

AI for sustainable development

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Abstract: Artificial Intelligence (AI) is revolutionizing sustainability, emerging as a key driver for achieving SDGs. A Delphi survey of experts reveals AI's strategic role in boosting progress across climate, education, and healthcare. Statistical analysis confirms consensus experts agree AI accelerates SDG attainment.

Keywords: Artificial Intelligence, sustainability, revolutionizing, consensus

Introduction

Generative AI is revolutionizing efforts to achieve the UN's Sustainable Development Goals (SDGs) by 2030, tackling poverty, inequality, climate change, and environmental decay. AI-driven solutions optimize resource allocation to combat poverty (SDG 1), forecast weather patterns for climate resilience (SDG 13), and accelerate disease diagnosis for better healthcare (SDG 3). The challenge now is scaling these innovations ethically and inclusively to ensure no one is left behind. AI is reshaping the global economy by fuelling innovation, boosting efficiency, and aligning with SDGs. Corporations adopt AI to streamline operations, cut costs, and craft sustainable models, fostering economic stability. In developing nations, AI acts as a catalyst—bypassing traditional paths, it tackles core issues like poverty, hunger, and healthcare. Example: AI-powered agriculture optimizes yields, combating food insecurity (SDG 2). AI is revolutionizing clean energy transitions by powering innovations in solar, wind, and grid management. Tools now forecast energy demand, predict maintenance needs, and optimize grids—boosting efficiency and cutting fossil fuel dependence. Smart grids, designed by AI, streamline citywide energy use, making clean energy accessible and affordable. This directly fuels SDG 7 ensuring universal access to affordable, clean energy, even in underserved regions.

Artificial Intelligence (AI) is transforming sustainability by driving environmental conservation, climate action, and social equity. It analyses satellite data to track deforestation, predicts weather extremes for disaster prep, and optimizes renewable energy grids. AI also powers smart cities, streamlining energy and traffic, while enhancing healthcare/education access for underserved communities. Yet, challenges persist:

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AI mirrors data biases, and its training consumes energy. So, ethical deployment, green algorithms, and renewable power are critical to harness AI sustainably. The first frontier in this journey is AI's role in environmental protection. By analysing vast datasets, AI systems can predict environmental trends and offer solutions to mitigate risks. Environmental monitoring with AI, for instance, plays a crucial role in tracking pollution levels, deforestation rates, and wildlife activities, enabling proactive responses to ecological threats.

The UN's Agenda 2030 (SDGs)—ending poverty, saving the planet, ensuring prosperity—faces huge hurdles post-COVID and amid conflicts. Pandemics deepened inequalities, wrecked economies, and strained healthcare. Geopolitics blocked global teamwork, skewing resources. So, achieving SDGs by 2030 needs a reboot: innovation. Enter AI—a potential game-changer turbocharging sustainable progress. The UN's 2030 Agenda for Sustainable Development outlines 17 SDGs for peace, prosperity, and sustainability. Achieving these linked goals needs integrated approaches tackling poverty, ecosystems, peace, and growth. Sustainability science is key, and AI offers new tools—systems thinking, data insights. AI can analyze datasets, predict climate trends, and solve challenges. But AI's growth is nation-driven, unevenly distributed, and outpaces ethics/regs. So, does AI transform sustainability research? A review of 792 SDG+AI studies shows a gap: few bridges AI tech with deep sustainability expertise. Bridging this gap is critical.

Future Directions and Opportunities

Agricultural AI innovations could revolutionize farming and food systems, with hyperspectral imaging and drone sensors enhancing crop and soil monitoring. Future agriculture will leverage AI for data-driven, precision crop management, improving yield and sustainability. To ensure equitable access, governments must invest in digital infrastructure, while partnerships should drive research and capacity-building. Regulations should govern ethical AI use and data protection for all stakeholders. The integration of Artificial Intelligence (AI) in agriculture has brought about a significant revolution. AI-powered technologies like automated irrigation, robotic weeding, and sensor-based spraying have addressed challenges such as climate change impacts, population growth, and labour shortages. These innovations not only conserve water and reduce chemical usage but also enhance productivity and crop quality. AI continues to play a pivotal role in ensuring food security and sustainability in farming practices worldwide. Artificial Intelligence (AI) enhances energy management by analysing data to forecast demand patterns, thereby improving efficiency and minimizing waste. AI also supports the circular economy by extending the lifecycle of materials and energy through advanced analytics and predictive models. In urban settings, AI-



driven smart grids and management systems enable real-time adjustments in energy distribution, facilitating the integration of renewable energy sources and reducing reliance on fossil fuels. AI's decision-support capabilities further promote energy-efficient building designs and urban planning strategies, while insights into consumer behaviour encourage sustainable energy practices. Overall, AI plays a pivotal role in advancing energy decarbonization and sustainability efforts in the built environment

Conclusion

AI can turbocharge SDGs via healthcare precision, personalized learning, smart cities, precision farming, green energy, and conservation. But hurdles remain: ethics, privacy, access gaps, digital divides. Solution? Interdisciplinary teamwork, capacity building, and policies to harness AI's power sustainably—equitably. Investing in AI boosts SDGs via healthcare, education, smart cities, farming, green energy, and conservation. It optimizes resources, sharpens decisions, and solves problems—if done right. But sustained investment is key to tackling ethics, privacy, and access gaps. Prioritize AI, unlock a sustainable future.

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