



# Harnessing Artificial Intelligence to Accelerate Sustainable Development for the Planet

Abeer Mohamed Abd El Razek Youssef

Faculty of Graduate Studies for Statistical Research, Econometrics of Statistical Department, Cairo University, Giza, Egypt

## Email address:

abeer\_yussef@yahoo.com

## To cite this article:

Abeer Mohamed Abd El Razek Youssef. Harnessing Artificial Intelligence to Accelerate Sustainable Development for the Planet. *Advances*. Vol. 3, No. 3, 2022, pp. 132-139. doi: 10.11648/j.advances.20220303.23

**Received:** August 14, 2022; **Accepted:** September 5, 2022; **Published:** September 29, 2022

**Abstract:** Because digital transformation is one of the main pillars to achieve the Egypt's Vision 2030, we seek to harness technologies and artificial intelligence to serve all different sectors, enable digital transformation in Egypt, and achieve many national digital achievements through a digital perspective that reflects our next vision. Artificial intelligence plays a key role in making radical progress in various sectors and keeping pace with the progress and development of the world. Artificial intelligence works by combining large amounts of data and intelligent algorithms, allowing the program to automatically learn from patterns. Artificial intelligence is a broad field of study encompassing many theories, methods, and techniques, as well as subfields such as machine learning, computer vision, natural language processing, and others. Artificial intelligence has the ability to accelerate global efforts to protect the environment and conserve resources, as it has the great capabilities inherent in collecting and analyzing data to help combat climate change, as machine learning can be used to improve energy generation methods, and regulate the process of demand for it, with a focus on the use of renewable energy. In addition to deploying sensors and smart meters inside buildings to collect data, monitor and analyze and improve energy use inside buildings. The use of artificial intelligence to preserve environmental diversity, where artificial intelligence connected to satellites can detect changes in land use, monitor vegetation cover, predict natural disasters, monitor, and analyze their effects, and can monitor alien (invasive) species of organisms that may threaten a specific environmental area such as Environmental reserves, identification, tracking, and elimination using machine learning.

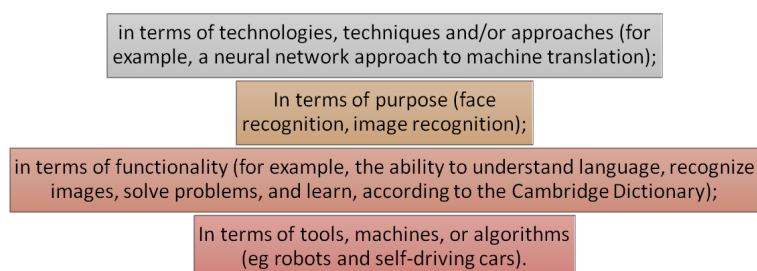
**Keywords:** Artificial Intelligence, Applications, Sustainable Development, Climate Challenges, Egypt

## 1. Introduction

Artificial intelligence (AI) consists of a rich set of methods and disciplines, including vision, perception, speech, dialogue, decisions, planning, problem-solving, robotics, and other applications that enable self-learning. AI is best viewed as a set of technologies and techniques used to complement

traditional human traits, such as intelligence, analytical ability, and other capabilities.

Artificial intelligence (AI) consists of a set of vastly different technologies, which can be broadly defined and grouped together as "Adaptive Self-Learning Systems". There are different approaches to defining AI:



Source: Prepared by the researcher.

**Figure 1.** Constants of Artificial intelligence.

AI comprises a rich set of methods and disciplines, including vision, perception, speech, dialogue, decisions, planning, problem-solving, robotics, and other applications that enable self-learning. AI is best viewed as a set of technologies and techniques used to complement traditional human traits, such as intelligence, analytical ability, and other capabilities. Artificial intelligence, machine learning (ML) and modern data technologies have been greatly enabled by recent advances in computer processing, power and speed, and advances in artificial intelligence in turn depend on advances in data technologies [1].

Across many sectors, artificial intelligence provides benefits from new and innovative services, and the potential to improve scale, speed, and accuracy. AI extends many of these advantages and combines them with insights from statistics and big data. Based on trend analysis, AI helps move business models, policies, and organizational methods from descriptive analysis and identifying trends to more sensitive, proactive, and evidence-based models and approaches. For example, AI is used to detect patterns in health-related vulnerabilities and insurance risks, among many other applications [2].

The use of artificial intelligence tools and techniques is creating new opportunities across many diverse fields. AI and other algorithms are widely used in internet search, entertainment, social media, self-driving cars, visual recognition, translation tools, smart assistants/speakers, voice-to-text conversion, and many other applications [3].

## 2. Artificial Intelligence

The term artificial intelligence (AI) refers to systems or devices that simulate human intelligence to perform tasks and that can improve themselves based on the information they gather. Artificial intelligence manifests itself in several forms. Some of these examples:

Chatbots use artificial intelligence to understand customer problems faster and provide more efficient answers.
Artificial intelligence uses it to analyze critical information from a large set of text data to improve scheduling.
Recommendation engines can make automated recommendations for TV shows based on users' viewing habits.

Source: Prepared by the researcher.

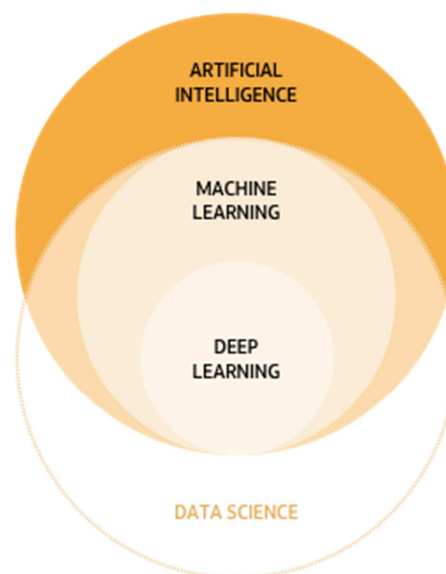
**Figure 2.** Examples of Artificial intelligence.

AI is more about the ability to think and analyze data than it is about a particular form or function. Although AI presents images of high-performance human-like robots taking over the world, it is not intended to replace humans. It aims to significantly enhance human capabilities and contributions.

This makes it a very valuable business asset [4].

The main principle of AI is to simulate and transcend the way humans perceive and interact with the world around us. Which is fast becoming the cornerstone of innovation. Now that AI is equipped with many forms of machine learning that recognize patterns in data to make predictions, AI can add value to your business by:

- Provide a more comprehensive understanding of the wealth of data available.
- Rely on predictions to automate highly complex and routine tasks [5].



Source: Prepared by the researcher.

**Figure 3.** Set of vastly technologies in AI.

## 3. Artificial Intelligence Technologies and Climate Challenges

Artificial intelligence technologies are being used to address global climate challenges. Climate change monitoring includes large, ever-evolving data sets. AI systems can help analyze sets of environmental information, with the aim of tracking changes in climatic conditions in real time, addressing vulnerabilities to reduce them, and providing vital opportunities for humanity to find solutions that can have a positive impact on our planet faster [6].

### 3.1. AI Can Be a Powerful Tool in Addressing Some of Humanity's Greatest Challenges

Machine learning can accomplish certain tasks very quickly and accurately. Conservationists use artificial intelligence to analyze months of underwater recording data and identify whale migration patterns, while medical diagnosticians use it to perform several medical examinations simultaneously to identify the first symptoms of disease.

**Table 1.** The contribution of artificial intelligence to the ecosystem.

AI-powered systems help us reduce the amount of energy wasted in the home by turning off heating systems and lights when we leave the house.
Worldwide, these systems help combat drought by monitoring areas affected by desertification.
These systems are used to model glacier melting and project sea level rise so that effective action can be taken.
Other systems are helping to find new chemical combinations needed to produce fuels from sunlight.
Researchers are also considering the environmental impact of data centers and AI computing systems themselves, such as finding a way to develop more energy-efficient systems and infrastructures.
AI is just one tool in the complex process of analyzing the causes of climate change, but its ability to process large amounts of data and discover patterns allows us to better understand the ecosystem.

Source: Prepared by the researcher.

### 3.2. Three Factors Are Driving the Development of AI Across Industries

It provides easy and affordable high-performance computing. The abundance of business computing power in the cloud has enabled easy access to affordable, high-performance computing. Prior to this development, the only computing environments available for AI were non-cloud-based and expensive [7].

Having large amounts of data available for learning. AI needs to learn from a lot of data to make correct predictions. The emergence of various tools for collecting disaggregated data, in addition to the ability for organizations to store and process this data, both structural and unstructured data, has led to more organizations being able to create and train AI algorithms easily and affordably [8].

Applied AI technology provides a competitive advantage. Companies are increasingly realizing the competitive advantage of applying AI insights to business goals and making them a business-wide priority. For example, targeted recommendations provided by AI technology can help make better decisions faster. The many features and capabilities of AI can lower costs, reduce risks, speed up time to market, and more [9].

### 3.3. Strong Indicators of an Increase in the Growth Rates of the Economies of Countries That Apply Artificial Intelligence Techniques

Many optimistic economic reports pointed to the strong role that artificial intelligence will play in bringing about

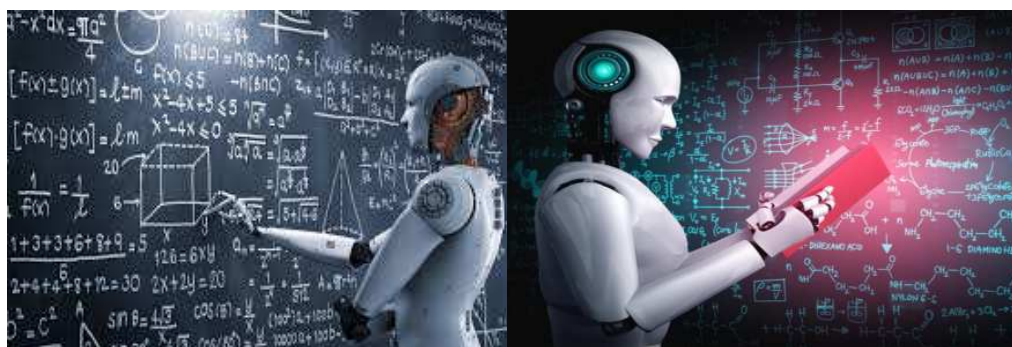
fundamental changes in the economic and social systems of countries that have relied on artificial intelligence and its mechanisms and applications in economic and educational institutions and bodies.

## 4. The AI for Earth Program Aims to Protect the Planet Through Data Science

Industrialization is one of the most serious environmental problems facing our world today. For example, the climatic changes that the world is witnessing, the pollution of soils and rivers, the large consumption of forest resources, and other environmental hazards are one of the effects in which industrialization plays a fundamental role.

Fortunately, we have reached a unique and unprecedented point in human history. We are facing a new era known as the Fourth Industrial Revolution. This revolution has created a great opportunity for us to reshape the way we manage our environment today, where the capabilities of digitalization and societal transformations are harnessed to solve environmental problems. And creating a revolution in the field of sustainability, with the aim of supporting innovative projects in the fields of agriculture, water, biodiversity, and climate change [10].

There are expectations that the economic growth rates of these countries will increase, and that artificial intelligence will add \$15 trillion to the global economy by 2030, according to the United Nations [11].



Source: Prepared by the researcher.

**Figure 4.** Artificial intelligence in Data Science.

Artificial intelligence depends in most of its characteristics on data, such as machine learning, as it helps








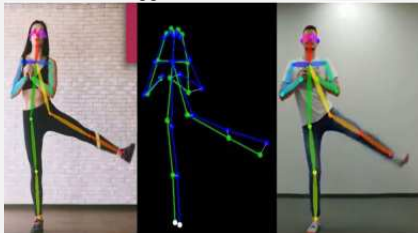


humans to predict the future and make better decisions. Artificial intelligence is one of the top priorities for the public policy agendas of most countries at the national and international levels. Several national government initiatives focus on the use of AI applications for development and economic growth [12].

## 5. Artificial Intelligence Applications

Artificial intelligence is used in many important technological and life applications, which facilitated many aspects of life and performed various functions that were limited to the human mind alone. Among the most important applications of artificial intelligence are the following:

*Table 2. Applications Artificial intelligence.*

Robotics	which are used in many industries such as healthcare, finance, and marketing.	Robotics	which are used in many industries such as healthcare, finance, and marketing.
Exploring outer space	Like machines sent into space, Satellite, map building, and location tracking technology. 	healthcare sector	So that health care machines can analyze the patient's condition based on his data, predict diseases that may occur to him in the future, and determine the type of treatment. 
Customer service	Such as robots that are used to respond to customer chats, and robots that perform customer service and e-marketing functions. 	face recognition	This technology is used in many devices such as the smartphone and works to learn and perceive patterns to produce fast and effective results. 
Stock market and finance	Such as the algorithms that are used in analyzing stocks in the financial market and analyzing and forecasting profits and losses. 	Virtual Voice Aids	It aids and imitates human intelligence through voice communication. 
digital media	So that it displays advertisements that are of interest to the target person by analyzing his data and understanding his trends from his searches on the Internet. 	fitness apps	Examples of fitness apps that use artificial intelligence are smart watches that count steps, calculate calories, and other fitness-related apps. 

Source: Prepared by the researcher.

## 6. Egypt's Strategy for Artificial Intelligence

The National Artificial Intelligence Strategy is a key priority to help Egypt achieve its sustainable development goals. It highlights the country's plans to promote the use of AI technologies to transform the economy beyond mere technology adoption to fundamentally rethink business models and bring about profound changes to reap productivity gains and create new areas of growth. This strategy will be implemented within three to five years.

### 6.1. Vision

Exploiting artificial intelligence technologies to contribute to achieving Egypt's development goals for the benefit of all Egyptians and enhancing Egypt's leading role at the regional level to be an active global player in the field of artificial intelligence.

### 6.2. The Message

Establish an artificial intelligence industry in Egypt, including skills development, technology, ecosystem, infrastructure, and management mechanisms to ensure its ability to be sustainable and competitive [13].

### 6.3. Themes of Egypt's Strategy for Artificial Intelligence

#### 6.3.1. Artificial Intelligence for Government

Integrating AI technologies into government operations to increase efficiency and enhance transparency.

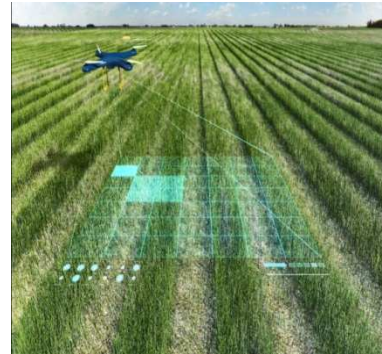


Source: Prepared by the researcher.

**Figure 5.** Artificial Intelligence In Agriculture.

#### 6.3.2. Artificial Intelligence for Development

Enhancing the use of artificial intelligence in vital development sectors by investing partnerships with local beneficiaries and local or foreign partners in the field of technology to ensure knowledge transfer while meeting Egypt's development needs [14].



Source: Prepared by the researcher.

**Figure 6.** Development Artificial Intelligence.

#### 6.3.3. Capacity Building

Preparing Egyptians for the age of artificial intelligence at all levels, from spreading public awareness to directing formal education and providing training programs at both technical and professional levels.



Source: Prepared by the researcher.

**Figure 7.** Artificial Intelligence in Building.



6.3.4. International Relations

Strengthening Egypt’s leadership position at the regional and international levels by supporting relevant initiatives, representing the African and Arab positions, and actively participating in discussions related to artificial intelligence in various international organizations such as UNESCO, the Organization for Economic Cooperation and Development, the International Organization of La Francophonie, the International Telecommunication Union, the World Intellectual Property Organization and others [15].



Source: Prepared by the researcher.

Figure 8. International Telecommunication.

6.4. Enabling Factors of Egypt's Strategy for Artificial Intelligence

1. Governance:	Track and Monitor Implementation of Strategy, Laws, Regulations, Ethical Principles, and Guidelines
2. Data:	Data collection, management, security, and availability are important enablers in this field
3. Ecosystem:	Academia, research, start-ups, SMEs, multinationals, NGOs, and civil society
Infrastructure:	Physical infrastructure includes computers, storage, and communication, as well as ensuring access to all members of the ecosystem

Source: Prepared by the researcher.

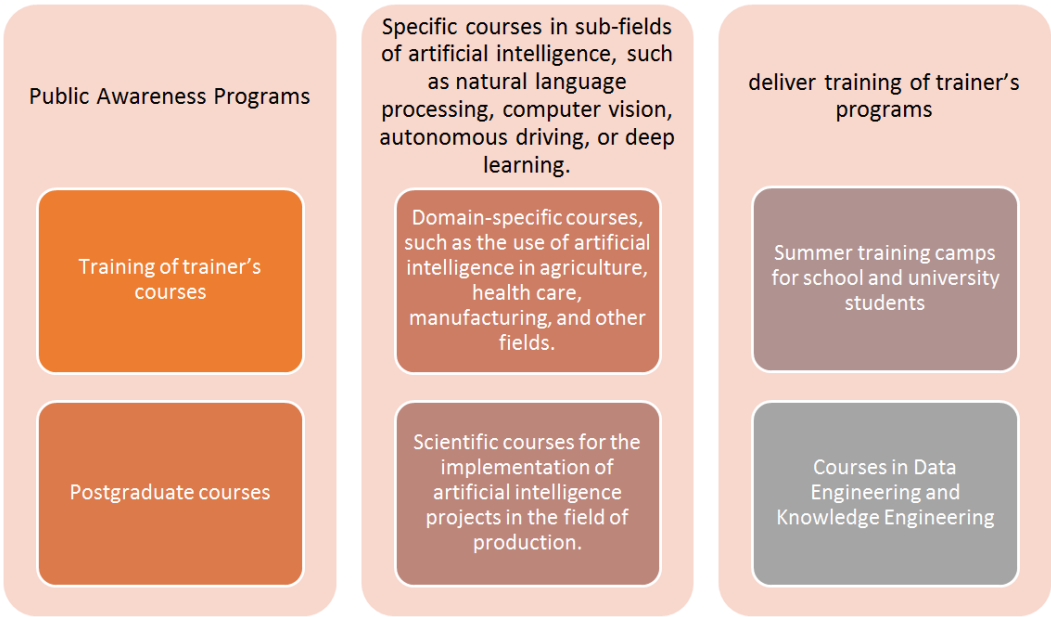
Figure 9. Strategy for artificial intelligence In Egypt.

6.5. Priority Sectors in Egypt

- 1. Agriculture/Environment and Water Management.
  - 2. Health care.
  - 3. Arabic Natural Language Processing.
  - 4. Economic Planning.
  - 5. Manufacturing and infrastructure management.
- To enhance the use of artificial intelligence techniques, Egypt seeks to build youth capabilities and cooperate with technology partners to develop artificial intelligence applications, which contribute to facing Egypt's challenges.

7. Building Abilities

Egypt is looking to build partnerships with academic institutions and private sector companies that can provide and deliver training of trainer’s programs or direct programs in various topics of artificial intelligence that target different groups in Egypt. Potential areas of cooperation include, but are not limited to, the following:



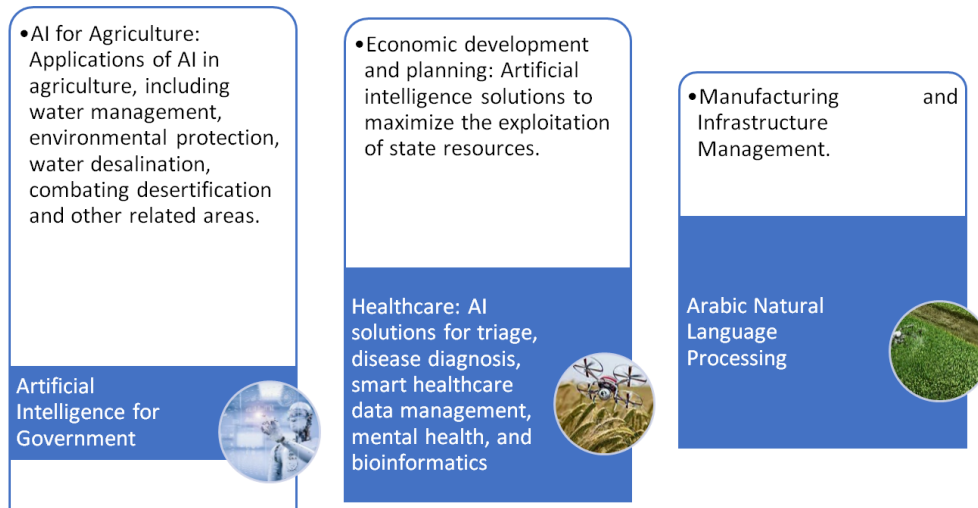
Source: Prepared by the researcher.

Figure 10. Building Abilities in Egypt.

## 8. Participation in Application Development

Egypt is looking for technology partners (private companies or applied research entities) who are willing to build a

partnership with the Ministry of Communications and Information Technology to address some of the most important challenges facing Egypt using AI applications. Potential areas of cooperation include, but are not limited to, the following:



Source: Prepared by the researcher.

**Figure 11.** Participation in application development.

## 9. AI in Healthcare Is Accelerating Medical Decisions in Egypt

In healthcare, artificial intelligence is being used to help deliver telehealth and follow-up tools. AI can analyze large amounts of data to gather insights from large groups of patients and improve diagnosis and predictive analysis. AI has been applied with some success to COVID-19 diagnostic models from lung scans and images, or to differentiate between "Covid" coughs and other types of coughs. AI and big data have the potential to improve healthcare systems by improving hospital workflows, providing more accurate diagnoses, improving clinical decision-making, and delivering better treatments and higher quality care at a lower cost.

With massive amounts of health data and growing responsibilities, clinicians are finding it hard to find time to keep up with the latest medical evidence and continue to deliver patient-centered care. By applying machine learning techniques to the latest biomedical data and electronic health records, healthcare professionals can quickly extract relevant, accurate evidence-based information organized by medical professionals. Some AI-powered medical decision support tools feature natural language processing and scope-based training—allowing users to type questions as they would a medical colleague in regular everyday conversation and receive fast, reliable answers [16].

Artificial intelligence (AI) and machine learning solutions are transforming the way healthcare services are delivered. Health organizations have accumulated huge data sets in the

form of health records and images, population data, claims data, and clinical trial data. AI techniques are well suited to analyze this data and uncover patterns and insights that humans have not been able to find on their own. With deep learning from AI, healthcare organizations can use methods (algorithms) to help them make better business and medical decisions and improve the quality of their experiences [17].



Source: Prepared by the researcher.

**Figure 12.** Artificial Intelligence in healthcare.

## 10. Artificial Intelligence Widens the Gap Between Rich and Poor Countries

The improvement in the productivity of robots is a driver of divergence between developed and developing countries if robots easily replace workers. In addition, this improvement

often increases income but also increases inequality in its distribution, at least during the transitional period and perhaps in the long run for some groups of workers, both in advanced and developing economies.

There is no magic bullet to avoid divergence. Given the rapid pace of the robotics revolution, developing countries should invest in raising overall productivity and skill levels more urgently than ever, so that robots are a complement to their workforce rather than a substitute for it. Of course, it is easier said than done. In our model, increasing TFP—which is responsible for many other institutional and fundamental differences between developing and developed countries that are not explained by labor and capital inputs—is particularly beneficial because it stimulates the accumulation of more robots and physical capital. Such improvements are always beneficial, but their gains are getting stronger in the context of the AI revolution.

Our results also underscore the importance of accumulating human capital to avoid divergence and suggest that there may be a different growth dynamic among developing economies with varying levels of skill. The landscape is likely to be much more difficult in developing countries, which hoped to make high profits from the demographic transition, which they anticipate with great interest. Policymakers have welcomed the growing young population in developing countries as a major potential opportunity to benefit from the shift in jobs from China because of its rise from the middle-income level. Our findings suggest that bots may steal these jobs, which calls for policy makers to act to mitigate these risks. In the face of these technology-driven pressures, a significant and rapid shift in productivity gains and investment in education and skills development will benefit from this anticipated demographic shift [13].

## 11. Conclusion

This study aims to identify artificial intelligence and show its various fields. The integration of artificial intelligence applications in various sectors that are closely related to the sustainable development goals are changing by finding optimal solutions because the speed of innovation is changing our world. One of the solutions provided by artificial intelligence applications is to determine the places where poverty is concentrated in the world. This is done using household surveys and census data to identify slums. In recent years, scientists have benefited from the huge and continuous flow of satellite images, which enabled them to develop poverty maps. Artificial intelligence technology has also enabled an increase in the productivity of agricultural land and the provision of electricity through electricity via the way of smart networks and saving water losses, and all of this contributes to increasing production and thus increasing the people's share of global output.

Industry, innovation and infrastructure There is a tendency to integrate hardware and software to make artificial intelligence techniques more feasible, as artificial intelligence is used to communicate between people and

machines and exchange information, which facilitates the manufacture of products and enhances efficiency in operations, as the new hybrid industries that include artificial intelligence, IoT sensors and printing Four-dimensionality is reshaping industries and generating tremendous innovation.

## References

- [1] Flasiński, M. (2016). Introduction to artificial intelligence. Switzerland: Springer International Publishing.
- [2] Fetzer, J. H. (1990). What is Artificial Intelligence?. In *Artificial Intelligence: Its Scope and Limits* (pp. 3-27). Springer, Dordrecht.
- [3] Jackson, P. C. (2019). Introduction to artificial intelligence. Courier Dover Publications.
- [4] Nilsson, N. J. (1982). Principles of artificial intelligence. Springer Science & Business Media.
- [5] Brynjolfsson, E., & McAfee, A. N. D. R. E. W. (2017). Artificial intelligence, for real. *Harvard business review*, 1, 1-31.
- [6] Ginsberg, M. (2012). Essentials of artificial intelligence. Newnes.
- [7] Cohen, P. R., & Feigenbaum, E. A. (Eds.). (2014). The handbook of artificial intelligence: Volume 3 (Vol. 3). Butterworth-Heinemann.
- [8] Lu, H., Li, Y., Chen, M., Kim, H., & Serikawa, S. (2018). Brain intelligence: go beyond artificial intelligence. *Mobile Networks and Applications*, 23 (2), 368-375.
- [9] Mitchell, R., Michalski, J., & Carbonell, T. (2013). An artificial intelligence approach. *Machine learning*. Berlin, Heidelberg: Springer.
- [10] Agrawal, A., Gans, J., & Goldfarb, A. (2017). What to expect from artificial intelligence.
- [11] Bond, A. H., & Gasser, L. (Eds.). (2014). Readings in distributed artificial intelligence. Morgan Kaufmann.
- [12] Davenport, T. H., & Ronanki, R. (2018). Artificial intelligence for the real world. *Harvard business review*, 96 (1), 108-116.
- [13] Goralski, M. A., & Tan, T. K. (2020). Artificial intelligence and sustainable development. *The International Journal of Management Education*, 18 (1), 100330.
- [14] Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S.,... & Fuso Nerini, F. (2020). The role of artificial intelligence in achieving the Sustainable Development Goals. *Nature communications*, 11 (1), 1-10.
- [15] Liengpunsakul, S. (2021). Artificial intelligence and sustainable development in China. *The Chinese Economy*, 54 (4), 235-248.
- [16] Truby, J. (2020). Governing artificial intelligence to benefit the UN sustainable development goals. *Sustainable Development*, 28 (4), 946-959.
- [17] Duvnjak, K., Gregorić, M., & Gorše, M. (2020). Sustainable development—an artificial intelligence approach. *Management Research and Practice*, 12 (4), 18-28.