a contribution to the growing debate on how artificial intelligence is reshaping the accounting

profession by shedding light on the largely overlooked experience of young Chartered Accountants. Through a qualitative exploration based on interviews with early-career Italian Chartered Accountants, the paper identifies two distinct approaches to artificial intelligence adoption: a horizontal approach, oriented toward efficiency and experimentation in routine tasks, and a vertical approach, involving the strategic use of artificial intelligence in high-value activities such as forecasting and market analysis. The study contrasts these two approaches across several dimensions (e.g., training, skills, patterns of use, perceived benefits, risks, and implications for client relationships), highlighting both shared foundations and key differences. By contrasting these two paths, the paper introduces a dual interpretative lens (functional and evolutionary) that allows for a nuanced understanding of artificial intelligence integration not just as a tool, but as a driver of professional identity transformation.

A broader perspective on the ongoing digital transformation of management control systems is adopted in the following three papers.

The contribution by Bassani, Gitto and Servalli offers a synthesis of 25 literature reviews focused on the adoption and impact of digital technologies, especially artificial intelligence, within the broad field of Economia Aziendale. Acknowledging the fragmentation of prior research across distinct domains within the accounting field (e.g., financial accounting, management accounting, auditing, taxation, and accounting education), the authors consolidate findings to provide a comprehensive framework that maps both the antecedents and the effects of digital technologies. The analysis reveals notable areas of convergence that emerge across the 25 literature reviews analyzed, including shared concerns about skills gaps and data quality, alongside divergences in terminology, theoretical engagement, and methodological approaches. Importantly, the review culminates in the articulation of seven forward-looking research directions, which call for deeper theoretical development, more practice-oriented empirical investigations and enhanced interdisciplinary collaboration. This integrative effort seeks to inform future research agendas and support more cohesive scholarly dialogue on digital transformation in Economia Aziendale.

The article by Boccali and Visani explores how business analytics can be embedded into management control systems, emphasizing the institutional rather than purely technical enablers of adoption. Using an action research approach within an Italian manufacturing company and drawing on the extended institutional framework by terBogt and Scapens, the authors investigate how business analytics tools were developed to support a new pricing system. The study reveals that integration of business analytics into

management control systems hinges on the presence of leaders who actively support the transition from an experience-based model to a data-driven approach, organizational readiness for innovation, internal conflicts that challenge existing routines, and the alignment between new business analytics tools and the overall business strategy. This contribution by Boccali and Visani highlights the dynamic and negotiated nature of business analytics adoption, offering theoretical insights into the institutional conditions that foster transformation for organizations seeking to move from intuition-based to data-driven decision-making.

The paper by Tafuro, Colamartino, Dammaco and Toma focuses on the adoption of business intelligence tools to support and innovate control systems in small and medium-sized enterprises. In particular, the study offers a bibliometric literature review that systematically examines 141 papers published between 2013 and 2023. The analysis reveals that academic interest in business intelligence and control systems in small and medium-sized enterprises is growing; however, most publications appear in conference proceedings rather than in high-impact journals, indicating a field that is still in a phase of conceptual development and consolidation. Furthermore, techniques such as data mining, machine learning, and cloud-based business intelligence are frequently mentioned, reflecting a broader shift toward data-driven decision-making. The authors argue that small and medium-sized enterprises should not adopt business intelligence tools in a piecemeal fashion, but rather through a holistic approach that draws on insights from different areas of control (management control, risk management, auditing).

The next two papers address the theme of sustainability, placing particular emphasis on the central role played by human capital in shaping sustainable practices.

The paper by Bartolacci, Del Gobbo and Soverchia investigates how and why family businesses adopt sustainable development practices, with a specific focus on the long-term family involvement dynamics that shape such adoption. Through a single in-depth case study of a large Italian family-owned company in the furniture industry, the study reveals that sustainability is not a monolithic or static goal, but, rather, it emerges as a process shaped by intergenerational dialogue and evolving mental models. The older generation prioritizes long-term economic sustainability and compliance-oriented approaches, while the younger generation envisions a broader and more structured role for sustainability, increasingly tied to reputational benefits of adopting and communicating sustainable practices. The findings suggest that the interplay between generational perspectives may act as

both an enabler and a tension point in driving sustainable development within family firms.

The paper by Bivona and Scirè makes a contribution to the evolving discourse on performance management in turbulent environments by introducing the Dynamic Balanced Scorecard for Sustainability. In a context where increasing environmental dynamism has amplified unintended employee behaviors, such as quiet quitting and the great resignation, the study challenges the adequacy of existing management control systems to capture and respond to such complexity. While the Sustainability Balanced Scorecard has offered valuable insights for integrating sustainability into strategic control, its reliance on static and linear assumptions limits its responsiveness to dynamic behavioral shifts within organizations. To overcome these limitations, the authors propose integrating the Sustainability Balanced Scorecard with the Dynamic Performance Management perspective. The resulting Dynamic Balanced Scorecard for Sustainability framework enables organizations to detect, monitor, and manage unintended employee behaviors by prioritizing non-financial indicators and dynamic cause-and-effect relationships. Thus, the framework equips decision-makers with a more comprehensive tool to enhance organizational resilience, sustainability and adaptability in volatile contexts.

Finally, the paper by Gotti, Morrone, Bianchi and Ferri, which places human capital at centre of attention, investigates the impact of intellectual capital on the profitability of innovative start-ups in Italy, while also analysing the moderating role of corporate governance mechanisms. More specifically, the authors conduct a panel data analysis of 1.152 innovative start-ups over their first three years of activity, using the Value Added Intellectual Coefficient to measure intellectual capital efficiency, ROA and ROE as proxies for financial performance, and directors' age, gender diversity, and managerial ownership as indicators of corporate governance. Findings confirm that intellectual capital positively influences profitability and that specific governance characteristics moderate this relationship: while board gender diversity and directors' age strengthen the positive impact of intellectual capital on performance, managerial ownership appears to hinder its effective exploitation. These results offer valuable insights into how intangible assets and governance interact in early-stage firms and provide guidance for founders and policymakers seeking to enhance the short-term viability and long-term competitiveness of start-ups.

In closing, we hope that the reader will find the papers included here of value. We would like to thank all authors for their contributions and the reviewers for their time and efforts in reviewing the manuscripts. My special

thanks go to the Editor-in-Chief, Professor Giuseppe D'Onza, for his valuable guidance during the preparation of this editorial, and to Alessandra Goti, for her excellent, conscientious editorial assistance.

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