



THE EFFECTIVENESS OF AI IN ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS

Mrs. Spandhana S Shindhe¹, Mr. Tukaram Moorteppa Lamani², Mr. Sunil Naik S³

¹Student, Department of PG Studies and Research in Commerce, Kuvempu University,
Jnana Sahyadri Shankaraghatta – Shivamogga Dist – Karnataka – 577451

²Faculty Member, Department of PG Studies and Research in Commerce,
Kuvempu University, Jnana Sahyadri Shankaraghatta – Shivamogga Dist – Karnataka – 577451

³Faculty Member, Department of Commerce, Sahyadri Commerce and Management College,
Constituent College of Kuvempu University, Shivamogga Dist- Karnataka -577203

ABSTRACT

Artificial Intelligence (AI) is emerging as a powerful tool in supporting the achievement of Sustainable Development Goals (SDGs) across the world. AI technologies improve efficiency in sectors such as healthcare, education, agriculture, and environmental management. Through predictive analytics and automation, AI can help reduce poverty, improve food security, and promote quality education. This studies Recent analyses indicate that AI technologies can enable the achievement of approximately 79% of the 169 SDG targets, particularly in fields such as healthcare, education, clean energy, and climate action. AI enhances climate monitoring, improves energy efficiency, facilitates smart grids, and detects threats to marine ecosystems. The social Impact in AI aids in mapping poverty, optimizing healthcare diagnostics, and customizing educational tools. Economic Growth in AI optimizes supply chains, boosts agricultural productivity through precision farming, and fosters innovation in infrastructure. Moreover, AI plays a significant role in monitoring climate change, agriculture, managing natural resources, and promoting clean energy solutions. Smart technologies enable better urban planning, waste management, and sustainable industrial practices. AI-driven innovations also support social inclusion by improving access to financial services and digital education platforms. Therefore, the effective integration of AI can accelerate progress toward achieving the Sustainable Development Goals and building a more sustainable and inclusive future.

KEY WORDS: Artificial Intelligence (AI), Sustainable Development Goals (SDGs), Predictive Analytics, Environmental Management, Smart Technology, Agriculture Productivity.

INTRODUCTION

Artificial Intelligence (AI) has emerged as a transformative technology that is reshaping various sectors of society and contributing significantly to sustainable development. With rapid advancements in data processing, machine learning, and automation, AI is increasingly being applied in areas such as healthcare, education, agriculture, environmental management, and industrial development. These technological innovations provide new opportunities to address global challenges and improve the efficiency and effectiveness of development initiatives. The global framework for sustainable development is guided by the United Nations Sustainable Development Goals (SDGs), which consist of 17 goals and 169 targets aimed at promoting economic growth, social inclusion, and environmental protection by 2030. Achieving these goals requires innovative solutions and the effective use of modern technologies. In this context, AI has gained considerable attention as a powerful tool capable of accelerating progress toward these objectives. AI technologies support sustainable development by enabling predictive analytics, data-driven decision making, and automation in various sectors. For instance, AI can improve healthcare services through better diagnostics, enhance agricultural productivity through precision farming, and support climate monitoring and energy efficiency.

REVIEW OF LITERATURE

Henrik Skaug saetra (2022), This study examined that the relationship between Artificial Intelligence and sustainable development in the book AI for the Sustainable Development Goals. The study explains that AI has become an important technological tool for addressing global challenges and supporting sustainable development initiatives. It highlights that AI can contribute to the achievement of the Sustainable Development Goals by improving efficiency in sectors such as healthcare, environment, and economic development. At the same time, the author points out that AI may also create challenges such as energy consumption, inequality, and ethical concerns. Therefore, the study emphasizes the need for responsible and balanced use of AI technologies for sustainable development.

Anibal Monasterio Astobiza, et al.(2021), This study highlighted that the role of ethical principles in the use of Artificial Intelligence for achieving the Sustainable Development Goals in the article AI Ethics for Sustainable Development Goals. The study explains that AI can be used as a powerful tool for solving global problems such as poverty, climate change, and social inequality. However, the authors emphasize that the development and application of AI must follow ethical principles such as fairness, transparency, accountability, and respect for human rights. The article also



highlights that improper use of AI can lead to discrimination, bias, and social injustice if ethical guidelines are ignored. Therefore, the study concludes that human-centric and ethically governed AI is essential for ensuring that AI technologies effectively contribute to sustainable development.

C. Gohr et al. (2025), This study analyzed that the application of Artificial Intelligence in sustainable development research in the article Artificial Intelligence in Sustainable Development Research published in Nature Sustainability. The study reviewed around 792 research articles to understand how AI contributes to achieving sustainability goals. The authors found that AI supports data-driven decision making, optimization of resources, and improved analysis across different scientific disciplines. The research highlights that AI applications are widely used in areas such as climate studies, environmental monitoring, and socio-economic development. The study concludes that AI has strong potential to accelerate progress toward sustainable development, but interdisciplinary collaboration is necessary for effective implementation.

Vinuesa R, et al. (2020), This study systematically evaluates the impact of artificial intelligence (AI) on all 17 Sustainable Development Goals (SDGs) using a consensus-based expert elicitation process. The authors find that AI can act as an enabler for 134 targets (79%) by enhancing areas like healthcare, education, and climate modeling, but may also inhibit 59 targets (35%) through risks such as increased energy consumption, algorithmic bias, and job displacement. The research categorizes the SDGs into societal, economic, and environmental pillars, providing detailed examples of AI's dual role in each sphere. A critical analysis reveals that current evidence is skewed toward positive outcomes, often derived from controlled settings, with significant research gaps in understanding long-term and negative impacts, particularly for environmental goals. The authors conclude by urging for regulatory insight, ethical frameworks, and a focus on equitable, locally relevant AI development to ensure its alignment with the 2030 Agenda for Sustainable Development.

RESEARCH GAP

The existing literature highlights the growing importance of Artificial Intelligence (AI) in achieving the Sustainable Development Goals introduced by the United Nations. Studies such as Henrik Skaug Saetra (2022) emphasize the potential of AI to support sustainable development while also addressing challenges such as inequality and energy consumption. Similarly, Anfbal Monasterio Astobiza, Mario Toboso, Manuel Aparicio and Daniel López (2021) highlight the importance of ethical principles in AI implementation for sustainable development. Other studies like Ricardo Vinuesa et al. (2020) and C. Gohr et al. (2025) discuss the broad impact of AI across various SDG targets and emphasize its role in data-driven decision-making and sustainability research. Therefore, there is a need for more comprehensive research that examines the practical application, challenges, and sector-wise contributions of AI in achieving sustainable development goals.

STATEMENT OF THE PROBLEM

Despite the growing potential of Artificial Intelligence (AI) in supporting the achievement of Sustainable Development Goals (SDGs), there remain significant challenges in its effective implementation and equitable utilization. While AI technologies contribute to improvements in healthcare, education, agriculture, and environmental management, their adoption is uneven across regions, particularly in developing countries where infrastructure, technical expertise, and financial resources are limited. Additionally, the increasing reliance on AI raises concerns related to data privacy, ethical governance, algorithmic bias, and energy consumption, which may hinder sustainable outcomes. There is also a lack of comprehensive empirical evidence measuring the long-term impact of AI on SDG achievement and insufficient policy frameworks to guide its responsible use. Therefore, the core problem lies in understanding how AI can be effectively, ethically, and inclusively integrated into sustainable development strategies to maximize its benefits while minimizing associated risks and inequalities.

NEED FOR THE STUDY

Artificial Intelligence (AI) has become an important technological advancement that can support sustainable development across different sectors. The global community, through the United Nations, introduced the Sustainable Development Goals to address major challenges such as poverty, hunger, inequality, and climate change. However, achieving these goals by 2030 remains a major challenge for many countries due to limited resources, lack of technological integration, and increasing environmental concerns. Therefore, it is important to explore how advanced technologies like AI can contribute to achieving these development goals.

OBJECTIVES OF THE STUDY

1. To study the role of Artificial Intelligence in supporting the achievement of the Sustainable Development Goals.
2. To examine the application of AI technologies in sectors such as healthcare, education, agriculture, and environmental management.
3. To analyze the social impact of AI in reducing poverty, improving healthcare diagnostics, and enhancing access to education.
4. To evaluate the economic benefits of AI in improving supply chains, agricultural productivity, and infrastructure development.
5. To assess the contribution of AI in addressing environmental challenges such as climate monitoring, energy efficiency, and natural resource management.

RESEARCH METHODOLOGY

Sources of Data: In order to meet the objectives of the study, the required data would be collected from the both primary and secondary data sources.

Primary Data: Primary data mean original data that has been collected specially for the purpose in mind. This type of data is generally afresh and collected for the first time. It is useful for



current studies as well as for future studies. Primary data will be collected through the structured questionnaire.

SAMPLING

Sample size: A total number of 100 respondents selected for the collection of information related to savings and investment behaviour of farmers.

Sample: I have taken farmers who are engaged in the agricultural productivity, and infrastructure development.

Sampling techniques: Simple random sampling technique is used to draw the sample.

SCOPE OF THE STUDY

This study focuses on examining the role of Artificial Intelligence (AI) in supporting the achievement of the Sustainable Development Goals introduced by the United Nations. The scope of the study covers how AI technologies contribute to improving efficiency and innovation in various sectors such as healthcare, education, agriculture, and environmental management. It explores the potential of AI in addressing major global challenges including poverty reduction, food security, quality education, and climate change. Overall, the study aims to understand how the effective integration of AI can accelerate progress toward sustainable development and support the achievement of global development goals.

Conceptual Framework on AI in Achieving the Sustainable Development Goals

Artificial Intelligence (AI) has become a trans-formative technological advancement that supports sustainable development by improving efficiency, innovation, and decision-making across multiple sectors. The concept of integrating AI with the Sustainable Development Goals introduced by the United Nations forms the conceptual foundation of this study. The framework explains how AI technologies such as predictive analytics, machine learning, and automation influence three major dimensions of sustainable development: social, economic, and environmental. In the social dimension, AI helps in poverty mapping, improving healthcare diagnostics, and providing personalized digital education, thereby promoting social inclusion and better public services. In the economic dimension, AI contributes to supply chain optimization, precision agriculture, and infrastructure development, which enhance productivity and economic growth.

Significance of AI in Achieving the Sustainable Development Goals

The Sustainable Development Goals are significant because they provide a global framework for improving social, economic, and environmental well-being. According to the abstract, SDGs are important for reducing poverty, improving food security, promoting quality education, ensuring better healthcare, and supporting clean energy and climate action. They encourage sustainable agriculture, efficient resource management, smart urban planning, and environmental protection. The goals also promote social inclusion by increasing access to financial services and digital education. In addition, SDGs help guide innovation, infrastructure

development, and sustainable industrial practices for long-term growth. Therefore, the significance of SDGs lies in their role in creating a balanced, inclusive, and sustainable future for all.

Importance of AI in Achieving the Sustainable Development Goals

1. Improves healthcare services:

AI helps in early diagnosis, disease prediction, and better treatment planning. This supports SDG 3 by improving public health and making healthcare services more efficient and accessible.

2. Enhances quality education:

AI-based learning tools provide personalized education according to students' needs and abilities. This supports SDG 4 by improving the quality of teaching and learning outcomes.

3. Reduces poverty:

AI helps in poverty mapping and identifying vulnerable populations through data analysis. This supports SDG 1 by enabling governments and institutions to take better poverty reduction measures.

4. Supports food security and agriculture:

AI improves agricultural productivity through precision farming, crop monitoring, and weather forecasting. This contributes to SDG 2 by helping farmers increase yield and ensure food security.

5. Promotes clean energy use:

AI improves energy efficiency, supports smart grids, and helps manage renewable energy systems. This supports SDG 7 by making clean and affordable energy more effective and sustainable.

6. Helps in climate action:

AI is useful in climate monitoring, predicting environmental changes, and managing natural resources. This supports SDG 13 by strengthening efforts to fight climate change.

Effectiveness of AI in Achieving the Sustainable Development Goals

Artificial Intelligence has proved to be highly effective in supporting the achievement of Sustainable Development Goals by improving efficiency, accuracy, and decision-making across various sectors. AI helps in healthcare through better diagnosis and treatment planning, in education through personalized learning, and in agriculture through precision farming and productivity improvement. It also supports environmental sustainability by enhancing climate monitoring, energy efficiency, smart grids, and natural resource management. In social development, AI assists in poverty mapping, financial inclusion, and digital education access, thereby promoting equality and inclusion. Economically, AI strengthens supply chains, encourages innovation, and improves infrastructure development. Since studies show that AI can contribute to nearly 79% of SDG targets, it is considered a powerful instrument for accelerating sustainable and inclusive global development.

LIMITATIONS OF THE STUDY

1. The study mainly relies on secondary data and existing research related to Artificial Intelligence and the Sustainable



- Development Goals, which may limit the availability of updated or region-specific information.
2. The analysis focuses on the general global impact of AI and may not fully represent the specific conditions or technological capabilities of individual countries or regions.
 3. The study discusses the potential benefits of AI in sectors such as healthcare, education, agriculture, and environmental management, but it does not include detailed empirical data or field-based analysis.
 4. Rapid technological advancements in AI may cause the findings of the study to change over time as new innovations and applications emerge.
 5. The research does not deeply examine the ethical, regulatory, and social challenges associated with AI adoption in sustainable development.

FINDINGS OF THE STUDY

1. The study finds that Artificial Intelligence is a strong supporting tool for achieving the Sustainable Development Goals because it improves efficiency, accuracy, and decision-making in many sectors.
2. The study shows that AI helps reduce poverty through poverty mapping, improves healthcare diagnostics, and increases access to digital education.
3. The study identifies that AI contributes to climate monitoring, energy efficiency, smart grids, natural resource management, and ecosystem protection.
4. The study identifies that AI contributes to climate monitoring, energy efficiency, smart grids, natural resource management, and ecosystem protection.
5. The study also finds that the benefits of AI are not equally available everywhere.

SUGGESTIONS

1. Governments and organizations should adopt AI in a way that is ethical, transparent, fair, and accountable so that its benefits support sustainable development without causing social harm.
2. AI benefits should reach all sections of society, especially vulnerable and marginalized communities, so that inequality is reduced rather than increased.
3. The study mainly relies on secondary data, future research should include field surveys, case studies, and empirical analysis to measure the real impact of AI on SDGs more accurately.
4. AI should be promoted in sectors like healthcare, education, agriculture, environmental monitoring, and urban planning to directly support SDG achievement.

5. Training programs, education, and capacity-building initiatives should be encouraged so that people, institutions, and policymakers can effectively use AI tools for sustainable development.

CONCLUSION

Artificial Intelligence has emerged as a highly valuable tool in supporting the achievement of Sustainable Development Goals across social, economic, and environmental dimensions. The study shows that AI contributes significantly to sectors such as healthcare, education, agriculture, environmental management, and infrastructure development by improving efficiency, accuracy, and decision-making. Through applications like predictive analytics, automation, climate monitoring, smart grids, and precision farming, AI helps address major global challenges such as poverty, hunger, poor healthcare, educational inequality, and climate change. Overall, the paper concludes that AI can act as a trans-formative force in building a more sustainable, inclusive, and resilient future. However, governments, policymakers, industries, and educational institutions must work together to ensure that AI technologies are developed and used ethically for the common good. With proper strategies, investment, and governance, AI can become a powerful enabler in achieving the Sustainable Development Goals by 2030.

REFERENCE

1. Cowsls, J., Tsamados, A., Taddeo, M. and Floridi, L., 2021. A definition, benchmark and database of AI for social good initiatives. *Nature Machine Intelligence*, 3(2), pp.111-115.
2. Sachs, J.D., Schmidt-Traub, G., Mazzucato, M., Messner, D., Nakicenovic, N. and Rockström, J., 2019. Six transformations to achieve the sustainable development goals. *Nature sustainability*, 2(9), pp.805-814.
3. Schwartz, R., Dodge, J., Smith, N.A. and Etzioni, O., 2020. Green ai. *Communications of the ACM*, 63(12), pp.54-63.
4. Fuso Nerini, F., Fawcett, T., Parag, Y. and Ekins, P., 2021. Personal carbon allowances revisited. *Nature Sustainability*, 4(12), pp.1025-1031.
5. Theodorou, A. and Dignum, V., 2020. Towards ethical and socio-legal governance in AI. *Nature Machine Intelligence*, 2(1), pp.10-12.

Websites

1. <https://www.usda.gov/>
2. <https://www.ifpri.org/>
3. <https://www.investopedia.com>
4. <https://www.researchgate.net>
5. <https://www.dotactiv.com>