

Artificial Intelligence as a Driving Force Towards a Sustainable Technological Future in Light of Smart Manufacturing

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In light of the growing environmental, economic, and social challenges facing the contemporary world, artificial intelligence (AI) emerges as one of the most important technological drivers capable of transforming the path to sustainable development. AI applications have transcended traditional uses into strategic fields that touch the core of sustainability, such as resource management, renewable energy, smart agriculture, low-emission transportation, and smart urban planning. With its ability to process vast amounts of data, discover patterns, and make decisions based on predictive analysis, AI today represents a powerful tool for formulating scientific solutions that meet current needs and anticipate future requirements. Hence, the importance of the increased research focus on this field within the broader framework of engineering and applied sciences, particularly in terms of harnessing it to achieve the 17 Sustainable Development Goals adopted by the United Nations.

AI has contributed to a qualitative shift in the concept of "smart manufacturing," through its reliance on machine learning algorithms, predictive analytics, and intelligent automation. These technologies have enhanced the flexibility of industrial systems, increased their efficiency, and achieved unprecedented levels of adaptability to sudden changes in markets and supply chains.

Smart manufacturing is a type of manufacturing that relies on artificial intelligence (AI) technologies in its operations. These technologies are characterized by their ability to learn, reason, and make decisions, and can leverage various AI technologies to improve the performance of manufacturing processes. Smart manufacturing technologies are characterized by their ability to monitor and evaluate the economic performance of a single manufacturing process or subunit, diagnose the causes of poor performance, and make appropriate decisions to improve the overall performance of the system. This is the ability to self-improve, as well as detect defects and make decisions to recover from them. This is self-adaptation, the ability to monitor itself, diagnose the causes of failures, and solve problems.

Smart manufacturing based on the use of intelligent algorithms, predictive analytics, and the Internet of Things enables improved productivity, reduced costs, reduced waste, and increased ability to predict market trends, contributing to long-term sustainability. AI is the backbone of this system, enabling machines to learn independently, make decisions based on real-time data, and continuously improve product quality. Therefore, the path to a sustainable technological future passes through artificial intelligence technologies, and smart manufacturing is one of its most prominent tools. Hence,

the role of scientists, researchers, and academic institutions remains pivotal in developing these systems and supporting a culture of innovation and digital transformation in scientific and engineering fields.

In this issue, we present a selection of peer-reviewed scientific research. These studies not only present advanced theoretical insights, but also provide practical models that can be built upon in industrial and academic fields, opening new horizons for multidisciplinary collaboration.

In recognition of the importance of modern scientific trends, the journal's editorial board reaffirms its commitment to supporting sound scientific publishing that reflects the spirit of innovation and ethical responsibility in dealing with technological transformations. We hope that this issue will contribute to strengthening academic dialogue on the role of artificial intelligence in building a sustainable future and will serve as a stimulating reference for researchers in various scientific and engineering disciplines. Finally, we extend our thanks to the distinguished researchers and scientific reviewers for their valuable efforts, and we invite the honorable readers to interact with the contents of this issue in a way that enhances the role of scientific research in serving society, the environment, and industry.