

AI-DRIVEN SUSTAINABLE DEVELOPMENT

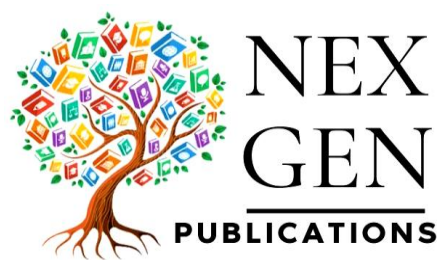
INTERDISCIPLINARY RESEARCH
AND INNOVATIONS



Pooja Gupta

Pooja Dahiya

AI-Driven Sustainable Development: Interdisciplinary Research and Innovations



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AI-Driven Sustainable Development: Interdisciplinary Research and Innovations

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Preface

The rapid advancement of Artificial Intelligence (AI) is reshaping economies, institutions, societies, and the ways in which complex global challenges are understood and addressed. At the same time, the pursuit of sustainable development has become an urgent global priority, requiring innovative approaches that integrate economic prosperity, social inclusion, environmental responsibility, technological advancement, and effective governance. The convergence of Artificial Intelligence and sustainable development therefore represents a significant area of interdisciplinary research, offering both transformative opportunities and critical challenges.

The edited book *AI-Driven Sustainable Development: Interdisciplinary Research and Innovations* brings together contemporary perspectives on how AI-enabled technologies, intelligent systems, data-driven approaches, and digital innovations can contribute to sustainable development across diverse sectors. The volume seeks to move beyond a purely technological understanding of AI by examining its broader economic, environmental, social, managerial, ethical, and institutional implications.

AI has the potential to strengthen sustainability initiatives through intelligent data analysis, predictive modelling, resource optimisation, automation, smart infrastructure, sustainable supply chains, climate and environmental monitoring, healthcare innovation, financial inclusion, precision agriculture, energy management, and smart governance. However, technological advancement alone cannot guarantee sustainable outcomes. Issues related to algorithmic bias, data privacy, cybersecurity, digital inequality, transparency, accountability, employment transformation, responsible innovation, and environmental costs of AI infrastructure require careful consideration. Sustainable AI must therefore be developed and deployed within frameworks that balance innovation with responsibility, inclusiveness, and long-term societal value.

This edited volume adopts an interdisciplinary approach and brings together research perspectives from management, business, economics, finance, information technology, computer science, social sciences, environmental studies, governance, education, healthcare, and related fields. The contributions explore emerging technologies and conceptual frameworks while examining practical applications of AI in addressing contemporary sustainability challenges. Particular attention is given to the relationship between technological innovation and the Sustainable Development Goals

(SDGs), responsible digital transformation, data-driven decision-making, sustainable business practices, and inclusive development.

The chapters included in this volume reflect the diversity of current research in AI and sustainability. They examine emerging opportunities as well as limitations associated with intelligent technologies, highlighting the need for collaboration among researchers, policymakers, industry professionals, educators, and other stakeholders. By bringing together multiple disciplinary perspectives, the book aims to encourage dialogue between technological capabilities and broader questions of human welfare, environmental sustainability, institutional resilience, and ethical governance.

The volume also recognises that the future of sustainable development will increasingly depend on the responsible integration of emerging technologies. AI-driven solutions must not only be efficient and innovative but also transparent, equitable, explainable, secure, and environmentally conscious. The development of appropriate regulatory frameworks, ethical standards, digital competencies, and inclusive innovation ecosystems will be essential for ensuring that the benefits of AI are widely distributed and that potential risks are effectively managed.

This book is intended for researchers, academicians, students, policymakers, industry practitioners, technology professionals, sustainability experts, and other readers interested in the intersection of Artificial Intelligence and sustainable development. It may also serve as a useful reference for postgraduate and doctoral researchers seeking to understand emerging interdisciplinary research directions in AI-enabled sustainability.

The editors hope that this volume will contribute to the growing body of scholarship on responsible and sustainable technological innovation and stimulate further research, collaboration, and policy dialogue. Ultimately, AI-Driven Sustainable Development: Interdisciplinary Research and Innovations seeks to emphasise that the future of AI should not be measured solely by technological sophistication, but by its capacity to contribute meaningfully to a more sustainable, inclusive, resilient, and responsible world.

Editors

Pooja Gupta

Pooja Dahiya

Parteek Jain

Acknowledgement

The editors would like to express their sincere gratitude to all those who contributed to the successful completion of the edited volume ***AI-Driven Sustainable Development: Interdisciplinary Research and Innovations***.

First and foremost, we extend our deepest appreciation to all the contributing authors for their scholarly contributions, intellectual engagement, and commitment to exploring the evolving relationship between Artificial Intelligence, technological innovation, and sustainable development. Their interdisciplinary perspectives have enriched the scope and academic value of this volume.

We are grateful to the reviewers and academic experts who devoted their valuable time to evaluating the submitted chapters and providing constructive observations and recommendations. Their critical feedback has helped strengthen the quality, clarity, relevance, and scholarly rigour of the contributions included in this book.

We also acknowledge the support and encouragement received from our academic colleagues, research collaborators, and institutional leadership throughout the development of this volume. Their guidance, discussions, and intellectual support provided valuable motivation at different stages of the editorial process.

Special appreciation is extended to the editorial and publishing team for their cooperation, professionalism, and assistance in bringing the manuscript to its final form. Their support in coordinating the submission, review, revision, editing, and production processes has been instrumental in completing this project.

We are also thankful to the researchers, policymakers, organisations, and wider academic community whose work continues to advance knowledge in Artificial Intelligence, sustainability, digital transformation, responsible innovation, and interdisciplinary research. The ideas and developments emerging from this broader scholarly community have provided an important foundation for the themes explored in this volume.

Finally, we express our heartfelt gratitude to our families, friends, colleagues, and well-wishers for their patience, encouragement, and continued support during the preparation of this book. Their understanding and motivation have been invaluable throughout the editorial journey.

The completion of this volume has been a collective intellectual endeavour, and we gratefully acknowledge everyone who contributed directly or indirectly to its successful completion.

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About the Editor



Dr. Pooja Gupta is an Associate Professor at the Panipat Institute of Engineering and Technology, Samalkha, Haryana. She is a seasoned management professional with over 16 years of academic experience, specializing in Finance, Banking, and Accounting.

She earned her Ph.D. from Guru Jambheshwar University, Hisar, with a research focus on Foreign Investors and the Stock Market. Dr. Gupta has made significant contributions to academic research, with numerous publications in reputed national and international journals, and has actively participated in various conferences and seminars.

In addition to her research work, she has served as an editor for more than five academic books and has authored four books in her area of expertise. Her academic and research pursuits reflect a strong commitment to advancing knowledge in the field of finance and management.

About the Co-Editor



Pooja Dahiya is an academician and researcher in the field of Computer Science and Engineering. She holds B.Tech. and M.Tech. degrees and is currently serving as an Assistant Professor in the Department of Computer Science and Engineering at CGC UNIVERSITY MOHALI PUNJAB, India. With over a decade of teaching experience, Ms. Dahiya has contributed extensively to academics and research. Her research interests include Artificial Intelligence, Cyber security, Deep Learning, Hyperspectral Image Analysis, and Remote Sensing. She has published numerous research papers in reputed international conferences and journals and has also contributed to book chapters, patents, and edited volumes. She has presented her work at various national and international conferences, and has been recognized with awards such as Best Paper Award and appreciation for her roles as reviewer, session chair, and jury member.

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ABOUT THE BOOK

AI-Driven Sustainable Development: Interdisciplinary Research and Innovations explores the transformative role of Artificial Intelligence in addressing contemporary challenges of sustainable development. The book brings together interdisciplinary perspectives that connect AI, technology, environmental sustainability, social development, economic growth, governance, and innovation.

It examines how AI-driven solutions can support efficient resource management, climate action, smart cities, sustainable industries, healthcare, education, agriculture, and inclusive economic development. By combining theoretical insights with practical applications, the book highlights emerging technologies such as machine learning, data analytics, intelligent systems, automation, and predictive modelling as powerful tools for creating sustainable and resilient societies.

A key focus of the book is the need to balance technological advancement with environmental responsibility, ethical considerations, social equity, and long-term human well-being. It also discusses the opportunities and challenges associated with adopting AI for sustainable development, including data privacy, digital inclusion, responsible innovation, and technological accessibility.

Designed for researchers, academicians, policymakers, industry professionals, and students, this book provides a comprehensive platform for understanding the intersection of AI and sustainability. It encourages interdisciplinary collaboration and innovative thinking to develop solutions that are technologically advanced, environmentally responsible, socially inclusive, and economically viable for a sustainable future.



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