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أستاذ مساعد ورئيس لجنة الاختبارات، جامعة الإمام عبد الرحمن بن فيصل، قامت بالتدريس في العديد من الجامعات، كما حضرت العديد من الدورات والمؤتمرات المحلية والدولية واهتماماتها البحثية في مجال الاقتصاد والاستثمار والتنمية والاقتصاد الأخضر والتنمية والمستدامة وريادة الاعمال. قدمت عدد من الدورات التدريبية في مجال الاقتصاد والتخطيط وإدارة الازمات والمهارات الشخصية وريادة الأعمال

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Artificial intelligence as one of the requirements to achieve the sustainable development goals

Case Study on Saudi Arabia and Egypt

Abstract:

Recently, interest in artificial intelligence (AI) and its effects on several economic sectors has increased, especially with the era of digital transformation and digitization. This study attempted to review the extent of the impact of artificial intelligence on achieving sustainable development goals. It was found that artificial intelligence can help achieve 134 goals. sustainable development. The study used the descriptive and experimental approach, where the study dealt with previous studies that dealt with artificial intelligence and its importance in achieving sustainable development goals. The study focused on the experience of both Egypt and Saudi Arabia in artificial intelligence applications as one of the important experiences in the Arab countries.

The study concluded with several findings and recommendations, including that the rapid rise of artificial intelligence should be accompanied by organizational understanding and supervision of artificial intelligence-based technologies. The NEOM project in Saudi Arabia, which is based on artificial intelligence considered one of the best projects which apply AI, and in Egypt, The National Council for Artificial Intelligence has been tasked with developing a comprehensive national plan for the localization of the artificial intelligence industry and Egypt's leadership role at the regional level as a global player in this field.

Abbreviations

AI: Artificial intelligence.
SDGs: Sustainable Development Goals.
SDAIA: The Saudi Data and Artificial Intelligence Authority.
NCAI: the National Council for Artificial Intelligence.
DT: Digital Technologies.

1-Introduction

Data and Artificial Intelligence (AI) areas are quickly expanding, prompting countries to turn to these technologies to shift from old models of economics for learning economies. Because of the exponential development in computer power and the applications in data science and AI as a result of the increased volume of data. it is considered an important resource for governments, called "the new oil." (Vinuesa, 2020).

A rising number of businesses are being transformed by artificial intelligence (AI). For example, AI is expected to have both short- and long-term effects on global productivity, gender equality and inclusion, environmental results, and a variety of other topics The impact of AI on sustainable development has been observed to have both positive and negative outcomes. However, no published study has yet to evaluate AI's impact on all areas of Sustainable development. We've discovered that AI may have an impact on our ability to reach all of the SDGs, so this is a big research gap. (Acemoglu,2018).

Figure (1)

Summary of positive and negative impact of AI on the various SDGs
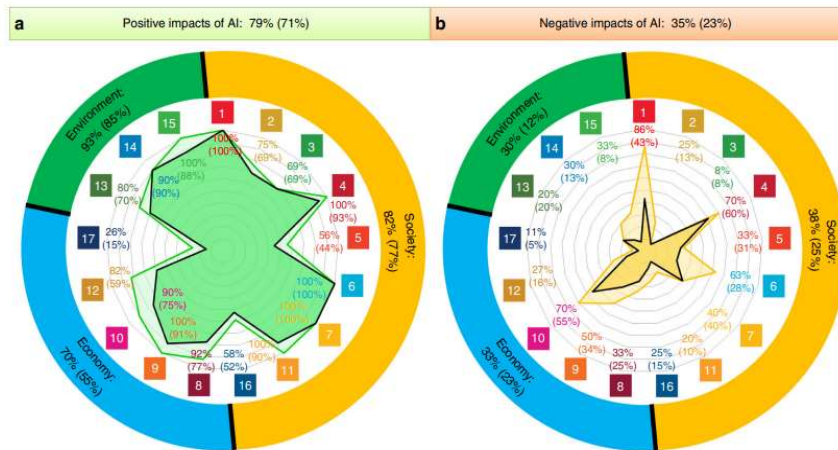

Figure 1 shows a summary of AI's There are both positive and bad effects on numerous aspects of SDGs. Each of The SDGs has documented evidence of AI functioning as (a) an enabler or (b) an inhibitor. Each of the SDGs is represented by the numbers inside the colored squares (see the Supplementary Data 1). (Norouzzadeh,2018).

The top numbers represent the proportion of all targets that AI could affect, whereas the percentages inside the circle represent each SDG. In the figure's outside circle, the results for the three groupings, Society, Economy, and Environment (Tegmark, 2017).

AI and the SDGs have already been related. AI has the potential to enable 134 targets (79 percent) across the SDGs, according to our study of relevant evidence, mostly through technological improvements that allow us to surpass some present restrictions. However, the advancement of AI could have a negative impact on

59 targets (35 percent across all SDGs). For Based on the three piers of sustainable development: society, economy, and environment, This is depicted in Figure 1. (UN General Assembly (UNGA). 2015).

The social impact of artificial intelligence. In the Society category, AI-based technologies can benefit 67 objectives (82 percent) (Fig. 2). AI could aid with the supply of food, health, water, and energy services to the population, for example, Goal 1 on no poverty, Goal 4 on a good education, Goal 6 on clean water and sanitation, Goal 7 on clean energy, and gaol 11 on sustainable cities. It can also help to construct low-carbon systems, such as circular economies and resource-efficient smart cities. (Nerini, 2017).

 Artificial Intelligence can enable smart and low-carbon cities by connecting a variety of technologies in the electrical sector, such as smart appliances, to enable demand response Smart networks can help by partially matching energy usage.

The Society group has fewer goals that can be influenced. There are interesting about how AI-enabled technological improvements can be implemented in countries. large computing centers may be required for advanced AI research and commercial development. These facilities may consume a lot of energy and produce a lot of CO_2. (Jones, 2018).

In today's world, artificial intelligence is used not only to battle pandemics, but also in a wide range of businesses. AI is also playing a bigger role on the international stage, with governments working together to implement technology for the greater good. AI is one of the end-to-end digital technologies that is being employed as a critical instrument for state-level digital transformation. Given that the goal of the most prevalent growth path of the twenty-first century (digital transformation) is to raise

state welfare and ensure sustainable development, AI's function in this area grows as well. The European Union's AI4Cities project, for example, was developed to bring cities together in their efforts to use artificial intelligence to advance carbon neutrality. (S.G. Kamolov, 2020)

Advantages of artificial intelligence

- ensuring that AI is used freely and equally in education, including reducing inequities based on socioeconomic class, gender, ethnicity, and geographic location; recognizing successful projects or proven effective techniques of employing AI to eliminate barriers to decent education for vulnerable communities;

- Using AI to improve education and learning - improving education management systems, enhanced AI learning management systems, and other AI in educational applications, as well as developing new kinds of personalized learning that can help teachers and solve problems in the field;

- The processing of large amounts of data in order to analyze it according to predetermined criteria and forecast the evolution of a specific event or phenomenon through time, based on a retrospective study of the data. (D'Amore, 2022)

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Figure (2)

Detailed assessment of the impact of AI on the SDGs within the Society group

Figure 2: An extensive study of AI's impact on the SDGs by a community group. Each of the Sustainable Development Goals (https://www.un.org/sustainabledevelopment/) contains established evidence of AI's beneficial or detrimental effects. A target is represented by each block in the diagram We discovered published evidence that AI can either enable or block the green and orange goals. The lack of highlighting shows that there isn't enough evidence to support the claim. (Nagano, 2018).

2- Literature Review

The paper (M.A. Hannan, 2021) addressed, analyzed, reviewed, and investigated how the usage of RE, including AI applications, can affect the achievement of the adopted 2030 agenda for sustainable development, which included 17 SDGs and 169 goals. The 17 SDGs were separated into three divisions in this analysis:

environment, society, and economy. These three groupings are the cornerstones of long-term development. An expert elicitation strategy based on consensus was employed to meet the aims of this study. According to the findings, the RE has a favorable impact on the achievement of 75 targets (44.3 percent) of the SDGs, while it has a negative impact on the achievement of 27 targets (15.97 percent of all targets). The results also showed that the AI application can assist the RE in meeting 42 targets (24.85 percent). The development and use of RE can favorably affect the achievement of 45 percent, 41 percent, and 50 percent of the environment, social, and economic targets, respectively, within the three sets of SDGs.

(Batok, 2020) clarified, Artificial Intelligence has advanced quickly, and the future is approaching faster than anticipated. By 2024, AI will be better than humans in translating languages, selling goods, and performing surgery. AI will become ingrained in our daily lives, and now is the time to invest in education and training to prepare for the AI era. It is still up to improve talents and participate in the Fourth Industrial Revolution. In addition to, Report set in 2054. AI will be better than humans in translating languages by 2024, selling goods by 2031 and conducting surgeries by 2053. AI will become an integral part of our lives and it is time to prepare for the age of AI by investing in education and training. The choice remains ours to upgrade our skills and be part of the Fourth Industrial Revolution.

Artificial Intelligence (AI) is making big impacts in daily life. In this talk, (Zhou, 2018) explained in his study, AI is transforming retail industry. In particular,Suggest the brand-new concept of Retail as a Service (RaaS), where retail is redefined as the natural combination of content and interaction. With the capability of

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knowing more about consumers, products and retail scenarios integrating online and offline, AI is providing more personalized and comprehensive multimodal content and enabling more natural interactions between consumers and services, how computer vision techniques can better understand consumers, help consumers easily discover products, and support multimodal content generation, how the natural language processing techniques can be used to support intelligent customer services through emotion computing, how AI is building the very fundamental technology infrastructure for RaaS.

In study **(Pigola, 2021)**, confirmed that digital technologies (DT) are characterized by innovation, and that they have played a key role in economic, social, and environmental dimensions. As a result, DT are important contributors to the achievement of the Sustainable Development Goals (SDGs). The study's goal was to compare the preference for artificial intelligence-driven digital technologies (AI-Driven DT) in Brazil and Portugal for achieving SDGs. To identify prospective artificial intelligence-driven digital technologies (AI-Driven DT) as favorable facilitators for SDG attainment in Brazil and Portugal, detailed analysis has been presented, as well as sample t-test analysis and Levene test. Based on the findings, a broader analysis is provided to I identify potentially favorable SDGs, (ii) discuss differences in AI-Driven DT preferences in each SDG between the countries, and (iii) make recommendations for potential technologies that could receive more attention and investments in both regions to help emergent digital technologies succeed, with a particular focus on cleaner production. The investigation is divided into three sections: Economic, social, and environmental factors all have a role. Finally, a review of the essential recommendations and prospects that might be used to maintain a strong and favorable

movement of AI Driven DT advancements and applications toward completely supporting the United Nations Organization (ONU) Agenda 2030 SDGs is presented.

Artificial intelligence as a simulator of human behavior and thought arose as a result of machine learning, according to the **(Nazarov,2021)** study. They recognize and understand data using AI, which is then used to build programs for many types of activities. This research looked at key components of AI and how they can be used to improve the process of reaching the SDGs more efficient and high-quality.

The study found that there are already some benchmarks that may be used to evaluate the performance of policies aimed at bringing intelligent systems that perform creative activities into public life. The success criteria are: 1) an increase in the number of enterprises that are among the industry leaders in implementing artificial intelligence-based technologies, as well as authorities at various levels that actively use AI technologies in their work; and 2) the level of digitalization of public services.

(Manzoor,2021) highlighted that in the year 2020, the pattern of publications in the field of AI in civil engineering received a lot of attention. In AI-related published projects, construction automation also plays a significant part. Developed countries, on the other hand, were found to be more interested in AI research than emerging countries. This review contributes by (I) demonstrating a basic understanding of civil engineering and demonstrating the potential importance of artificial intelligence in supporting and enhancing construction work, and (ii) discussing the impact of AI on sustainable assessment, which provides substantial evidence highlighting AI techniques' benefits. (iii) to

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provide a theoretical framework into which future researchers can integrate their findings. Learning has been found to be accelerated by AI, as well as the ability to simplify and augment reasoning. which is important in construction projects with varying core properties.

The role of AI in the establishment of a sustainable business model for the WEF nexus is still unexplored in the academic literature, according to a study **(D'Amore, 2022)**. Despite the fact that scholars have made significant efforts to discover and quantify the interconnections between the water, energy, and food sectors, there remains a significant gap between science and policymaking in terms of efficiently implementing solutions into policy agendas. This chasm could be bridged by combining scientific data and policy needs into inclusive technologies that fulfill policy goals while being technically viable in terms of resource utilization.

In this research paper, we review the experience of Egypt and Saudi Arabia in artificial intelligence as one of the important experiences in the Arab countries, where the Kingdom of Saudi Arabia has taken a new approach in establishing cities that are based on sustainability and artificial intelligence, such as NEOM, Oxagon and The Line, and Egypt has commissioned the National Council for Intelligence AI is developing a comprehensive national plan for the localization of the AI industry.

3-Some Arab experiences in the application of artificial intelligence as a condition for achieving sustainable development
3-1 Saudi Arabia

Saudi Arabia's Vision 2030, which describes the kingdom's long-term goals and objectives, was revealed in April 2016 by Crown Prince Mohammed Bin Salman Al Saud (KSA). The Saudi Data and Artificial Intelligence Authority (SDAIA) was established by Royal Decree in August 2019 to ease the transition and assist in achieving Vision 2030's goals and realizing KSA's full potential. The major goal of the SDAIA is to promote and advance Saudi Arabia's data and AI agenda in order to make the country a global leader in the data-driven economy. To carry out its task correctly, SDAIA issued the National Strategy for Data and AI (NSDAI) in October 2020, with the lofty goal of "making the best of data and AI a reality." (Memish,2021).

Artificial intelligence also is the application of complicated algorithms to solve problems automate the fulfillment of predetermined tasks. Data and AI technologies will revolutionize public health by enhancing disease prevention and treatment methods, resulting in major health benefits and a reduction in illness burden.

Saudi Arabia's Vision 2030, which describes the kingdom's long - term goals and objectives, was revealed in April 2016 by Crown Prince Mohammed Bin Salman (KSA). As illustrated in Figure 1, the Saudi Data and Artificial Intelligence Authority (SDAIA) was founded by Royal Decree in August 2019 to assist with the transition and to enable KSA realize its full potential. The major goal of the SDAIA is to promote and advance Saudi Arabia's data and AI agenda in order to make the country a global leader in the

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data-driven economy. To further fulfill its objective, SDAIA launched the National Strategy for Data and AI (NSDAI) in October 2020. "Making the best of data and AI a reality" is the lofty goal.

The goal is to realize the ambitious vision through a multi-phased approach that focuses on solving national priorities by 2025, developing the platform for competitive advantage in key specialist areas by 2030, and becoming one of the top countries using and exporting data and AI by 2030. The National Data Management Office (NDMO), the National Information Center (NIC), and the National Center for Artificial Intelligence are the three primary agencies within SDAIA that help deliver on the promise of a data-driven and AI-supported government and economy (NCAI). (SAMA Working Paper, 2021).

Saudi Vision 2030 has presented the healthcare sector with new challenges and chances to grow and thrive. Because of the importance of data and AI technology in meeting the sector's expanding expectations, SDAIA has classified healthcare as a national priority. In addition, as indicated in Figure 2, data and AI could be leveraged to achieve three of Vision 2030's main objectives: Contribute to the overarching goal of increasing life expectancy from 74 to 80 years and improving quality of life by expanding healthcare access, improving healthcare value, and promoting health-prevention initiatives. SDAIA will lead, drive, and coordinate these initiatives because the health industry has a large role to play and various opportunities for data and AI to be used, we must recognize and promote these opportunities to improve healthcare. SDAIA is focusing on three key healthcare objectives in accordance with Vision 2030 and will engage with the entire ecosystem to achieve them and grow healthcare. (Statistical Yearbook, 2021).

Figure (3)

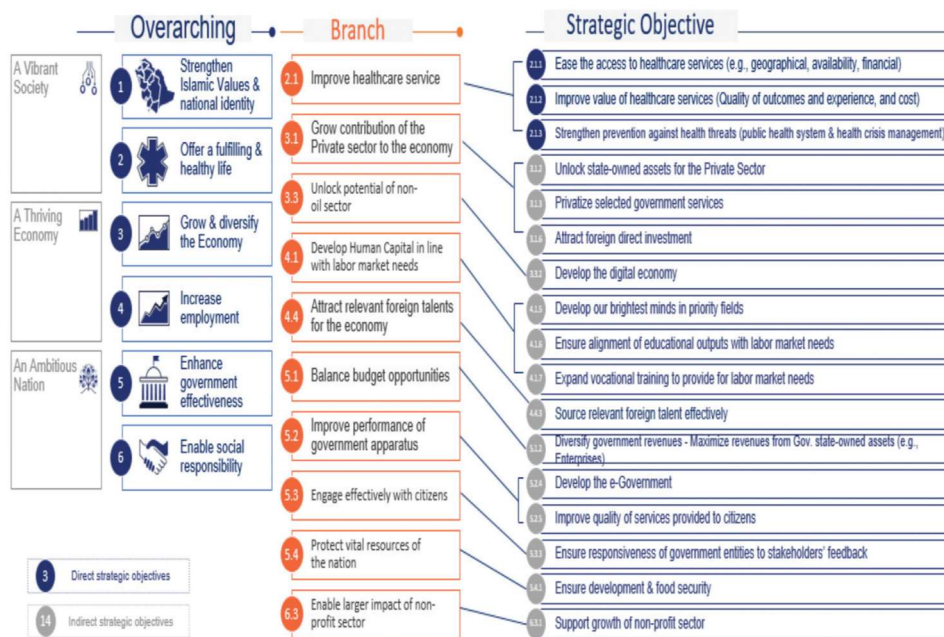# SDAIA's governance structure

Fridsma DB. Health informatics: a required skill for 21st century clinicians. BMJ 2018;362;k3043.

Figure (4)

Vision 2030's strategic objectives

O'Malley AS. Tapping the unmet potential of health information technology. N Engl J Med 2011;364;1090–1.

One of the best huge projects that would be applied artificial intelligence in Saudi Arabia is "The Line" city project in NEOM, which will feature interconnected cognitive communities improved by artificial intelligence along a 170-kilometer stretch,

The Line project aims to help the Kingdom reach its Vision 2030 goals for economic diversification by creating 380,000 jobs and contributing $48 billion to the gross domestic product by 2030.

The city of NEOM, the city of one million, reaches a length of 170 km, and preserves 95% of the nature in the lands of NEOM because it will be without cars and streets and without carbon emissions."

The city will redefine the concept of urban development by developing societies in which people are the main focus, for the first time in more than 150 years, which enhances the quality of life, and ensures access to all basic service facilities including medical centers, schools, entertainment facilities as well as green spaces, And high-speed transportation solutions will make commuting easier. The communities will be managed by relying entirely on artificial intelligence techniques to facilitate the process of communication, and the communities will be interconnected by default, as about 90 percent of the data will be harnessed to enhance the capabilities of the infrastructure. The city will rely entirely on clean energy while ensuring a positive carbon future, and The Line will be an attractive environment for innovators, entrepreneurs and investors. (https://www.neom.com/en-us).

The NEOM Industrial City "Oxagon" will revolutionize the field of reliance on renewable energy and zero carbon emissions, making it an important model to be emulated in the whole world, and the focus of the attention of investors and international economic institutions, as it is one of the most important giant projects in the Kingdom, which reflects its interest in the economy Blue by relying on the seas to achieve sustainable development, as well as fight pollution, which appeared in the "Green Saudi Initiative" and "Green Middle East Initiative", to help other countries, not only the Kingdom, reduce carbon emissions, and double dependence on renewable and clean energy.

The NEOM Industrial City will also attract large investments to push the Kingdom into the ranks of the major industrial countries, and will not only revive the Kingdom's economy, but will revive the economy of all surrounding countries, including Egypt and Jordan, and its impact may extend to the Middle East. This helps achieve the sustainable development goals.

3-2 Egypt

The sustainable development strategy, Egypt's Vision 2030, is a critical stage in Egypt's comprehensive development process, linking the present to the future and drawing inspiration from the achievements of ancient Egyptian civilization, in order to adopt a clear development process for an advanced and prosperous nation where economic and social justice reigns, and to revitalize Egypt's historical role in regional leadership. It strives to maximize the benefit from competitive components and advantages, as well as to put the Egyptian people's ambitions and aspirations for a decent and dignified existence into action. It is regarded as the first strategy to be developed using long-term strategic planning and participatory planning methodologies, as it was developed with broad public participation, taking into account the perspectives of civil society, the private sector, ministries, and government agencies. It also got strong support and cooperation from international development partners, allowing it to incorporate goals from all pillars and sectors of the Egyptian government.

The foundation of the National Council for Artificial Intelligence was approved by Egypt's Cabinet (NCAI) in November 2019, which will be made up of representatives from all key government agencies as well as independent AI professionals (AI). The primary goal of the Council is to develop and monitor the execution of Egypt's National AI Strategy.

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AI adoption in global economies can have a net beneficial influence, according to recent studies and economic indicators. Egypt is no exception; with the correct investment climate and labor upskilling/reskilling plan in place, the country might gain from AI while avoiding its downsides, the most noteworthy of which being an increase in unemployment.

Egypt is developing a national AI plan for this purpose, with the goal of fulfilling the following vision: (Egypt National Artificial Intelligence Strategy).

a) Apply artificial intelligence (AI) to assist Egypt in achieving its long-term development goals, which will benefit all Egyptians.
b) Establish Egypt as a major player in AI on a global scale by developing regional collaboration in the African and Arab worlds.

According to the vision, Egypt should build an AI sector that includes talent development, technology development, ecosystem development, infrastructure development, and governance procedures to ensure the business's long-term viability and competitiveness.

According to the vision statement, Egypt should build an AI sector that includes talent development, technology development, ecosystem development, infrastructure development, and governance frameworks to ensure the business's long-term viability and competitiveness. (First iteration of Egypt's National AI Strategy, developed jointly by the Ministries of Communications and Information Technology, as well as higher education and scientific research, in 2019).

To achieve the goal and objective, Egypt will focus on the following areas:

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- Incorporate artificial intelligence (AI) into government operations to boost efficiency and transparency.

- Incorporate artificial intelligence (AI) into important developmental sectors to generate economic effect and solve local and regional problems for the benefit of all Egyptians, in support of Egypt's long - term development strategy and the United Nations' Sustainable Development Goals.

- Encourage public-private partnerships and investments in AI research and innovation with universities, research institutes, and the private sector.

- To face the needs of local, regional, and global markets, establish a regional talent and education base for AI.

- Encourage the use of lifelong learning and reskilling efforts to help with workforce development and long-term employment prospects.

- Foster an academic scientific environment rich in ideas, innovations, and discoveries by supporting local business and innovation activities and nurturing an academic scientific environment rich in ideas, inventions, and discoveries.

- Promote a human-centric AI strategy that prioritizes people's well-being to foster multi-stakeholder conversation on the deployment of responsible AI for the benefit of society and to inform relevant policy discussions.

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Figure (5)

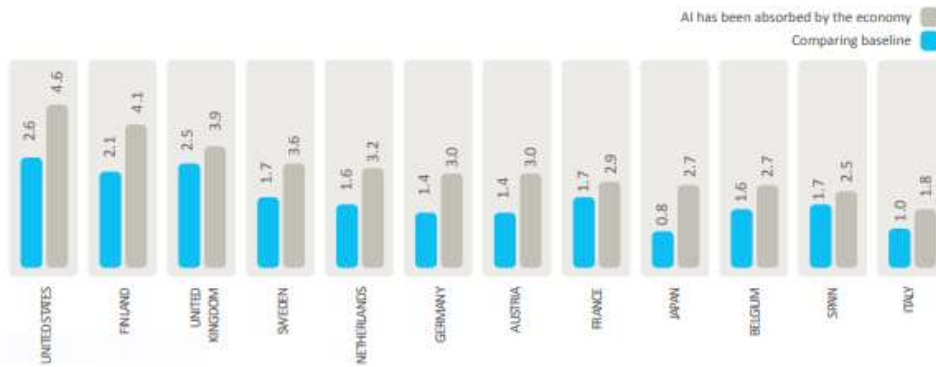## Predicted annual growth rates in 2035 of Gross Value added

Figure (5): Predicted annual growth rates in 2035 of Gross Value added (a good predictor of GDP) comparing baseline to   a scenario where AI has been absorbed by the economy (Source: Accenture).

AI is expected to be the driving force of economic growth in decades to come and in all regions of the world. Egypt is on the map, but not in a prominent enough place yet.

Figure (6)

Comparison of AI contribution to GDP between the Middle East and other regions by 2030
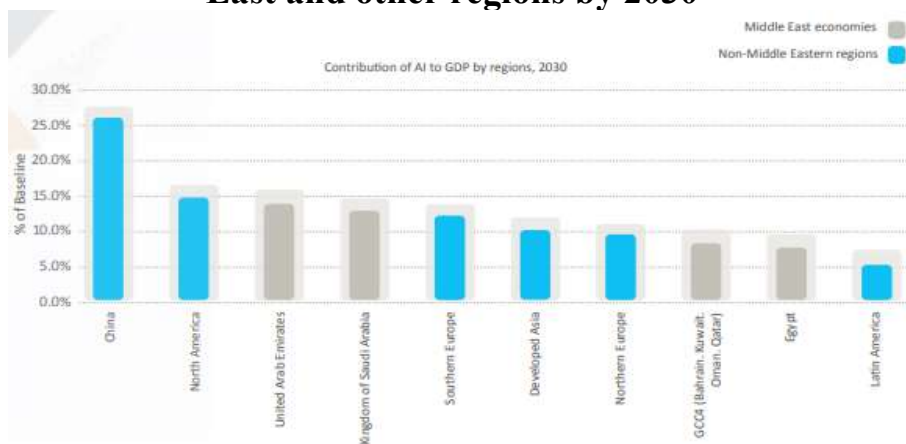

Figure (6): Comparison of AI contribution to GDP between the Middle East and other regions by 2030. (Source: PwC).

Figure (6) illustrates that when it comes to AI integration, Middle Eastern countries outperform other nations. Egypt is now ranked seventh in the area, behind all Gulf countries (excluding Iraq). AI is expected to contribute about 7.5 percent of Egypt's GDP by 2030, according to PwC estimates. While this is higher than many other countries and regions throughout the world, such as Latin America and Africa, it pales in comparison to Egypt's capabilities and prospective AI benefits. Finding strategies to improve Egypt's GDP contribution should be one of the major goals of a national AI policy. (OECD,2020).

4- Conclusion

This paper reviewed artificial intelligence as one of the requirements of the sustainable development goals, which include 17 goals and was divided into three groups: the environment, the economy, and society, and these groups are the main pillars of the sustainability process. It has become one of the basics of sustainable development projects at the present time, an example of which is the NEOM project in Saudi Arabia, which is based on artificial intelligence, and in Egypt, The National Council for Artificial Intelligence has been tasked with developing a comprehensive national plan for the localization of the artificial intelligence industry and Egypt's leadership role at the regional level as a global player in this field. To ensure its long-term viability and capability, Egypt's artificial intelligence sector involves skill development, technology, ecosystem, infrastructure, and management systems.

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