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# How artificial intelligence can support the sustainable development of organizations? Findings from a literature review

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## Abstract

This article explores the intersection of artificial intelligence (AI) and sustainable development (SD) within organizational contexts. As sustainability becomes an increasingly critical imperative in response to global environmental, social, and economic challenges, organizations are turning to AI as a transformative tool to enhance their sustainability performance. Drawing from a diverse range of scholarly sources, this study investigates how AI technologies contribute to the three dimensions of sustainability - environmental, social, and economic - while aligning with the Sustainable Development Goals (SDGs). The research employs a qualitative content analysis method and is guided by three research questions focused on the role of AI in advancing sustainability objectives.

**Keywords**: artificial intelligence, sustainable development, organizational sustainability, sustainable development goals.

## Introduction

The imperative of sustainable development (SD) has intensified over the past decade, compelling organizations to confront complex and interrelated challenges such as climate change, ecosystem degradation, resource scarcity, and widening socio-economic inequalities. These challenges have underscored the inadequacy of conventional business models and have prompted a global shift toward more responsible and forward-looking organizational strategies. Consequently, sustainability is no longer a peripheral concern but a core strategic priority across industries and sectors (Ekins & Zenghelis, 2021; Mensah, 2019). However, achieving SD in practice remains difficult, given the multidimensional and often conflicting demands of environmental, social, and economic goals.

Amid this landscape, artificial intelligence (AI) is emerging as a transformative force with the potential to accelerate the transition toward sustainability. AI comprises a broad set of technologies - including machine learning, deep learning, and natural language processing - that enable systems to autonomously analyze vast datasets, generate insights, and optimize complex processes (Zhang & Goyal, 2024; Rashid & Kausik, 2024). When effectively integrated into organizational contexts, these capabilities can drive substantial improvements in sustainability performance. For example, AI can enhance energy efficiency, minimize waste, optimize supply chains, predict environmental risks, and enable real-time monitoring of sustainability indicators (Jankovic & Curovic, 2023; Olawade et al., 2024). More importantly, AI can support the design and implementation of data-driven strategies that align day-to-day operations with long-term sustainability objectives.

Despite its promise, the intersection of AI and organizational sustainability is still under-explored and insufficiently theorized. Much of the existing literature is fragmented, focusing on sector-specific implementations or isolated use cases (Dhiman et al., 2024; Yigitcanlar et al., 2021). As a result, there is limited understanding of how AI technologies are being integrated holistically within organizations to support their SD agendas. A more comprehensive perspective is needed to synthesize insights across fields and to assess both the opportunities and limitations of AI in this context.

To address the gap in understanding how artificial intelligence (AI) intersects with sustainable development (SD) at the organizational level, this study explores the role of AI as a strategic enabler across key sustainability dimensions. Rather than conducting a systematic literature review, the study adopts an integrative, narrative approach - synthesizing insights from a broad range of academic and practitioner sources to examine how AI technologies are operationalized to advance sustainability objectives.

The study is structured around the widely accepted three-pillar model of sustainability - environmental integrity, social equity, and economic viability - and investigates the concrete applications and strategic implications of AI within each domain. The analysis is guided by one overarching research question (RQ) and three supporting sub-questions (Sub-RQs):

**Overarching RQ:**
*How is artificial intelligence being leveraged by organizations to advance sustainable development across environmental, social, and economic dimensions?*

***Sub-RQs:***

1. *In what ways do AI technologies contribute to environmental sustainability practices within organizations?*

2. *How are AI applications shaping social sustainability outcomes, such as inclusion, well-being, and equity?*

3. *What role does AI play in promoting economic sustainability, including innovation, resilience, and responsible value creation?*

This framing enables a more cohesive analysis while allowing for a detailed examination of the distinct, yet interrelated, roles that AI can play in sustainable development efforts across organizational contexts.

The article is structured into five main sections. Following the introduction, the second section presents the material and method, which outlines the research approach and the data sources used in the study. This is followed by a literature review, encompassing three key components: a theoretical overview of organizational SD, an outline of AI technologies, and an examination of the existing applications of AI in the context of organizational sustainability. The fourth section provides a discussion of the findings. The article concludes with a summary.

## Material and methods

Although this study does not adopt a systematic literature review methodology, it follows a structured and transparent narrative review approach to ensure academic rigor and replicability. The research is grounded in a qualitative content analysis of scholarly literature that explores the intersection of AI and organizational SD, with specific attention to environmental, social, and economic dimensions.

The literature search was conducted using two major academic databases: Scopus and Web of Science, which are widely recognized for their comprehensive coverage of peer-reviewed research across disciplines. To identify relevant studies, the author used a combination of keywords that reflected the scope of the research. These included: "artificial intelligence", "organizational sustainability", "environmental sustainability", "social sustainability", and "economic sustainability". Boolean operators (e.g., AND, OR) were applied to refine the search and capture studies that linked AI applications explicitly with one or more dimensions of sustainability in organizational contexts.

The selection process prioritized academic journal articles published in English between 2015 and 2025. While no rigid inclusion and exclusion criteria were applied as in a systematic review, only studies that met the following narrative relevance criteria were included:

- they addressed AI implementation or integration within organizational settings,
- they presented empirical evidence, case studies, or conceptual models related to sustainability outcomes, and,
- they offered insight into how AI technologies or methods were operationalized in support of sustainable practices.

The final body of literature included a diverse set of studies spanning sectors such as energy management, smart manufacturing, sustainable agriculture, waste reduction, workforce management, and financial decision-making. These sources were analyzed using a qualitative content analysis approach to identify recurring themes, patterns, and mechanisms through which AI contributes to sustainability goals. The analysis emphasized both the technological aspects of AI and their practical implications in real-world organizational settings.

While a systematic review was initially considered, it was ultimately not pursued due to the heterogeneous and still-emerging nature of the literature at the intersection of AI and organizational sustainability. Many relevant contributions are spread across various disciplines, industries, and methodological approaches, making it difficult to capture the full scope of current developments through rigid procedural criteria. The narrative review format was therefore deemed more appropriate for the goals of this study, as it allowed for greater flexibility in synthesizing diverse sources and highlighting cross-sectoral insights, while still ensuring academic transparency and methodological clarity.

## Literature review

SD has evolved into a central organizing principle for policy and business strategy in the 21st century. Since its political articulation in the Brundtland Report (1987) - which defined SD as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" - the concept has undergone significant theoretical refinement and practical adaptation. At its core, SD encompasses the interdependence of three domains: environmental integrity, social equity, and economic viability (Purvis et al., 2019).

In academic and organizational discourse, this triadic model is commonly represented using the "three-pillar" structure, an equilateral triangle, or a Venn diagram of overlapping circles. These models emphasize that sustainability cannot be achieved through isolated improvements in one domain while neglecting the others. Rather, the principle of balance is critical - requiring systemic thinking and integrated action at all levels of governance, including within individual organizations (Glass & Newig, 2019).

To translate this abstract vision into measurable action, the United Nations launched the Sustainable Development Goals (SDGs) in 2015 as part of the 2030 Agenda. The SDGs consist of 17 goals and 169 targets, providing a comprehensive blueprint for addressing global development challenges. Although initially conceived for national-level implementation, the SDGs have rapidly been adopted by corporations and non-governmental organizations as a strategic sustainability framework (Hák et al., 2016; Arora-Jonsson, 2023).

The relevance of the SDGs to organizational practice lies in their breadth. They cover environmental concerns such as clean energy (SDG 7), climate action (SDG 13), and biodiversity (SDGs 14 and 15); social dimensions including education (SDG 4), gender equality (SDG 5), and decent work (SDG 8); and economic goals focused on innovation, infrastructure, and responsible consumption (SDGs 9 and 12). This universality enables organizations across sectors to align their strategies with specific SDGs that match their core operations and societal impact.

However, the literature highlights several critical gaps. First, although many corporations claim alignment with the SDGs, evidence of meaningful implementation remains limited (van der Waal & Thijssens, 2020). Second, SD is often approached through a compliance or reporting lens - rather than as a transformative, system-wide shift in business models, value chains, and innovation practices (Evans et al., 2020). Third, there is insufficient integration of cross-cutting goals such as SDG 17 (partnerships for the goals), which are vital for collective action in sustainability.

In response to these challenges, AI has emerged as a powerful enabler of SD at the organizational level. AI technologies - including machine learning, natural language processing, and computer vision - offer unprecedented capabilities to gather, process, and interpret complex datasets, enabling organizations to make evidence-based decisions aligned with sustainability goals. AI can automate resource optimization, track progress against SDG metrics in real time, and identify previously hidden risks or inefficiencies in value chains.

Integrating AI into sustainability strategy allows organizations to shift from reactive compliance toward proactive, scalable, and dynamic sustainability practices. As such, the intersection of AI and SD presents a timely and underexplored opportunity for innovation - not merely in technology, but in the fundamental rethinking of how sustainability is achieved in business operations.

To explore this intersection in depth, the literature review will be structured into three thematic sections, each aligned with a core pillar of SD: (1) environmental sustainability and AI integration, (2) social sustainability and AI integration, and (3) economic sustainability and AI Integration. This structure enables a targeted analysis of how AI contributes to each dimension of organizational sustainability, while also identifying shared challenges and emerging opportunities across sectors.

**Environmental sustainability and AI integration**

Environmental sustainability represents one of the most mature areas of integration between AI and SD practices. A growing body of literature demonstrates AI's transformative potential in enhancing organizational environmental performance, particularly through data-driven approaches to resource efficiency, carbon footprint reduction, and ecosystem monitoring.

AI technologies - particularly machine learning, deep learning, and computer vision - enable organizations to extract actionable insights from complex environmental data. In industrial contexts, AI-powered predictive analytics are widely used to optimize energy use by adjusting operational loads and maintenance schedules in response to real-time data streams (Jankovic & Curovic, 2023). These smart systems reduce

wasteful energy consumption and greenhouse gas (GHG) emissions, particularly in energy-intensive sectors such as manufacturing, transportation, and construction. In parallel, smart building technologies leverage AI algorithms to manage lighting, heating, and ventilation systems with adaptive control logic, improving energy efficiency and reducing emissions at the facility level (Halhoul Merabet et al.2021).

In the energy sector, AI contributes to the decarbonization of power systems by enhancing the reliability and integration of renewable energy sources. Advanced machine learning models forecast wind and solar energy production with high accuracy, mitigating the intermittency challenges that limit renewable adoption (Malakouti et al., 2024). Furthermore, AI supports the development of smart grids by analyzing consumption patterns, predicting demand surges, and dynamically allocating energy resources. Such capabilities facilitate the transition toward decentralized and resilient energy infrastructures, which are essential for achieving net-zero targets (Wang et al., 2025).

Agriculture is another domain where AI contributes significantly to environmental sustainability. Precision agriculture technologies, supported by AI, combine IoT sensors, satellite imagery, and machine learning algorithms to tailor irrigation, fertilization, and pest control strategies based on site-specific data. These interventions reduce the overuse of water, fertilizers, and agrochemicals, thereby minimizing environmental degradation while maintaining high crop yields (Kumar et al., 2024). Such AI-enabled agricultural systems promote sustainable land use practices, mitigate soil and water pollution, and support biodiversity conservation in alignment with SDG 15.

In terms of environmental monitoring, AI-enabled remote sensing and image recognition technologies are increasingly used to track deforestation, illegal mining, glacier retreat, marine pollution, and other ecological disturbances (Ramachandran et al., 2024). By processing vast amounts of satellite and drone imagery, AI tools offer near-real-time surveillance capabilities, enabling businesses, governments, and NGOs to make faster and more informed decisions. These insights are critical not only for compliance and reporting but also for proactive conservation efforts and environmental risk management.

**Social sustainability and AI integration**

Compared to the environmental dimension, the role of AI in advancing social sustainability remains relatively underexplored. Existing research highlights specific applications such as real-time monitoring of workplace hazards, anonymized recruitment tools to support diversity and inclusion, and adaptive technologies that enhance accessibility for marginalized populations (Caputo et al., 2022). AI has also been utilized to promote employee well-being by identifying stress indicators in communication patterns and optimizing workload distribution. Natural language processing techniques enable early detection of harassment or burnout (Murray & Ayoun, 2010), while AI-driven chatbots enhance access to training and mental health support - contributing to SDGs 4 (Quality Education), 5 (Gender Equality), and 10 (Reduced Inequalities).

Furthermore, AI applications are increasingly used to promote equity in organizational practices. For example, natural language processing is deployed to mitigate gender bias in job advertisements and candidate evaluations (Barriuso, 2024), while personalized learning platforms tailor content to individual needs, supporting inclusive professional development (Na, 2024). In occupational health and safety, computer vision technologies monitor unsafe behaviors and equipment failures, particularly in high-risk industries such as construction (Liu et al., 2021). AI analytics also facilitate the monitoring of diversity, equity, and inclusion (DEI) metrics, enabling organizations to track fairness in compensation, promotions, and employee representation (Madanchian, 2024).

Despite these advancements, much of the literature treats AI applications in social sustainability as isolated initiatives rather than as part of an integrated organizational strategy. Moreover, critical concerns around algorithmic bias, surveillance, and loss of autonomy remain insufficiently addressed. These issues underscore the need for more comprehensive and ethically grounded frameworks to guide the use of AI in promoting socially sustainable practices.

**Economic sustainability and AI integration**

From an economic standpoint, AI plays a pivotal role in enhancing organizational adaptability, resilience, and long-term value creation - core tenets of economic sustainability. Increasingly, AI technologies are integrated across business functions to drive operational efficiency, stimulate innovation, and support more inclusive and transparent economic systems.

In the financial domain, AI-powered predictive analytics have significantly improved the accuracy of budgeting, forecasting, and cash flow management, thereby strengthening organizational fiscal stability and decision-making agility (Adelakun, 2023). In customer-facing functions, AI-driven systems, including conversational agents and recommendation engines, enable hyper-personalized engagement, fostering customer retention and optimizing service delivery (Sofiyah et al., 2024).

Procurement processes have also been transformed by AI applications that facilitate real-time pricing strategies, intelligent supplier evaluation, and dynamic contract management, all of which contribute to cost reduction and value chain optimization (Guida et al., 2023). In the context of innovation, generative AI accelerates product development by automating ideation, prototyping, and testing phases, thereby shortening time-to-market and reducing R&D expenditures (Feng, 2024).

Furthermore, AI contributes to sustainability-oriented governance by automating the collection, analysis, and reporting of environmental, social, and governance (ESG) data. This not only supports compliance with evolving regulatory standards but also enhances transparency and accountability, allowing stakeholders to more accurately assess corporate sustainability performance (Wang, 2025).

Beyond efficiency gains, emerging literature also points to AI's potential in democratizing economic participation. AI-as-a-service platforms provide affordable and scalable tools for small and medium-sized enterprises (SMEs), facilitating their entry into competitive markets and enabling more equitable access to technological innovation. Moreover, AI-driven platforms are fostering the development of inclusive business models, such as platform cooperatives and peer-to-peer service ecosystems.

These applications of AI are directly aligned with key SDGs - specifically SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production). However, critical gaps remain in the literature regarding the distributional impacts of AI-enabled economic transformations. Issues such as job displacement, technological inequality, and the ethical use of data in economic decision-making are frequently underexamined.

## Discussion

This study examined the integration of AI into organizational sustainability practices across environmental, social, and economic domains. Table 1 consolidates these applications across sectors and functions, providing concrete examples of how AI technologies are being operationalized in sustainability efforts.

The integration of AI into environmental sustainability appears to be the most mature and widely documented, as also confirmed in Table 1. Consistent with earlier studies, AI is extensively used to optimize energy systems, manage emissions, and enable precision agriculture (e.g., Rojek et al., 2024; Wang et al., 2022). However, this study advances prior literature by demonstrating the increasing diversity of AI applications - from adaptive building controls to real-time waste tracking and ecological monitoring.

In contrast, AI's role in social sustainability remains relatively fragmented in existing literature. Table 1 shows that although AI is being applied to areas such as recruitment, mental health support, and DEI monitoring, these uses are often treated as isolated interventions rather than part of a cohesive strategy. This study's findings support that observation while offering new evidence of how organizations are beginning to link these technologies to broader goals of inclusivity, safety, and equitable access. Applications like NLP-based bias detection and AI-assisted employee training platforms not only echo earlier research (e.g., Caputo et al., 2022), but also illustrate how AI can actively shape internal culture and institutional fairness.

**Table 1. Examples of the use of AI in various aspects of organizational sustainability**

| Sustainability dimension | Application area | Description | References |
|---|---|---|---|
| **Environmental** | Energy management (and carbon accounting) | AI-driven systems for optimizing energy consumption in buildings and factories | Rojek et al., 2024 |
| | Waste reduction | AI-driven tracking of production waste to suggest real-time optimizations | Bang & Andersen, 2022 |
| | Sustainable agriculture | Identification of weeds by drones or wheel robots and use of chemical weed control | Wang et al., 2022 |
| **Social** | Recruitment | NLP for improving diversity in recruitment (NLP can analyse terms and sets of words to identify the language and traits associated with managerial positions and then compare how those traits are associated with gender) | Barriuso, 2024 |
| | Employee training and development | AI-powered personalized learning platforms that adapt to skill gaps and roles | Na, 2024 |
| | Mental health and well-being | AI-powered chatbots offering anonymous mental health support and triage | van der Schyff et al., 2023 |
| | Workplace safety | Computer vision to detect hazardous behavior or equipment malfunctions | Liu et al., 2021 |
| | Diversity, equity, and inclusion | AI tools for analyzing pay equity, promotions, and recruitment trends | Madanchian, 2024 |
| **Economic** | Financial management | AI-driven forecasting for cash flow, budgeting, and financial planning | Adelakun, 2023 |
| | Customer relationship management | AI chatbots and personalization engines for customer service | Sofiyah et al., 2024 |
| | Procurement and cost optimization | AI tools for dynamic pricing, supplier selection, and spend analysis | Guida et al., 2023 |
| | Product design | Generative AI for rapid prototyping and design optimization | Feng, 2024 |

Source: own elaboration.

Economically, AI integration is the most extensive in terms of functional breadth, touching everything from financial forecasting to product development and ESG reporting. These findings are largely consistent with the dominant narrative in business literature that emphasizes AI's potential to drive productivity and innovation (Witjes & Lozano, 2016; Lewandowska & Cherniaiev, 2022). What distinguishes the present study, however, is its emphasis on the role of AI in advancing inclusive and resilient economic practices. Table 1 illustrates how AI is increasingly being leveraged by SMEs, supported through accessible AI-as-a-service platforms and cooperative digital ecosystems. These developments expand the economic discourse beyond efficiency, highlighting AI's potential to democratize innovation and create more equitable business opportunities.

A key contribution of this study is its integrated view across sustainability domains. Unlike previous research that tends to silo AI applications into environmental, social, or economic compartments, this study presents a cross-cutting analysis that highlights both overlaps and gaps. Table 1 serves as a synthesis tool, demonstrating not only the functional diversity of AI tools, but also their strategic alignment (or misalignment) with sustainability goals.

However, this cross-domain perspective also reveals a significant challenge: the absence of a unified governance framework to guide AI implementation across environmental, social, and economic dimensions. Most organizations, as the findings suggest, apply AI in an ad hoc or compliance-driven manner, rather than as part of a cohesive, holistic sustainability transformation. This fragmented approach risks underutilizing AI's full potential to drive systemic change and may even introduce unintended negative consequences if social and ethical considerations are overlooked in favor of technical or economic gains. To address this, Table 2 consolidates representative AI applications mapped directly to specific SDGs, providing a clearer strategic lens for organizations to align their AI initiatives with global sustainability priorities. This table highlights key areas where AI can create value across sectors by supporting integrated environmental stewardship, social inclusion, and economic resilience. It serves as a practical guide for decision-makers seeking to harness AI as a lever for SD, emphasizing the importance of deliberate governance, cross-sector collaboration, and continuous monitoring to ensure positive impacts.

**Table 2. AI technologies and their impact on Sustainable Development Goals**

| AI technology | Application area | Relevant SDG(s) |
|---|---|---|
| **Machine Learning** | Energy optimization in manufacturing, transportation, and construction | SDG 7 (Affordable and Clean Energy), SDG 13 (Climate Action) |
| **Deep Learning** | Renewable energy forecasting | SDG 7, SDG 13 |
| **Computer Vision** | Smart buildings, safety monitoring in workplaces | SDG 8 (Decent Work), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities) |
| **Natural Language Processing** | Bias detection in hiring, burnout/harassment identification | SDG 5 (Gender Equality), SDG 8, SDG 10 (Reduced Inequalities) |
| **AI Chatbots** | Employee mental health support, access to training | SDG 3 (Good Health), SDG 4 (Quality Education), SDG 10 |
| **Generative AI** | Product development, prototyping, innovation acceleration | SDG 8, SDG 9 |
| **Predictive Analytics** | Smart grids, demand forecasting, predictive maintenance | SDG 7, SDG 9 |

Source: own elaboration.

By clearly linking AI capabilities to the SDGs, organizations can better prioritize investments and governance mechanisms to support integrated sustainability outcomes. This mapping also underscores the need for ongoing research and policy development to foster ethical AI deployment, address emerging risks, and promote inclusive innovation ecosystems.

## Conclusion

This study offers a comprehensive overview of how AI is being integrated into organizational sustainability efforts across environmental, social, and economic dimensions. By mapping diverse AI applications and their alignment with the SDGs, the research underscores AI's significant potential to enhance sustainability performance, drive innovation, and democratize access to sustainable solutions. The findings reveal that while AI adoption in environmental sustainability is relatively advanced, social applications remain fragmented, and economic uses are broad but still evolving. Importantly, the study highlights a critical gap: the lack of a unified governance framework to guide holistic AI deployment, which may limit the technology's full transformative potential and risk unintended negative consequences.

However, this study's broad, integrative approach comes with limitations, including its reliance on secondary qualitative data and a general overview that does not deeply explore sector-specific contexts or the ethical and governance challenges associated with AI use. These limitations point to essential avenues for future research, such as in-depth, sector-focused analyses, longitudinal studies examining the long-term impacts of AI on sustainability, and critical investigations into ethical, legal, and governance issues surrounding AI implementation.

Ultimately, this study lays a foundation for understanding the multifaceted role of AI in advancing organizational sustainability while emphasizing the need for continued, nuanced research. A more refined and context-sensitive exploration of AI's capabilities and challenges will be vital for guiding responsible, equitable, and effective adoption of AI technologies in support of the SDGs.

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