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Opportunities and Risks of Artificial intelligence in Achieving Sustainability: Proposed Actions for Sustainable Artificial intelligence

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Abstract

Artificial intelligence is one of the newest fields in computer science, designed to simulate human intelligence and decision-making processes. This capability enhances its effectiveness in advancing sustainability through various technologies and applications that create an integrated framework, ensuring a necessary balance among the economic, social, and environmental dimensions of development. However, the excessive and uncontrolled use of artificial intelligence poses significant risks, including violations of human privacy and inherent rights, as well as the proliferation of intelligent weaponry, which could lead to catastrophic global conflicts. These threats fundamentally contradict the principles of sustainability. Therefore, it is essential for artificial intelligence to embrace sustainability, guided by a set of proposed measures aimed at achieving what is referred to as sustainable artificial intelligence.

Keywords: sustainability, sustainable development, artificial intelligence.

JEL Coding: Q010, Q01, O3

1- Introduction:

Experts predict that the global economy will be affected by business models powered by artificial intelligence as a major economic engine, weakening the size of economic growth and increasing the efficiency of the workforce by 40%, as the autonomous vehicle economy will reach \$7trillion and the Internet will reach \$15 trillion of global GDP over the next 20 years. In addition, the impact of artificial intelligence and robotics technologies on global GDP is estimated at \$114trillion by 2030, and can rise to 14%, which leads to critical development transformations in various development fields (Al- Barashi, 2023, p. 985). Artificial intelligence is expected to add \$7 trillion to the Chinese economy. North America's

revenues are estimated at \$3.8 trillion. Northern European countries' revenues will reach \$ 1.8 trillion, compared to \$1.2 trillion for Africa, Oceania and other Asian markets by 2030. It is estimated that 35% of global institutions use artificial intelligence technologies, as well as 83% of companies in various fields that place reliance on artificial intelligence as a priority within their future strategy. Despite the slow economic growth rates against the huge profits achieved by technology companies since the 1990s, they are generally driven by a rise in productivity due to reliance on computer and communication technologies, which calls into question the ability of artificial intelligence to achieve benefits for the economy as a whole and not a specific sector in itself (Salah, 2024, pp. 97-98).

These statistics confirm that the world today is witnessing its fastest and most advanced stages through what is called the Fourth Industrial Revolution, which announced the signs of the Fifth Industrial Revolution, which is most distinguished by artificial intelligence, which imposed its existence through various products and services associated with it, which changed the shape of our day, and our way of life, and extended its repercussions on various economic, social and environmental aspects at the macro level, affecting sustainability, including sustainable development. The expansion of the use of artificial intelligence technologies and the expansion of the innovation of new ones confirm that the market for artificial intelligence technologies will become one of the most important and most important global markets contributing to the global economy, but on the other hand, a very important issue looms, which is the comparison between the extent to which humanity benefits from this and the extent to which it is affected. Therefore, artificial intelligence applications must have a set of determinants that indicate the degree of their response and interest in issues beyond economic profitability, which is preserving the environment and achieving social ethics related to workers and employees, and social justice related to citizenship behavior towards stakeholders and humanity with the entire international community, and this can be termed sustainable artificial intelligence. The widespread adoption of artificial intelligence applications in the future raises some concerns related to the risks resulting from excessive use without subjecting it to determinants or criteria that ensure the achievement of sustainability in its various dimensions, including sustainable development in its objectives.

From the above, the following problem can be raised: What are the opportunities and risks surrounding artificial intelligence in order to achieve sustainability?

2- Conceptual Framework

2. 1. Artificial Intelligence

The definition of artificial intelligence (AI) has evolved over time, reflecting differing perspectives among scientists and specialists. Some view AI as a system that mimics human thought processes, while others see it as a system designed to interact with humans. Additionally, some definitions emphasize logical reasoning, while others focus on the simulation or representation of logical thinking. Among these interpretations, AI can be described as a subfield of computer science dedicated to enabling computers to perform tasks akin to human intelligence, such as learning, reasoning, and decision-making. This modern discipline seeks to replicate the cognitive processes of the human mind, allowing computers to solve problems and make decisions in a logical and organized manner, similar to human thought.

Defining artificial intelligence reveals essential requirements for its application, which include: a data system for representing information and knowledge, algorithms to process this information, and a programming language to convey both the information and the algorithms (Blilita, 2022, pp. 18-20). These components manifest in three primary types, progressing from simple reactions to more complex forms of perception and self-interaction.

Simple artificial intelligence: This type depends on understanding the reality and evaluating some simple and limited functions in the economic fields, and illiteracy, and its behavior is considered as a reaction to not standing with me, and it can only work through certain circumstances.

Strong artificial intelligence: It is characterized by the ability to collect people who died at night and accumulate experiences from previous positions, which lead it to make independent decisions for themselves, thirds of the time; self-driving cars, chatbots, and personal assistance programs.

Super artificial intelligence: It represents models that are still under experimentation, and seeks to simulate humanity, and we can distinguish between basic stereotypes: the first tries to They are human thoughts and emotions that affect the locks of humans, and has a specific ability to interact socially, and the second is a model of the theory of reasoning; where these models can predict the feelings of others and their attitudes and interact with them, it represents the position of super-intelligent machines. This type is the most dangerous type of

artificial intelligence for me, which requires the need to deal with it legally, because it exceeds the capabilities of humans and their existence (Al-Karim, 2024, p. 347).

The previous classifications of artificial intelligence types indicate that they are organized by developmental stages, yet they share numerous common characteristics, which can be summarized as follows: the ability to think and understand, to acquire and apply knowledge, to leverage past experiences in new contexts, to use trial and error for exploration, to respond swiftly to new situations, to navigate challenging problems, to manage ambiguous scenarios in the absence of information, to discern the relative importance of various elements, to provide relevant information for administrative decision-making, to visualize and comprehend visual information, and to utilize intelligence in problem-solving when complete information is lacking (Al-Barashi, 2023, p. 962).

Therefore, it can be said that artificial intelligence is an intelligence similar to the human intelligence that he invented. He applies his machine or computer commands in order to make a decision or solve a specific problem quickly and efficiently, without getting tired of the human mind at this stage. Thus, human intelligence makes a great effort to find artificial intelligence at its inception, but later artificial intelligence saves a lot of effort, time and cost from human intelligence and guarantees it significant material and moral well-being.

2. 2. Sustainability

The term sustainability is related verbally and terminologically to sustainable development and its known dimensions, the economic dimension, the social dimension and the environmental dimension.

Sustainability represents the ability of systems, practices, or processes to continue indefinitely without harming the environment, depleting resources, or compromising the well-being of future generations. It is an approach that balances economic, social, and environmental factors to ensure an equitable and healthy world for present and future generations (Dyabe, 2024, p. 147). It can also be defined as the integrated framework that ensures the necessary fit between the economic, social and environmental aspects of development (Fatima Ramadane Al-Nadjare, 2023, p. 707/719). Accordingly, the relationship between sustainable development and sustainability lies in that the first poses the ways and methods through which sustainability is achieved, and these methods are represented in various activities and practices related to development, and thus sustainability is one of the most important goals of sustainable development and the added value that this concept brings, through the use of

resources without harming them and preserving them as they are or better for future generations.

Sustainability, within the context of sustainable development, encompasses several key characteristics, which can be summarized as follows (Fatima Ramadane Al-Nadjare, 2023, p. 721): it necessitates continuity, which involves a steady increase in national income to allow for reinvestment in the replacement, renewal, and maintenance of resources; it mandates the regulation of both influential and renewable natural resources to secure these resources for future generations; and it aims to achieve environmental balance through the preservation of natural life, equitable resource use, and the production of renewable resources, highlighting the intrinsic link between development and the environment as foundational to sustainable initiatives. Moreover, sustainability is a process occurring at local, regional, and international levels, evidenced by transfer mechanisms that convey negative impacts from one country to another. It spans multiple, interconnected domains—economic, social, and environmental—where success does not stem from any single aspect but from the intricate relationships among these fields, which can be understood and applied from various perspectives. Achieving sustainability requires a shift in our mindset and approach to local environments, focusing on three simultaneous directions: fostering reasonable economic growth while ensuring horizontal and vertical equity within and across generations, all within a healthy, clean environment that prioritizes rational and sustainable resource use.

Based on this foundation, sustainability aims to achieve several key objectives (Fatima Ramadane Al-Nadjare, 2023, pp. 722-723): fostering continuous and appropriate changes to meet societal needs while balancing economic development with environmental and social issues to find suitable solutions; ensuring the rational exploitation of resources, treating them as limited to prevent their depletion; raising awareness of economic, social, and environmental challenges, promoting responsibility, and encouraging active participation from all levels of society; and integrating modern technology to enhance community awareness regarding its significance and application in development, thus improving quality of life while mitigating negative impacts. Sustainability encompasses three main dimensions: the environmental dimension, which recognizes that all activities can pose environmental risks affecting water, air, and human health through energy use, waste, and pollution; the social dimension, which addresses the social and ethical implications of activities, emphasizing contributions to societal development, including safe working conditions, fair

insurance systems, and effective community relations; and the institutional dimension, which focuses on governance, transparency, and the protection of shareholder interests (Salah, 2024, pp. 103-104). Within these dimensions, sustainability is guided by principles that reflect their significance: in the environmental dimension, crucial principles include preserving natural beauty and the quality of water, air, and soil, as well as addressing climate change and biodiversity; in the social dimension, key principles encompass local and regional development, healthcare, lifelong learning, social cohesion, equality, critical thinking, and problem-solving skills; and in the economic or institutional dimension, the emphasis is on economic development, poverty eradication, competition, growth, creativity, and industrial advancement (Wizarete Al-Beae Djoumhouriyate Masre Al-Arabya) (Fatima Ramadane Al-Nadjare, 2023, p. 723). Ultimately, sustainability represents the responsible and balanced interaction with the environment to prevent the depletion or degradation of natural resources, ensuring long-term environmental quality and meeting the needs of present generations without compromising the abilities of future ones, thereby achieving sustainable development in a more integrated manner.

3- METHODOLOGY :

This article is grounded in a review of pertinent literature concerning the role of artificial intelligence in promoting sustainability, as well as the associated risks that hinder its effectiveness. Various academic databases were utilized, including Google Scholar, with search terms such as: artificial intelligence, sustainability, risks of artificial intelligence, education, health, and digital governance.

The chosen literature was subsequently analyzed using an objective, descriptive analytical framework to uncover significant trends, opportunities, and challenges related to the implementation of AI in enhancing sustainability. Furthermore, the article presents real-world examples of diverse AI applications that support various dimensions of sustainability, showcasing AI's potential to contribute to sustainable development. It also addresses the different risks linked to the unchecked and excessive use of AI.

The article also included some practical recommendations that organizations and policymakers can adopt, in order to benefit as much as possible from artificial intelligence applications in achieving sustainability and avoiding its risks.

4- Study Results and Discussion:

Artificial intelligence has innumerable effects on various aspects of sustainability, including the Sustainable Development Goals. Either these effects are positive, hiding within them opportunities for progress and more balanced development, or negative, hiding within them threats and risks that may not be controllable.

4.1. Areas of application of artificial intelligence for sustainability: Artificial intelligence supports the various dimensions of economic, social and environmental sustainability in its integrated framework aimed at achieving sustainable development, and this can be illustrated by the following.

4.1.1. The role of artificial intelligence in achieving the Sustainable Development Goals: In 2015, the United Nations General Assembly approved seventeen sustainable development goals within a comprehensive plan that expires by 2030. Artificial intelligence and its innovations are considered one of the most important things that humanity has brought to serve it and its planet. However, the debate is still open about its applications that are difficult to limit or limit their future repercussions, especially on the Sustainable Development Goals. This role can be briefly clarified through the table below.

Table No. (1)
Artificial Intelligence and the Sustainable Development Goals

Objective	And this is where AI comes into play.
Poverty reduction	Artificial intelligence applications provide household surveys and data showing the concentration of poverty. Satellites also provide poverty maps. Smart grids provide electricity and water, and this raises productivity
Ending hunger and encouraging agriculture	The presence of small models that can measure humidity, the efficiency of crops, fertilizer, the amount of water, the timing and quantity of fertilization. The sites of agricultural land study its area and climate, and determine the most appropriate type of crops
healthy life	Providing a huge amount of data used to improve health services
Lifelong Education	Systematic integration of AI in education and innovation of new teaching and learning practices based on modern technologies

Equality	Artificial intelligence provides equal opportunities for both sexes such as training programs, funding, flexible work environment and communication channels with decision makers
Water and sanitation	Intelligent water management provides effective tracking and forecasting of water demand and immediate response to each emergency, as well as processing and analyzing various information collected through water flow and movement in pipes and faucets.
Sustainable Energy for All	Smart grids for electricity distribution provide energy at the right efficiency and cost, along with a map showing real-time energy supply and demand and this ensures needed improvements to the grid
Decent work	Artificial intelligence contributes to the creation of new jobs
Industry and Innovation Infrastructure	New production methods such as the Internet of Things and 4D printing ensure machine-people communication and information exchange, saving effort and time and raising quality based on smart infrastructure
EQUALITY OF STATES	The contribution of artificial intelligence in raising productivity to increase wealth and thus reduce disparities between countries
Sustainable Cities	Relying on smart mobility and smart city ensures a quality of life and sustainable urban services
Unsustainable consumption and production patterns	Artificial intelligence contributes to increasing the production of some vital sectors such as energy, water and agriculture, and it can also predict the increase in the consumption of a commodity or reduce its consumption and this is reflected in the amount produced
CLIMATE ACTION	Monitoring climate changes through massive, ever-evolving real-time data ensures effective solutions such as melting glaciers
Life is under the water	Artificial intelligence technologies play an active role underwater such as offshore pipeline inspection and repair, maintenance of ships and submarines and exploration of disaster areas
into the wild.	The deployment of smart cameras improves protection against overfishing and the use of computer networks to monitor visible animals and identify the number of their members in a single species
peace, justice and strong	Artificial intelligence is used in insurance, preventing intrusions between countries, and preventing cybercrime

institutions	
Strategic partnerships forged	Publication of a joint report on artificial intelligence in the provision of public services by the United Nations highlighting the importance of partnerships between the private sector and the public sector to include industrial knowledge and expertise in government initiatives so that the public can access information related to artificial intelligence projects as well as adapt them to their cultural, linguistic and organizational conditions

Source: Prepared by the researcher based on: Tariq Al-Sayed Al-Sayed Al-Barashi, 2023, page 976.

Through the table, it can be said that artificial intelligence has a significant role in achieving sustainable development through its seventeen goals, and this indicates the strong functional relationship between artificial intelligence and sustainability, that is, artificial intelligence has the ability to ensure the sustainability of the development process in its various dimensions.

To give a realistic view of the role of artificial intelligence in ensuring sustainability, the extent to which it contributes to the achievement of the three sustainability standards will be addressed through examples that reflect the positive effects resulting from its integration; these effects are considered as the reasons for adopting artificial intelligence in various fields and sectors.

4.1.2. Reasons for integrating artificial intelligence in the dimensions of sustainability:

The deterioration of the environment and climate, waste of energy and disparity in the standard of living among members of the same society, not to mention the disparity between developed and developing countries, all these complex problems need more innovative and advanced solutions, and this can be provided through artificial intelligence techniques, and this can be illustrated in the following techniques and examples:

Artificial intelligence and the environmental dimension: The importance of artificial intelligence is due to its ability to derive meaning from the complex geographical and environmental data set, the possibility of converting it into information, improving its quality and ensuring its consistency and accuracy in a short time, and from it it helps in finding the most efficient solutions and making decisions. There are many applications of artificial intelligence that can be used in this field, including:

Smart GIS: which has a significant role in achieving the SDGs, ranging from mapping poor and unequal areas to monitoring climate change such as: identifying areas where temperatures are irregular, as well as developing models to illustrate how climate warming affects the environment in different regions.

Geographical modeling: Geographical models are used to predict future scenarios based on current data such as predicting the impact of climate changes on a specific region. This process is often complex and requires a lot of computing power, so artificial intelligence can make it simple, fast and accurate at the same time.

Remote imaging: through the use of satellites and aircraft to collect data on the Earth's surface, ranging from monitoring environmental changes to mapping the spread of diseases using artificial intelligence, and this data can be analyzed and processed more efficiently (Hanafi, 2023, pp. 378-379)

Artificial intelligence and the social dimension: Artificial intelligence applications are able to promote many sectors, enhance their efficiency and increase their productivity, which helps in facing and solving many problems, such as raising the educational level and providing appropriate health care and others. In this regard, some vital sectors will be addressed and how artificial intelligence has been able to raise its level of service.

Artificial intelligence and education: The use of artificial intelligence in education may achieve many benefits for all members of educational institutions, including students, professors, management and even families of teachers.

- ✓ **Digital School:** Digital schools in education are a great source of data where school systems can be designed that are able to manage school and student data at the same time and save them in the form of huge databases. This huge data can be used to train huge neural networks that can predict the weakness at the individual level of the student and the shortage of material and human resources at the level of schools and universities before it occurs. From it, institutions and the ministry make informational decisions, which will increase the quality of educational outputs and reduce costs. In this regard, efforts are being made to eliminate the phenomenon of heavy school bags and reduce the burden on them, and what follows is the programming of training courses by the educational institution for the benefit of the pedagogical staff to control more the initial principles of automated media in order to develop a database and information for each year in the field of digitization. The use of a combination of

robotics and tailor-made AI will also be useful for a lot of office tasks such as exam grading and assessment of assignments, and this will reduce the time needed for grading and administrative work in order to devote more time to students. Well-trained robots can complement the role of experienced teachers in providing some additional lessons and classes to strengthen and develop students' skills. This technique can solve the problems of the lack of teachers or their shortage in some fields; but it must be noted here that for the purpose of not replacing the teacher and dispensing with him completely, but that the human mind works side by side with the artificial mind in an elaborate calculated combination (Blilita, 2022, pp. 21-22).

- ✓ **Chatbots in education:** The importance of chatbots lies in providing a safe learning environment for the learner, and repetition of scientific content without monotony or boredom. This enhances the motivation to learn, for example, the friend of geography, a robot that helps students know geographical facts, where the student can trust him and enjoy talking to him, and it turns geographical skills into something fun for teachers (Hanafi, 2023, p. 379).
- ✓ **Artificial intelligence and health:** Artificial intelligence techniques have proven their effectiveness in the medical aspect, and they also provide rich learning for medical students. Examples that confirm this include (Al-Fifi, 2023, pp. 5-7):
- ✓ **Intelligent surgery:** which is carried out with or without the help of robots in the operating room. One of the most famous of these technologies is the Microsoft HoloLens holographic lens, to help perform surgeries, and this has improved the accuracy and dexterity of surgery, it improves situational awareness, which allows to significantly enhance the surgeon's ability to make perfect decisions at the perfect time.
- ✓ **Speed of viewing patient files:** Doctors can scan the patient's wrist, and view the patient's entire history, which is retrieved by means of a medical record in electronic format, which allows doctors to see health records at the same time as they examine the patient, or talk to him, without having to refer to computers to review the patient's medical record.
- ✓ **Treatment of injuries:** One of the traditional methods of treating and caring for wounds is to rely on touch and sensitivity on the part of the therapist, which may be inaccurate and painful for the patient, while artificial intelligence techniques allow the

evaluation of wounds, through accurate three-dimensional visual models of the wound, as they provide the evaluation of the surgeon with a better understanding, and a clearer perception of the depth, cause, and appropriate treatment methods. Nurses help to heal wounds properly, without mistakes.

- ✓ **Blind:** Counting blind and visually impaired artificial intelligence helps to recognize familiar faces, ease navigation in their surroundings, and help find the missing items they are looking for.
- ✓ **Medical education:** Artificial intelligence technology helps with the basics of anatomy, its complex concepts, as well as the identification of drugs, and their effect on the human body. One of the most prominent examples of medical education using artificial intelligence is ARnatomy available on mobile phones, where a detailed anatomy of the human body is applied, explaining the muscles, bones, veins, arteries, and nerves... etc., with high accuracy.
- ✓ **Healthy sports:** Augmented reality may significantly reduce costs in the field of health and care, which contributes to improving the standard of living and saving many lives annually. It facilitates exercising with others digitally using artificial intelligence applications such as FitTech and Motitech, which encourages daily walking, improved lifestyle and sleep, and the many physical and psychological benefits of daily exercise.

Through the above, the importance of artificial intelligence in ensuring health for all and providing a healthy culture for various segments is shown, and its effectiveness is not limited to doctors and hospital institutions only through the speed of processing and analyzing data and making the right decisions in real time, but extends to the simplest citizens. This raises the level of prevention and the chances of recovery, including the low probability of infectious diseases and the ability to control them before they escalate, and this contributes to reducing the financial burdens allocated to such conditions.

AI and individualized services: AI has the ability to provide personalized services that enhance sustainability by examining data on consumer behavior and preferences. For instance, AI can recommend energy-efficient products and services or offer alternatives to traditional items. It can also provide individuals with transportation options that lower carbon emissions and support sustainable travel. Retailers leverage AI-driven recommendation

systems to suggest eco-friendly alternatives based on customer preferences and previous purchasing patterns.

A notable example is Marks & Spencer, a UK retailer that utilizes AI to recommend food items with lower carbon footprints based on historical customer purchases. Their recommendation engine evaluates data related to the product lifecycle, supply chain, and customer preferences, suggesting options with reduced environmental impact, such as vegetarian, seasonal, and locally sourced products. Similarly, passenger transport companies employ artificial intelligence to present personalized transportation choices that encourage sustainable travel, including electric or hybrid vehicles, along with public transit options. This illustrates the potential of AI in offering tailored services that foster sustainability and motivate consumers to adopt more environmentally responsible choices (Rakha, 2023, p. 6).

Artificial intelligence and the economic and institutional dimension: Artificial intelligence has the potential to promote sustainability across various economic sectors and processes by minimizing waste, enhancing resource accessibility, and achieving environmentally friendly outcomes in production and distribution, as well as in agriculture, transportation, public utilities, construction, and more. Additionally, AI offers practical solutions that institutions and policymakers can implement, positively impacting economic development through innovation and sustainable industrial practices that foster economic growth and reduce poverty levels. This can be exemplified in the following cases (Rakha, 2023, pp. 3-7):

AI and Production: AI can enhance the sustainability of production processes by optimizing resource use, lowering energy consumption, and minimizing waste. By analyzing production data, AI can pinpoint inefficiencies and recommend improvements. It can also forecast maintenance needs to prevent equipment failures. A recent example of AI's impact on production can be seen in a steel plant in India that utilizes AI-driven process optimization technology. By analyzing data from various sensors, the system identifies shortcomings and suggests enhancements. As a result, the factory has achieved a reduction in carbon emissions by up to 1.5%, decreased energy consumption by up to 3%, and increased productivity by as much as 5%. The AI system also facilitates predictive maintenance, leading to reduced downtime and enhanced equipment reliability.

AI and Distribution: AI can optimize distribution processes by refining logistics strategies, lowering transportation costs, and improving inventory management. It enables real-time shipment tracking and helps reduce carbon emissions by identifying the most efficient

delivery methods. Furthermore, AI can enhance supply chain transparency and mitigate the risk of unethical practices. A notable example is Amazon, the world's largest online retailer, which has adopted an AI-driven system to boost delivery efficiency and minimize environmental impact. Known as Amazon Scout, this system analyzes customer preferences and traffic patterns to optimize delivery methods and package schedules. The AI technology has helped Amazon reduce transportation costs by up to 20%, cut delivery times by up to 30%, and decrease carbon emissions by up to 10%. By optimizing logistics routes and improving inventory management, Amazon is establishing a benchmark for sustainable distribution practices.

Artificial Intelligence and Construction: AI-powered software can reduce waste of resources, energy, and up to the time of completion, in the field of construction. For example, construction technology company Katerra uses AI-powered software to simplify the design and construction of buildings and make them less energy-intensive and more efficient. This reduces material waste and completion time while improving energy efficiency. The software can also analyze data on building materials and suggest more sustainable alternatives. This contributes to reducing construction waste to 30%. Thus, the example presents the idea of the role of artificial intelligence in optimizing the use of various resources on the one hand, and reducing the environmental impact of the construction sector on the other.

Artificial intelligence and infrastructure: Artificial intelligence can instantly monitor critical infrastructure such as bridges, dams and ports. It is used to detect potential large risks and prevent disasters. For example, the Port of Rotterdam, one of the largest ports in Europe, uses artificial intelligence to monitor the condition of pavement walls, which are important for the safety and stability of the port. Artificial intelligence analyzes images and data from sensors to detect cracks, erosion or others, which indicate the possibility of a malfunction or collapse. This allows for timely repairs and maintenance. Thus, artificial intelligence contributes effectively to predicting and even preventing major risks by analyzing data and predicting incoming possibilities.

Artificial intelligence and agriculture: The use of artificial intelligence techniques in agriculture means interest in agriculture, and this contributes significantly to accelerating the time and effort of the farmer, and facilitating investment in more areas and agricultural land. The use of modern technologies from the robot in adding fertilizers and fertilizers with suitable estimates, provides large quantities of fertilizers and pesticides, in addition to treating

damaged plants better. Precision agriculture also provides appropriate guidance to farmers about optimal agriculture, water management, timely harvesting and others, by using sports programs, big data and images taken by satellites and drones to predict weather conditions, such as temperature, rainfall, wind speed and solar radiation, analyze the sustainability of crops, and assess the nutrition of plants and the presence of diseases or pests. Providing data ensures that agriculture is transformed into precision agriculture; to produce better quality crops while using fewer resources. In addition to the use of remote sensing applications, GIS and modern technologies, and their application in many fields, such as estimating the crop area, following up and preventing encroachments on agricultural land, studying agricultural expansion, and studying soil salinity (Al- Barashi, 2023, pp. 969-970).

The introduction of artificial intelligence in the agricultural sector ensures the achievement of one of the most important principles of sustainability, which is the elimination of hunger through the achievement of food security, and even the achievement of export surpluses that ensure the raising of national income, including the redistribution of income and wealth, and this contributes to achieving equality and justice between different societies.

Artificial intelligence and digital government (Hassan, 2019, pp. 9-14): There is access to an efficient and effective administrative apparatus, characterized by governance, that lives up to the aspirations of the citizen and is accountable, and contributes strongly to the achievement of the development goals of the state. This is done through artificial intelligence techniques such as the development of a digital platform aimed at activating the exchange of information between the various state agencies (ministries and various official departments), in return for the establishment of a parallel digital platform for the provision of government services based on electronic payment or mobile phone applications according to an electronic national number for every legal or physical person, without neglecting the integration of this base of big data with the spatial information structure and thus the citizen can request, pay or redeem any public service from anywhere and at all times. This will ensure more transparency in the movement of information and money, including combating administrative corruption such as tax evasion and bribery.

Artificial intelligence also has sustainability-supportive effects on the positive side, as it has many negatives that pose risks that may threaten humans even in their existence, and this requires that artificial intelligence be sustainable in itself, so that it does not contradict with the objectives of its creation and with the aforementioned principles of sustainability.

4.2. Contraindications to sustainability in artificial intelligence: The use of artificial intelligence applications poses many risks that prevent the achievement of sustainability and its principles. This calls into question the effectiveness of artificial intelligence and forces a reconsideration of its use in an absolute manner. Rather, a set of standards and conditions must be established to frame this and ensure the sustainability of these applications, which in turn achieve the desired sustainability, including the Sustainable Development Goals. Therefore, the most important risks surrounding artificial intelligence and the use of its applications will be presented:

4.2.1. Risks related to the social dimension of sustainability: These are the risks resulting from artificial intelligence applications and prevent the achievement of the desired educational and health levels, not to mention compromising privacy and equality:

Risk of information leakage: related to personal data, its misuse in marketing and sales, the leakage of information with comparative advantages, or by providing automated answers through an answering machine that contradicts the directions of companies (Salah, 2024, p. 105). An example that can be included in this context is Facebook and its illegal exploitation of user data. This issue raised the issue of privacy (Al- Barashi, 2023, p. 959), and the fact that the electronic applications are free of charge in return for, and the individual, his information and his data may be corresponding to, where the applications for you save data, and the use of them in commercial promotion, and the leakage of data to commercial companies to achieve material profits, and what counts as a violation of privacy. Although Facebook denied the matter and considered that recording conversations and voice calls is a service that allows the user to approve or reject them, but the use of artificial intelligence algorithms remains in the form of free applications, which makes them clearly uncontrolled for the user and completely, and this allows the use of data without the user's knowledge, which is considered a violation of privacy by exploiting the user's ignorance of the terms of such applications (Al-Karim, 2024, pp. 351-352).

Growing bias: This is a problem faced by most machine learning algorithms, as they rely heavily on data. If the data is biased towards a particular group of people or orientation, an effort should be made to avoid unfair repercussions on the affected group. Example: Some facial recognition technologies may fail to recognize black people because they are not represented in the data used in training artificial intelligence algorithms. Google

emphasizes the importance of diversity in data sources by data collectors to avoid unfair bias that harms a certain group of people in crucial decisions, such as job or diagnosis of a disease. Some artificial intelligence techniques fail and are biased in their results because of the bias of data in training these algorithms, and this may harm and injustice some groups (Al- Barashi, 2023, p. 958). Therefore, saying that AI is more neutral than humans is incorrect, because those who program AI applications are the ones who transfer their biases to those systems (Salah, 2024, p. 108).

Medical errors: Despite the development of the health sector in the use of artificial intelligence, there are increasing concerns about the inaccuracy of systems in some cases, which have serious consequences that may threaten people in their lives, in addition to the fact that robots do not meet the psychological needs of patients to feel reassured that they provide human medical staff often (Salah, 2024, p. 108), and this reflects a set of challenges that the health sector in this field is faced with funding, as the creators and innovators of these technologies will need significant capital to refine them and make them more efficient and safe. Until this is achieved, these technologies remain not sufficiently accurate, which leads to a state of resistance on the part of the beneficiaries. Patients use these technologies, and medical service providers need periodic and daily training to realize the advantages of these technologies, as well as hospitals whose traditional administrative system based on paper records must be radically and completely changed, without neglecting the restructuring of the insurance system and the related organizational matters according to the requirements of artificial intelligence (Al-Fifi, 2023, p. 8).

4.2.2. Risks related to the institutional and economic dimension of sustainability:

Artificial intelligence applications may threaten the sustainability goals related to security and peace and increase the burdens related to this, which weighs on the state budget, not to mention the decline in the level of innovation and income inequality, and this will be addressed in the following lines:

- ✓ **The crisis of responsibility:** With the spread of smart machines such as autonomous cars and other technologies created by artificial intelligence, the likelihood of inability to hold responsibility in the event of harm to humans has increased, especially since there is no legal or moral text condemning the machine or sentencing a robot to prison if it makes a mistake (Al-Karim, 2024, p. 354), or even requiring insurance companies

to pay insurance premiums to those affected, and therefore artificial intelligence algorithms may cause fatal accidents despite their effectiveness in most cases, and here Google confirms the extent of responsibility that falls on scientists in what they make and its positive or negative effects on all humanity (Al- Barashi, 2023, p. 959).

- ✓ **The rise of cybercrime:** It is one of the most important damages that artificial intelligence causes to different societies, whether individuals or institutions, and this can be explained in the following:
- ✓ **Crimes targeting individuals,** whether through their bank accounts or via the Internet, whether by impersonating them, threatening them, blackmailing them with important information about them, or publishing false information that distorts their reputation, with the aim of achieving material gains or inflicting material and psychological harm on the victim per se.
- ✓ **Crimes targeting institutions,** which are carried out through hacking their cyber systems causing significant material damage, or exploiting employees' accounts, inciting them, and blackmailing them to destroy the systems of these companies or installing spy systems on them. Among the companies most vulnerable to this type of crime are financial and banking institutions, credit card theft, and accounts related to state institutions. It is worth mentioning that this type of crime negatively affects the economy and incurs material losses to States in their national income.
- ✓ **Crimes targeting communities,** by hacking websites and controlling them to serve dangerous parties aimed at destabilizing the security of the country and controlling the minds of young people: including the destruction of systems using electronic viruses, causing chaos and destruction of the infrastructure on which significant sums were spent by the responsible authorities (Al-Karim, 2024, pp. 355-356), and this is what is called hacking and electronic terrorism (Salah, 2024, p. 105).
- ✓ **Widening inequality in income distribution:** Unemployment rates are likely to rise due to the decline in dependence on human labor and its replacement with artificial intelligence techniques, and this will be accompanied by an increase in poverty rates, in turn, the returns of business owners are doubled due to the decline of the wage item, and this exacerbates inequality in income distribution (Salah, 2024, p. 108).
- ✓ **The decline of innovation in humans:** The worsening replacement of the human factor by artificial intelligence leads to a decline in the level of skills acquired by

workers and a decline in their sense of innovation, and even exacerbates their negative feeling of the futility of their jobs in light of the complex tasks performed by artificial intelligence systems at the click of a button (Salah, 2024, p. 108).

4.2.3. Risks related to the environmental dimension of sustainability: The risks that will be mentioned affect humanity and the planet alike with its various land, air and marine systems, as well as threaten man in his existence and even his biological characteristics, and this can be clarified in the following (Al-Karim, 2024, pp. 352-354/348-350):

- ✓ **The race towards smart armament:** Many countries have witnessed the increasing use of artificial intelligence techniques in the military field, which are autonomous weapons, led by major countries such as the United States of America, Russia, China and others, such as robots and Dorns, whether marine, air or land, where the United States of America alone has more than 20,000 autonomous combat units, and what distinguishes this type of weapon is the independence in carrying out some vital functions of monitoring, controlling, protecting and deciding to attack without human intervention. However, in all cases, these armament techniques remain only a deficient machine that lacks the sense and ability to distinguish between those who pose a threat and do not pose a threat to it, despite being equipped with algorithms that enable it to distinguish between facial expressions. This may be what raises concern and fear for human life from an autonomous machine that no one controls. Therefore, global voices calling for world peace have escalated on the need for ethical standards that regulate the manufacture and possession of this type of smart and dangerous weapons at the same time, which enable any developed country to penetrate the security of other countries, or violate the laws of war, especially since these systems are not yet subject to the laws of war.
- ✓ **Artificial human cloning:** This technique raises a great controversy from an ethical and even biological point of view, although the cloning and treatment of some human organs is legitimate, but cloning embryos or similar cloning makes reproduction an industry and this completely contradicts and encroaches on human subjectivity and privacy and poses several risks that can be summarized as follows:
 - ✓ The demolition of the human balance, headed by the family, the severing of the connection of the wombs, in addition to the mixing of genealogies, and the transformation of man into a field of scientific experiments.

- ✓ The demolition of human diversity. Cloning will provide thousands of people who are similar physically and psychologically. This eliminates societal integration and threatens the life system with the disappearance of biological diversity, such as the decline of males or females, or the disappearance of certain human qualities such as courage, intelligence, and others.
- ✓ The transmission of known genetic diseases and others, the loss of rights and the ability to hold responsibility. Human nature has distinguished between humans with certain genetic characteristics, but when cloning this cannot be confirmed, as the trade of embryos may increase and the same man and his organs become a tool for trade and medical and human tampering.

This is why many international conventions of the World Health Organization and other organizations reject and criminalize cloning because it conflicts with human dignity and safety. Within the framework of the existence of these risks that affect all dimensions of sustainability and prevent the achievement of sustainable development goals, and even threaten humans in their physical and psychological existence and the existence of their environment, there is an urgent need to develop value standards for artificial intelligence and its various applications.

5- Conclusion

In every revolution since the first industrial revolution, to the fourth industrial revolution and even the fifth, man has been able to invent technologies that changed the face of the earth and benefited all humanity. On the other hand, he was inventing many machines that annihilate humanity, and so artificial intelligence, whose output risks may be more lethal compared to what preceded it, despite its imaginative and unique role in achieving the dimensions of sustainability. Excessive and unframed investment in artificial intelligence with precise standards and procedures exposes humanity to annihilation, and if previous wars are taking place between humans, the future of wars will be between humans and robots. Therefore, it is necessary to reconsider and deter severely and strictly all the outputs of artificial intelligence that do not serve sustainability, but rather do not serve humanity or the planet. Artificial intelligence must have sustainability and the legal and moral obligation towards human intelligence that it has created, and this raises the problem of the sustainability of human

intelligence in itself before artificial intelligence, because in the end technologies and applications artificial intelligence is a reflection of human consciences and intentions.

6- Recommendations:

The acquisition of artificial intelligence applications for sustainability makes the goal of artificial intelligence developers and users from universities, scientists, investment companies and businessmen, with the support and control of the system as a whole, does not stop at achieving the highest possible level of material return and meeting the legal and economic requirements associated with legal accountability within its minimum limits and taxation only. Rather, sustainability is the advantage of all artificial intelligence outputs in the three dimensions known as the economic dimension, the social dimension and the environmental dimension, and this will be clarified in the following:

6.1. Economic sustainability measures: The pursuit of sustainability in this context should not be viewed as an added expense; rather, it is integral to the profitability and competitiveness of artificial intelligence applications. This can be achieved through several key measures: developing AI outputs that align with consumer expectations for security and privacy; ensuring full transparency throughout the production and utilization stages of AI applications by providing comprehensive information to facilitate safe usage; engaging in continuous and adequate research and development that preserves available resources and meets the needs of future generations; prioritizing productive, efficient, and environmentally friendly practices that adhere to ethical standards; safeguarding consumer protection and the confidentiality of consumer, particularly personal, information; implementing fair and transparent pricing while avoiding corruption; and adopting responsible practices at all stages, from preparation and operation to development, maintenance, and waste disposal, all within a closed-loop lifecycle approach.

6.2. Social sustainability measures: Sustainability in this context should focus on the common good, emphasizing that the goal is not to reduce the workforce to cut costs, but rather to view artificial intelligence applications as complementary tools that enhance job quality and life overall. To achieve this, several measures should be implemented: engage employees in new practices, fostering integration and openness

while diversifying programs to prevent bias in technology; organize ongoing training courses that align with technological advancements, recognizing that machines cannot replace human intelligence, emotion, and empathy; support a healthy work-life balance for employees, ensuring that machines do not replace them during holidays and implementing a fair wage structure that enhances job satisfaction and loyalty; acknowledge that skilled and engaged employees cannot be substituted by robots; offer free services and support for voluntary initiatives and charitable organizations; promote values that enhance quality of life and benefit both the underprivileged and the affluent; create opportunities for skill development through partnerships with educational institutions from early education to university levels; collaborate with public sector entities to provide technologies that comply with cybersecurity and disclosure laws; engage with NGOs in charitable activities, supporting them financially or through technology, such as robots for collecting donations, and through regular supportive content on social media; demand clear information regarding each AI product or service, ensuring consumers understand the details, limitations, and ethical considerations of AI use; and enforce local laws that deter cybercrime, safeguard privacy, and protect human rights.

6.3. Environmental sustainability measures: Procedures related to the environmental aspect must adhere to the principle that artificial intelligence exists to protect the environment, restore and renew its resources, and assist humanity in its role of nurturing the planet, rather than destroying it or reviving colonial practices in a more insidious and harmful way. To this end, several measures are proposed: criminalizing all applications of artificial intelligence that pose threats to human existence, identity, and the planet, both locally and internationally, and holding accountable those who acquire and promote such technologies; establishing specialized teams to assess the dangers posed by smart weapons, robotic soldiers, and other advanced technologies, while developing protective solutions against superintelligent AI, which remains a creation of the unique human intellect; prioritizing research and applications of AI that serve humanity and promote well-being, particularly in healthcare, while rejecting initiatives that jeopardize human life and dignity. The effectiveness of these proposals will depend on the support of the political, economic, social, and ethical frameworks that enforce sustainable practices

in AI, monitor compliance, and impose penalties through laws specifically designed for this purpose. This powerful and potentially hazardous technology must be guided by a comprehensive state intervention plan that aligns with various interests and goals to ensure that artificial intelligence effectively meets the needs of the present generation without compromising those of future generations.

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