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AI APPLICATIONS FOR ACHIEVING SDG 4

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Abstract. With an emphasis on SDG 3 (Good Health and Well-Being), SDG 4 (Quality Education), and SDG 5 (Gender Equality), this study explores how artificial intelligence (AI) can help achieve the Sustainable Development Goals (SDGs). The study highlights the main obstacles and possibilities in applying AI for sustainable development through a mixed-methods approach that includes a survey of 345 participants and qualitative analysis. Results show that AI has a lot of promise for fields like gender equality advocacy, predictive healthcare, and personalized learning. However, obstacles like limited funding, a lack of technical know-how, problems accessing data, and moral dilemmas prevent it from being widely used. The study suggests practical remedies, such as improved data infrastructure, AI literacy training for professionals, focused funding, and the creation of AI algorithms free from bias. The recommendations place a strong emphasis on developing cooperative alliances and utilizing AI to develop inclusive systems that tackle global issues in gender equity, education, and health. This study comes to the conclusion that although AI has the potential to revolutionize the SDGs, its success hinges on resolving these fundamental issues. AI can be a vital component of creating a sustainable, just future of resources, training, and regulatory frameworks are prioritized. In order to support AI-driven SDG initiatives globally, future research should concentrate on long-term effects and scalable interventions.

Keywords: gender equality, quality education, predictive healthcare, artificial intelligence (AI), and the Sustainable Development Goals (SDGs).

INTRODUCTION

A worldwide attempt to address pressing issues pertaining to poverty, inequality, climate change, environmental degradation, and peace is represented by the Sustainable Development Goals (SDGs), which were adopted by the UN in 2015 [11]. By 2030, these 17 interrelated goals, which address a variety of socioeconomic and environmental issues, should be accomplished, providing both developed and developing countries with a thorough framework for creating a more sustainable future. Artificial Intelligence (AI) has emerged as a crucial technology with the potential to speed up progress toward these goals as the world struggles with ever-more complex issues. AI can revolutionize how we tackle problems like hunger, healthcare, education, and climate action by providing sophisticated data analysis, automation, and decision-making capabilities [8, 10].

Machine learning (ML), natural language processing (NLP), computer vision, and robotics are just a few of the technologies that are included in artificial intelligence. By simulating human cognitive processes, these technologies allow machines to analyze large datasets, spot patterns, and automate difficult tasks [3, 12]. AI is especially well-suited to addressing global issues like boosting disaster response systems, increasing agricultural productivity, and optimizing healthcare delivery because of its capacity to process and analyze vast amounts of data with previously unheard-of speed and accuracy [9]. The need for AI-driven solutions grows as these problems become more intricate and interconnected.

AI has shown that it is capable of making a significant contribution to each of the SDGs at their intersection. Precision agriculture powered by AI, for instance, has been demonstrated to greatly increase food production efficiency, tackling concerns associated with SDG 2 (Zero Hunger) [7]. AI directly supports Good Health and Well-Being (SDG 3) in the healthcare industry by improving diagnostic capabilities, expediting treatment plans, and potentially aiding in the tracking and prediction of disease spread [8]. By facilitating more precise environmental monitoring and predictive climate models, which guide mitigation plans for natural disasters and global warming, artificial intelligence (AI) technologies also support Climate Action (SDG 13) [9]. The development and application of AI are not without difficulties, though, especially when it comes to algorithmic bias, data privacy, and the digital divide, which prevents all people from having equal access to AI-powered solutions [4].

Both the advantages and disadvantages of AI's contribution to the SDGs have been emphasized in recent research. While artificial intelligence (AI) has demonstrated promise in improving fields like healthcare, education, and environmental sustainability, it also has the potential to worsen already-existing disparities, especially if low-income populations are unable to access these technologies [1, 2]. For example, automation made possible by AI may result in job displacement, which would disproportionately impact workers in developing nations and widen socioeconomic gaps [3]. The ethical ramifications of AI are also a source of concern, especially in relation to algorithmic bias and how it affects SDGs 5 and 10, reduced inequality and gender equality, respectively [4]. These difficulties highlight the necessity of strong governance structures to guarantee the moral and equitable application of AI technologies.

By investigating how AI can be used to achieve different SDGs and tackling the ethical and accessibility issues that have not yet been addressed in the literature, this study seeks to expand on earlier research. Drawing on recent developments in AI

technologies, this paper will specifically examine how AI contributes to SDG 3 (Health), SDG 4 (Education), and SDG 5 (Gender Equality). It will also identify the gaps that need to be filled to ensure that AI is a force for good rather than a source of further inequality [6, 11]. This study aims to add to the expanding body of knowledge on how technology can be used for sustainable development by critically examining both the advantages and disadvantages of artificial intelligence.

CONCEPTUAL FRAMEWORK

The main ideas of artificial intelligence (AI) technologies, the Sustainable Development Goals (SDGs), and the moral implications of their application are all integrated into the conceptual framework used in this study. This framework acts as a roadmap for investigating how AI can successfully help achieve the SDGs while tackling the moral dilemmas raised by its application.

A. Essential Ideas

The Sustainable Development Goals (SDGs) have been defined. In order to address global issues such as poverty, inequality, climate change, environmental degradation, and peace, the United Nations set up 17 interconnected goals [11]. Every goal includes particular objectives and metrics intended to make measurement and accountability easier. For example, SDG 4 prioritizes inclusive and equitable quality education, while SDG 3 focuses on promoting well-being and ensuring healthy lives.

Artificial Intelligence (AI) is a collection of technologies that allow machines to carry out tasks like learning, problem-solving, and decision-making that normally require human intelligence [3]. Important AI technologies include:

➔ Machine Learning (ML): Algorithms that automatically get better with data and experience.

➔ Machines can now comprehend and produce human language thanks to natural language processing, or NLP.

➔ Computer vision: Enables machines to decipher and comprehend visual data from their surroundings.

➔ Ethical Considerations: Data privacy, algorithmic bias, and fair access to technology are ethical concerns in the application of AI. These issues are crucial because they have the potential to worsen already-existing disparities, especially for underprivileged groups [2, 4].

Conceptual Interactions

Understanding how these ideas interact is essential to figuring out how AI can be used to accomplish the SDGs while lowering ethical risks:

➔ AI as a Catalyst for SDG Achievement: AI technologies have the potential to improve the effectiveness of programs designed to achieve particular SDGs. SDG 2 (Zero Hunger) can be addressed and food production greatly enhanced by the use of AI in precision agriculture, for instance [7]. Similar to this, AI can enhance healthcare accessibility and results, supporting SDG 3 (Good Health and Well-Being) [8]. These uses highlight AI's potential as a potent instrument for sustainable growth.

➔ Ethical Issues as Barriers: In spite of the potential, ethical issues place limitations on the use of AI to accomplish the SDGs. Disparities that already exist may be exacerbated by algorithmic bias, which can produce unfair results [4]. The objective of health equity, for example, may be undermined by biased algorithms in the healthcare industry that produce recommendations for unequal treatment [8].

➔ Loop of Feedback: There is a feedback loop where the way ethical considerations are incorporated into the use of AI affects how well it supports the SDGs. Enhancing public trust and acceptance of AI technologies through effective governance frameworks that tackle ethical issues can lead to their wider adoption and more substantial contributions to sustainable development [5].

B. The Framework's Significance

In light of the SDGs, this conceptual framework is essential because it offers an organized method for comprehending the dual nature of AI's potential. It emphasizes the significance of integrating ethical considerations into the design and implementation of AI solutions by outlining the main ideas and how they interact. This framework not only directs the current investigation but also helps practitioners, researchers, and policymakers create plans that optimize AI's advantages while reducing its risks, guaranteeing a more sustainable and just future.

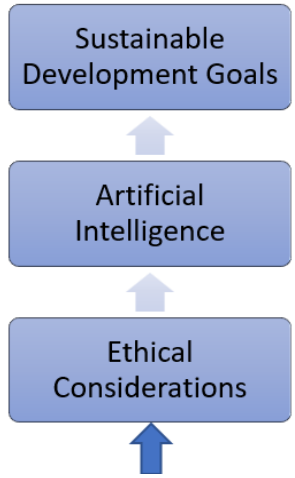


Fig. 1 Conceptual Framework

The theoretical structure The relationship between artificial intelligence (AI), ethical considerations, and the Sustainable Development Goals (SDGs) is depicted in Fig. 1.

➔ Goals for Sustainable Development (SDGs): symbolize the international goals for resolving different environmental and socioeconomic issues.

➔ Artificial Intelligence (AI): Describes how AI tools help achieve the Sustainable Development Goals.

➔ Moral Points to Remember: highlights how crucial it is to guarantee the ethical application of AI in order to successfully influence the SDGs.

The arrows show how these ideas relate to one another and interact, highlighting how AI can both advance the SDGs and adhere to moral principles.

METHODOLOGY

The applications, possibilities, and difficulties of artificial intelligence (AI) in accomplishing the Sustainable Development Goals (SDGs) are investigated in this study using a mixed-methods approach. Focusing on gender equality (SDG 5), education (SDG 4), and health (SDG 3), the methodology combines qualitative and quantitative approaches to capture the complexity of AI's impact on particular SDGs.

By taking this approach, the study hopes to address accessibility and ethical concerns while offering a thorough analysis of AI's contributions.

A. Research Design

To get a comprehensive picture of AI's contribution to SDG achievement, the research design incorporates both qualitative and quantitative elements.

The qualitative element Interviewing AI specialists, educators, legislators, and specialists in sustainable development in-depth is part of this component. The participants' opinions on AI's ability to further SDGs, the moral issues at play, and the difficulties they encounter when putting AI solutions for sustainable development into practice are all revealed by these interviews. Open-ended questions promote thorough answers, making it possible to gather rich, complex information about the accessibility and ethical issues associated with implementing AI technologies in practical settings.

A survey given to a larger group of people, such as students, instructors, researchers, and policymakers, makes up the quantitative component. Likert-scale responses to structured questions are used in the survey to gauge opinions on the possible effects of AI, the frequency of ethical issues, and the perceived significance of particular AI technologies for achieving SDG targets. The validity and reliability of the findings are improved by this data, which offers statistical insights into general attitudes toward AI in SDGs and aids in quantifying important opportunities and challenges.

B. Information Gathering

Participants in the sample population come from a range of professional backgrounds and geographical areas, with an emphasis on academic institutions and policy organizations that are actively engaged in AI and sustainable development projects. To guarantee diversity in organizational roles, experience levels, and professional expertise, a purposive sampling technique is used. This method encompasses a variety of viewpoints regarding AI's contribution to the SDGs as well as the moral and practical difficulties involved in its application.

Sample Size: About 345 people, 120 students, 100 educators, 80 researchers, and 45 policymakers, are given the survey. With a focus on the Azerbaijani region where the study was carried out, this sample size allows for the gathering of both general and detailed insights into AI's applications in the context of the SDGs.

a. Sources of Data

Qualitative Information: A chosen subset of 30 participants are interviewed in semi-structured interviews to obtain in-depth knowledge of AI's applications in the SDGs, ethical dilemmas, and accessibility issues. With the participants' permission, interviews are videotaped and then transcribed for analysis.

Quantitative Data: Answers to both closed-ended and open-ended questions about AI applications, difficulties, ethical issues, and useful suggestions for boosting AI's contribution to SDGs are gathered via an online survey.

b. Software and Tools

➔ Qualitative Analysis: Thematic analysis of interview transcripts using NVivo software enables the grouping of responses into themes pertaining to the challenges, ethical issues, and efficacy of AI.

➔ Quantitative Analysis: Survey responses are analyzed statistically using SPSS, with an emphasis on descriptive statistics (mean, frequency) and inferential statistics (correlation analysis) to look at relationships between variables, like the perceived influence of AI on SDGs and the prevalence of ethical concerns.

C. Plan for Data Analysis

➔ Qualitative Data Analysis: To find recurrent themes about the advantages and difficulties of AI for SDGs, thematic analysis is applied to the interview data. The potential of AI to improve SDG outcomes, ethical considerations, accessibility obstacles, and policy suggestions are some of the main themes. In order to produce insights into typical problems and opportunities, this process entails coding responses and classifying them.

➔ Quantitative Data Analysis: SPSS software is used to analyze survey responses. Participants' opinions of AI's contribution to achieving the SDGs, the significance of particular AI technologies, and the frequency of ethical issues are summed up by descriptive statistics. Relationships between variables like perceived ethical concerns, AI familiarity, and views on the scalability of AI for SDG-related projects are investigated using correlation analysis. The analysis, for instance, looks at the relationship between participant roles—such as students versus educators or policymakers—and the prevalence of ethical issues (such as algorithmic bias and data privacy).

➔ Analysis by Comparison: The results of the qualitative and quantitative analyses are compared in order to address the goals of the study. This comparison reveals similarities and differences in viewpoints regarding the usefulness of AI, moral dilemmas, and useful suggestions. The combination of quantitative findings and qualitative insights strengthens the conclusions' resilience and offers a more thorough comprehension of AI's contribution to the SDGs.

D. Moral Points to Remember

The study takes ethical issues very seriously, especially when it comes to participant privacy and handling sensitive data associated with AI applications. Anonymization is used to protect participant confidentiality, and informed consent is acquired before surveys and interviews. To ensure that the results appropriately reflect the ethical complexities involved in AI's deployment for SDG goals, ethical issues related to AI, such as algorithmic bias and data privacy concerns, are not only central to the study's framework but are also acknowledged in the data analysis process.

E. Restrictions

The study's findings may not be as applicable to other areas with varying degrees of technological infrastructure and policy support for AI due to its primary focus on participants in Azerbaijan. Furthermore, response bias might be introduced by the study's reliance on self-reported data. To confirm results and deepen understanding of AI's long-term effects on SDGs, future research should take cross-regional comparisons and longitudinal studies into account.

This mixed-methods approach offers an organized way to look into how AI might help achieve the Sustainable Development Goals while paying close attention to the accessibility and ethical issues that come with its use. The goal of the study is to create useful insights for educators, policymakers, and AI practitioners by integrating qualitative and quantitative data. This will help create responsible AI frameworks that support sustainable development objectives.

RESULTS AND FINDINGS

A.. Participants' Demographic Overview

345 respondents from various nations and industries participated in the survey, which focused on how artificial intelligence (AI) can help achieve the Sustainable Development Goals (SDGs).

➔ Country/Region: Baku, Sumqayit, and Ganja were among the cities represented, but the majority of participants were from Azerbaijan.

➔ Role/Position: The majority of participants were students, with a small number of government experts, instructors, and university employees.

Participants' varied professional and geographic backgrounds offer a wide range of viewpoints on the opportunities and difficulties of using AI to further SDGs.

B. Key SDGs Organizations Prioritize

Participants listed the SDGs that their companies prioritize. The SDGs that were chosen the most often were:

Table 1: **Primary SDGs Focused on by Organizations**

SDG	Number of Selections
SDG 4: Quality Education	158
SDG 3: Good Health and Well-being	108
SDG 5: Gender Equality	91
SDG 16: Peace, Justice, and Strong Institutions	86
SDG 1: No Poverty	72
SDG 17: Partnership for the Goals	72



Fig. 2 Primary SDGs Focused on by Organizations

The organizations' primary SDGs are shown on the X-axis in Fig. 2, while the number of selections is shown on the Y-axis. The main focus areas are Good Health and Well-Being (SDG 3) and Quality Education (SDG 4), suggesting a strong emphasis on enhancing health and education via AI.

C. Using AI to Achieve SDGs

When asked if their company had used AI to further any SDGs:

➔ Indeed, 202 people (58.5%) took part.

➔ No: 143 individuals (41.5%)

There is a positive trend in applying AI to SDG-related challenges, as more than half of the respondents reported implementing AI to some extent.

D. Particular AI Uses for the SDGs

The participants gave instances of how AI was being used in their companies, such as chatbots and natural language processing to increase the caliber and accessibility of education.

Using predictive analytics in healthcare can improve patient outcomes and resource management.

Tools for data analysis for resource allocation and environmental monitoring.

Applications of AI in environmental sustainability, healthcare, and education were widespread, indicating that AI is being used to address a number of SDG priorities.

E. Difficulties in Putting AI Solutions into Practice

Participants noted a number of difficulties in putting AI solutions for SDGs into practice:

Table 2: **Challenges in Implementing AI Solutions**

Challenge	Number of Selections
Financial constraints	97
Lack of technical expertise	72
Limited data availability	37
Regulatory issues	18
Other	110

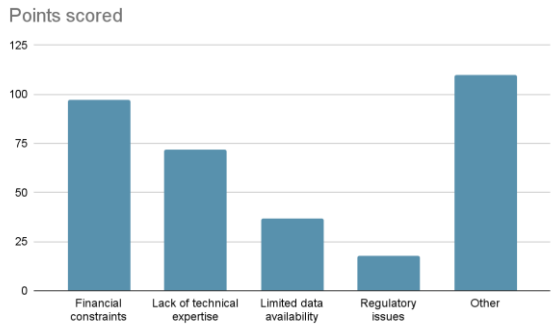


Fig. 3 Challenges in Implementing AI Solutions

The difficulty of implementing an AI solution is represented by the X-axis in Fig. 3, while the number of choices is represented by the Y-axis. The most frequently mentioned obstacles were lack of technical knowledge and financial limitations, suggesting that these are necessary for the effective integration of AI in SDG-related projects.

F. AI's Ability to Help Achieve SDGs

Participants evaluated how well their AI solutions worked to accomplish the desired SDGs:

- ➔ Very successful: 99 people
- ➔ 109 participants, somewhat successful
- ➔ 39 participants, somewhat ineffective
- ➔ Extremely ineffectual: 28 participants

➔ 59 participants were neither effective nor ineffective.

Although almost a quarter of respondents thought the impact was minimal or ineffective, indicating areas for improvement in AI implementation, the majority of respondents saw AI as somewhat effective in reaching SDG goals.

G. AI Solutions' Scalability

In response to the question of whether the AI solution could be expanded to other areas or industries:

➔ Indeed, there were 141 participants.

➔ Number of participants: 53

➔ Perhaps: 145 people

The large number of participants who selected "Maybe" indicates scalability uncertainty, most likely as a result of regional and sector-specific resource or contextual variations.

H. Elements That Affect Scalability

Key elements that would facilitate the scalability of AI solutions for SDGs were identified by the participants:

Table 3: **Factors Contributing to Scalability**

Factor	Number of Selections
Availability of data	101
Supportive regulatory environment	87
Technical expertise and infrastructure	92
Financial resources	81
Stakeholder collaboration	50

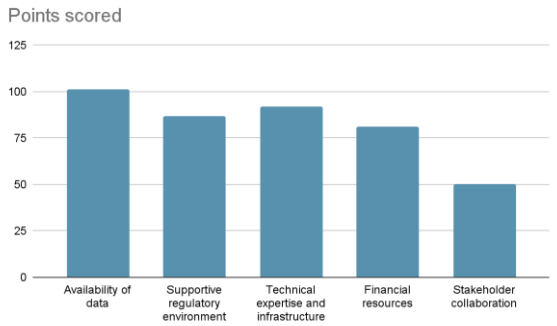


Fig. 4 Factors Contributing to Scalability

In Fig. 4, the Y-axis shows the number of choices, and the X-axis shows the factor influencing scalability. Scaling AI for SDGs requires technical know-how, regulatory support, and data availability, highlighting the importance of solid foundational resources and policies.

I. SDGs Anticipated to Gain the Most from AI Over the Next Five Years

Participants were asked which SDGs they thought AI would most likely help with in the near future, and they chose:

➔ SDG 3: Health and Well-Being SDG 4: High-quality education

➔ SDG 13: Addressing Climate Change

It is believed that AI could have a major impact in the fields of education, health, and climate action, all of which are in line with international goals to improve environmental sustainability and human well-being.

J. Suggested Upgrades to Strengthen AI's Contribution to SDG Achievement

The following changes were proposed by participants to enhance AI's contribution to the SDGs:

Table 4: **Suggested Enhancements to Strengthen AI's Contribution to SDG Achievement**

Recommended Improvement	Number of Selections
Increased data access	105
Enhanced technical and infrastructure support	92
Policy reform and regulatory support	87
Financial support and funding	81

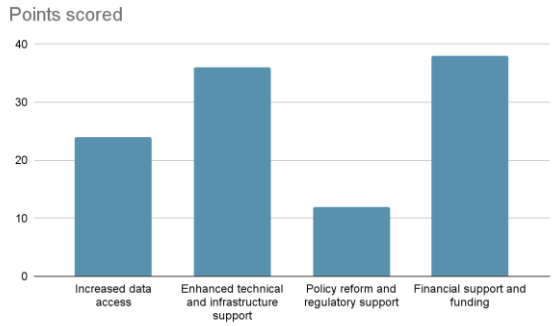


Fig. 5 Recommended Improvements to Enhance AI's Role in Achieving SDGs

In Fig. 5, the Y-axis shows the number of choices, and the X-axis shows the suggested changes to strengthen AI's contribution to reaching SDGs. To optimize AI's contribution to SDG achievement, it is believed that policy reforms, data access expansion, and technical assistance are essential first steps.

The results of this survey show that although AI is acknowledged as a useful instrument for accomplishing SDGs, significant obstacles still exist. The necessity for focused investments and policy support was highlighted by the identification of financial limitations, technical know-how, and data access as the main barriers. With a focus on scalability through improved resources and cooperative partnerships, participants think AI has the potential to significantly improve health, education, and climate action. By removing these obstacles, AI can significantly contribute to the advancement of sustainable development in a variety of industries and geographical areas.

REMEDIES AND SUGGESTIONS

To improve the role of artificial intelligence (AI) in accomplishing SDG 3 (good health and well-being), SDG 4 (quality education), and SDG 5 (gender equality), the following suggestions and solutions are put forth in light of the findings. For AI to be as effective as possible in achieving these Sustainable Development Goals (SDGs), these recommendations tackle the main issues noted in the analysis, such as limited technical expertise, financial limitations, and regulatory obstacles.

A. SDG 3: Good Health and Well-Being: Solutions and Suggestions

AI has the potential to greatly enhance health outcomes by streamlining resource management, treatment planning, and diagnosis. The following tactics are advised in order to get past the obstacles that have been found when implementing AI for SDG 3:

➔ Improve Health Analytics Infrastructure and Data Access: For AI applications in predictive analytics and diagnosis, health data is essential. Establishing safe, centralized health data repositories should be the main goal of partnerships between governments, healthcare organizations, and AI developers. In order to address concerns about patient confidentiality, this can make data sharing easier while guaranteeing adherence to data privacy laws.

➔ Invest in Healthcare Professionals' AI Training: It is essential to develop technical expertise in the healthcare industry. For healthcare professionals to effectively use AI tools, governments and organizations should support AI training programs. Healthcare workers would be better equipped to incorporate AI into their practices with training in topics like data interpretation, electronic health record (EHR) administration, and AI-based diagnostic tools.

➔ Boost Finance Public Health Initiatives Using AI: AI adoption in healthcare can be accelerated with financial assistance from the public and private sectors. To increase access to healthcare services in underserved areas, funding should be given priority to AI-driven public health initiatives like telemedicine and disease outbreak prediction.

➔ Use AI in Predictive and Preventive Healthcare: Predictive analytics driven by AI can assist in identifying populations at risk and enabling preventive care interventions. AI systems should be used by health departments to monitor and forecast health trends in order to facilitate prompt interventions and lessen the strain on medical facilities.

B. SDG 4: Quality Education: Solutions and Suggestions

AI presents chances to enhance accessibility, personalize instruction, and assist educators in developing successful learning environments. The following suggestions are put forth to address the difficulties encountered when implementing AI for SDG 4:

➔ Adaptive learning platforms and intelligent tutoring systems are two examples of AI-driven educational tools that schools and universities should incorporate into their curricula to provide individualized learning experiences. Individual learning outcomes can be improved by using these tools to determine students' strengths and weaknesses and modify the content accordingly.

➔ Give educators professional development in AI literacy because their lack of technical expertise frequently makes it difficult for them to use AI tools. In order to prepare teachers to successfully incorporate AI applications into their teaching practices, schools should set up professional development programs that teach them digital skills and AI literacy.

➔ Improve Accessibility for Students with Disabilities: AI-driven assistive technologies, like text-to-speech and speech-to-text apps, can contribute to greater accessibility in education. To promote inclusive education for all students, educational institutions should invest in AI tools made to assist students with disabilities.

➔ Encourage cooperation between AI developers and educational institutions: The creation of focused AI educational solutions can be aided by collaborations between academic institutions, schools, and AI technology firms. These partnerships can help institutions effectively use AI by addressing particular needs, such as automated administrative procedures or virtual learning environments.

C. SDG 5: Gender Equality: Solutions and Suggestions

By addressing biases, enhancing resource accessibility, and offering data-driven insights into gender disparities, artificial intelligence (AI) can promote gender equality. The following suggestions are made to improve AI's contribution to SDG 5:

➔ Create Bias-Free AI Models and Algorithms: To guarantee impartial and equitable results, AI systems must be built with the least amount of gender bias possible. The development of AI algorithms that identify and reduce potential biases should be a top priority for researchers and developers. Regular auditing of AI models is also necessary to evaluate and address gender disparities in their outputs.

➔ Collect and Examine Gender-Specific Data with AI: Policies and interventions targeted at reducing gender gaps can be informed by data on gender-based issues. AI systems are able to examine gender-specific data on topics like employment, education, and health, offering insights that help guide focused initiatives to advance equality and empower women.

➔ Encourage AI-Based Entrepreneurship Programs for Women: Both the public and private sectors ought to set up initiatives that support women's involvement in AI-driven fields. AI-powered platforms can help female entrepreneurs get training and capital, giving them the tools and resources they need to lead and innovate in the tech industry and beyond.

➔ Use AI-Powered Platforms to Promote Gender Equality: By increasing awareness and offering resources, artificial intelligence (AI) can be used to develop platforms that support gender equality. For instance, organizations can reach a larger audience and bolster their advocacy efforts by identifying and addressing gender discrimination issues through data analysis and AI-driven social media tools.

The aforementioned suggestions and solutions are meant to tackle the main obstacles to using AI to achieve SDGs 3, 4, and 5. AI has the potential to revolutionize healthcare, education, and gender equality through strengthening data infrastructure, boosting technical know-how, obtaining funding, and encouraging inclusive practices. To fully utilize AI and ultimately aid in the global endeavor to accomplish these Sustainable Development Goals, cooperation between governments, organizations, and AI developers is crucial.

CONCLUSION

With a particular focus on SDG 3 (Good Health and Well-Being), SDG 4 (Quality Education), and SDG 5 (Gender Equality), this study demonstrates the revolutionary potential of artificial intelligence (AI) in achieving the Sustainable Development Goals (SDGs). The study found both opportunities and major obstacles in applying AI for these important goals using a mixed-methods approach that included surveys and qualitative analysis. Key obstacles that affect the effectiveness and scalability of AI solutions in

gender equality, healthcare, and education include limited technical expertise, financial limitations, data access problems, and ethical considerations.

The analysis emphasizes that a coordinated strategy involving skill development, infrastructure investment, and regulatory support is necessary to overcome these obstacles. Institutions can successfully use AI to optimize healthcare, create gender equality, and personalize education by addressing technical constraints with improved data systems, training initiatives, and focused funding. In order to support equitable outcomes, the recommendations also stress the significance of creating AI algorithms free from bias, encouraging cooperative partnerships, and improving accessibility through AI-driven tools.

To sum up, artificial intelligence (AI) presents strong instruments to hasten the achievement of SDGs 3, 4, and 5, but its effectiveness depends on resolving the fundamental issues this study found. AI has the potential to play a significant role in building a more sustainable, just, and inclusive world of governments, academic institutions, healthcare providers, and tech developers working together. Future studies should look at specific interventions that promote sustainable AI implementation across various contexts and regions, as well as the long-term effects of AI-driven SDG initiatives.

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ЗАСТОСУВАННЯ ШТУЧНОГО ІНТЕЛЕКТУ ДЛЯ ДОСЯГНЕННЯ ЧЕТВЕРТОЇ ЦІЛІ СТАЛОГО РОЗВИТКУ

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Анотація. *З акцентом на третю (Добре здоров'я та благополуччя), четверту (Якісна освіта) та пяту (Гендерна рівність) Цілі сталого розвитку, це дослідження вивчає як штучний інтелект (ШІ) може допомогти досягти Цілей сталого розвитку (ЦСР). Дослідження висвітлює основні перешкоди та можливості застосування ШІ для сталого розвитку за допомогою змішаного методу, який включає опитування 345 учасників та якісний аналіз. Результати показують, що ШІ має багатообіцяючі можливості для таких галузей, як адвокація гендерної рівності, прогнозна охорона здоров'я та персоналізоване навчання. Однак такі перешкоди, як обмежене фінансування, брак технічних знань, проблеми з доступом до даних та моральні дилеми, перешкоджають його широкому використанню. Дослідження пропонує практичні рішення, такі як покращена інфраструктура даних, навчання фахівців грамотності в галузі ШІ, цілеспрямоване фінансування та створення алгоритмів ШІ, вільних від упередженості. У рекомендаціях робиться сильний акцент на розвитку кооперативних альянсів та використанні ШІ для розробки інклюзивних систем, що вирішують глобальні проблеми гендерної рівності, освіти та охорони здоров'я. Це дослідження доходить висновку, що хоча ШІ має потенціал революціонізувати Цілі сталого розвитку (ЦСР), його успіх залежить від вирішення цих фундаментальних проблем. ШІ може бути життєво важливим компонентом створення сталого, справедливого майбутнього, де ресурси, навчання та нормативно-правові бази мають пріоритет. Для підтримки ініціатив ЦСР, заснованих на ШІ, у всьому світі, майбутні дослідження повинні зосередитися на довгострокових наслідках та масштабованих втручаннях.*

Ключові слова: *гендерна рівність, якісна освіта, прогнозна охорона здоров'я, штучний інтелект (ШІ), Цілі сталого розвитку (ЦСР).*

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