How to Cite:
Meliani, M., Billel, M., Omar, B., & Imane, M. (2024). Artificial intelligence and the challenge of readiness in Algeria. *International Journal of Economic Perspectives*, *18*(11), 2663–2679. Retrieved from https://ijeponline.org/index.php/journal/article/view/746

Artificial intelligence and the challenge of readiness in Algeria

Maamar Meliani
Economics Sciences Department, Faculty of Economics, Management & Commercial Sciences, Ali Lounici University, Blida2, Algeria
Email: em.meliani@univ-blida2.dz

Mouzai Billel
Management Sciences Department, Faculty of Economics, Management & Commercial Sciences, Ali Lounici University, Blida2, Algeria
Email: b.mouzai@univ-blida2.dz

Belkacem Omar
Accounting and Financial Sciences Department, Faculty of Economics, Management & Commercial Sciences, Ali Lounici University, Blida2, Algeria
Email: omardoc84@gmail.com

Massaoudine Imane
Accounting and Financial Sciences Department, Faculty of Economics, Management & Commercial Sciences, University Center, Tipaza, Algeria
Email: messaoudine.imane@cu-tipaza.dz

***Abstract*---**This research paper aims to shed light on Algeria's readiness to adopt artificial intelligence technology, by comparing it with the readiness of different countries of the world from different geographical regions, such as America, Europe, Asia, Africa, and some Arab countries, this was done based on indicators taken from the Oxford Insight website for government readiness to adopt artificial intelligence (2022). In order to achieve the objectives of the research, researchers used the analytical descriptive approach, by analyzing and studying the indicators and numbers of the three main pillars of artificial intelligence readiness, which in turn are divided into nine dimensions, and then draw the results, as this study concluded that Algeria still does not rise to the acceptable level of readiness to adopt artificial intelligence technology, The study also revealed the existence of a very deep digital gap between Algeria and the various developed countries of the world, which requires concerted efforts to reduce it, in order to develop artificial intelligence technology in the future.

Submitted: 09 September 2024, Revised: 10 November 2024, Accepted: 26 November 2024

***Keywords*---**artificial intelligence, neurons, artificial neural networks, machine learning.

1. Introduction

Artificial intelligence is a fascinating concept whose origins can be found in the mid-twentieth century, and it is a special branch of computer sciences that was first given this name by Marvin Minsky at the Dartmouth conference in 1956, and now it has become a very important topic that deserves more study, and it is one of the most interesting and fastest growing fields, and it encompasses a huge variety of subfields changing from the general like learning, reasoning, perception and so on, to the specific such as playing chess, proving mathematical theorems, writing poetry, driving a car or diagnosing diseases, in fact artificial intelligence is relevant to any intellectual task, it is truly a universal fields.

The purpose of the research on artificial intelligence is to create systems that operate at least as good as humans in different environments and with different levels of complexity and predictability.

Artificial intelligence is an interdisciplinary field, integrating the efforts of logicians, mathematicians, computer scientists, psychologists, and more recently, managers and ethicists.

Not only does artificial intelligence understand intelligent entities, but it can also show us how to act effectively and safely in a variety of situations, and therefore artificial intelligence still has many opportunities for masterminds.

The question of the study:
How ready is Algeria to adopt and apply artificial intelligence technology?

Hypothesis:
- Algeria is not yet ready to adopt artificial intelligence technology
- The use of artificial intelligence technology in Algeria is still weak and does not rise to the required level.
- Algeria is striving to develop areas of using artificial intelligence.
- The weakness of the main pillars of artificial intelligence such as data and infrastructure, government and technology sector is what prevents the widespread use of artificial intelligence technology in Algeria.

The Objectif of the study:
- The study aims to form a knowledge framework about artificial intelligence technology.
- Determining Algeria's readiness to adopt and apply artificial intelligence technology
- Trying to highlight the impact of artificial intelligence technology on achieving an increase in growth rates at various levels
- An attempt to discover the most important problems and challenges that hinder the application of artificial intelligence technology in Algeria.

The importance of the study:

The importance of the topic we are dealing with in this research paper lies in the fact that it is a vital and important topic, and as one of the most important digital transformation technologies currently in use, being an engine for progress, growth and prosperity over the next few years, the most important thing is knowing the extent of Algeria's readiness to adopt and apply artificial intelligence technology in light of the available capabilities, and then identify the various economic effects of artificial intelligence applications and the various aspects related to them.

Methodology:

So that we can answer the problem and try to prove or deny the hypotheses adopted, as the descriptive analytical approach will be adopted when presenting the various concepts in the theoretical aspect, in addition to analyzing data and statistical indicators when studying the features of the use of artificial intelligence in Algeria and assessing its contribution to achieving growth.

2. What is Artificial intelligence?

2.1. Definition of the word Artificial:

The word artificial often has a negative connotation as it is a substitute the real thing, however, artificial things can come close to their real counterpart, and this is what makes them sometimes very useful (1 p. 02).

2.2. Definition of the word intelligence:

The oxford learner’s dictionaries use "the ability to learn, understand and think in a logical way about things" (2 p. 08). Intelligence is the cognitive ability of an individual to learn from experience, the reason well to remember important information, and to cope the demands of daily living (1 p. 02).

2.3. Definition of Artificial intelligence:

John Mc Carthy, was the first to define the term artificial intelligence, roughly as follows:
"The goal of artificial intelligence is to develop machines that behave as thought they were intelligent" (3 p. 01).

Feigenbaum's definition: "Artificial intelligence is that part of computer science concerned with designing intelligent computer system, i.e. systems that exhibit the characteristics which we associate with intelligence in human behavior, understanding language, learning, reasoning, solving problems etc" (4 p. viii).
Definition of Patrick Winston 1984: "Artificial intelligence is the study of ideas that enable computers to be intelligent (4 p. ix).
Definition of Elaine Rich: "Artificial intelligence is the study of how to make computers do things at which at the moment, people are better (3 p. 02).
The more recent formulation of artificial intelligence by Eugene Charniak and Drew Mc Dermott (1985): Artificial intelligence is the study of mental faculties through the use of computational models (4 p. viii).

The oxford learner's dictionary is always a good advisor for linguistic questions like this and defines artificial intelligence as follows: "An area of study concerned with making computers copy intelligent human behavior", it means the artificial intelligence enables machines to reason and act like humans and mimics human behavior (5 p. 166).

Table 1: Historical development of artificial intelligence

Years	Events
1931	The Austrian Kurt Gödel shows that in first-order predicate logic all true statements are derivable. In higher-order logics, on the other hand, there are true statements that are unprovable. Gödel showed that predicate logic extended with the axioms of arithmetic is incomplete.
1937	Alan Turing points out the limits of intelligent machines with the halting problem.
1943	McCulloch and Pitts model neural networks and make the connection to propositional logic.
1950	Alan Turing defines machine intelligence with the Turing test and writes about learning machines and genetic algorithms].
1951	Marvin Minsky develops a neural network machine. With 3000 vacuum tubes he simulates 40 neurons.
1955	Arthur Samuel (IBM) builds a learning chess program that plays better than its developer.
1956	McCarthy organizes a conference in Dartmouth College. Here the name Artificial Intelligence was first introduced. Newell and Simon of Carnegie Mellon University (CMU) present the Logic Theorist, the first symbol-processing computer program.
1958	McCarthy invents at MIT (Massachusetts Institute of Technology) the high-level language LISP. He writes programs that are capable of modifying themselves.
1959	Gelernter (IBM) builds the Geometry Theorem Prover.
1961	The General Problem Solver (GPS) by Newell and Simon imitates human thought.
1963	McCarthy founds the AI Lab at Stanford University.
1965	Robinson invents the resolution calculus for predicate logic.
1966	Weizenbaum's program Eliza carries out dialog with people in natural Language.
1969	Minsky and Papert show in their book Perceptrons that the perceptron, a very simple neural network, can only represent linear functions.
1972	French scientist Alain Colmerauer invents the logic programming language PROLOG. British physician de Dombal develops an expert system for diagnosis of acute abdominal pain. It goes unnoticed in the mainstream AI community of the time.

Years	Events
1976	Shortliffe and Buchanan develop MYCIN, an expert system for diagnosis of infectious diseases, which is capable of dealing with uncertainty.
1981	Japan begins, at great expense, the "Fifth Generation Project" with the goal of building a powerful PROLOG machine.
1982	R1, the expert system for configuring computers, saves Digital Equipment Corporation 40 million dollars per year.
1986	Renaissance of neural networks through, among others, Rumelhart, Hinton and Sejnowski. The system Nettalk learns to read texts aloud.
1990	Pearl, Cheeseman, Whittaker, Spiegelhalter bring probability theory into AI with Bayesian networks. Multi-agent systems become popular.
1992	Tesauros TD-gammon program demonstrates the advantages of reinforcement learning.
1993	Worldwide RoboCup initiative to build soccer-playing autonomous robots.
1995	From statistical learning theory, Vapnik develops support vector machines, which are very important today.
1997	IBM's chess computer Deep Blue defeats the chess world champion Gary Kasparov. First international RoboCup competition in Japan.
2003	The robots in RoboCup demonstrate impressively what AI and robotics are capable of achieving.
2006	Service robotics becomes a major AI research area.
2010	Autonomous robots start learning their policies.
2011	IBM's natural language understanding and question answering program "Watson" defeats two human champions in the U.S. television quiz show "Jeopardy!" SIRI from Apple and Google Now from Google are two smartphone apps that use natural language to answer questions, make recommendations, and perform actions.
2013	Issuing a program NEIL from Carnegie Mellon University to extract visual knowledge from web data
2018	Alibaba's artificial intelligence model of language processing outperformed older subjects in a test of reading comprehension and comprehension at Stanford University Announcing Google Duplex, a service that allows artificial intelligence representatives to conduct natural conversations by simulating a human voice, and book appointments over the phone.

Source: Wolfgang Ertel (2011), Introduction to artificial intelligence, springer, pp10-11(adapted

2.4. Levels of artificial intelligence:

Artificial intelligence can be classified into:

2.4.1 Weak AI: which can only process specific tasks (2 p. 08).

2.4.2 Strong AI (AGI): It is a term used to describe the process of developing artificial intelligence to the point where the intellectual capacity of a machine is functionally equal to that of a human being, It includes the following main characteristics: the ability to think and interact intelligently, solve puzzles, make judgments, plan and learn, communicate as if conscious, objective thoughts, feelings and behavior (6 p. 95).

2.4.3 Superior artificial intelligence: Researchers are concerned that AGI will lead to super intelligence that exceeds human cognitive performance (2 p. 08).

3. How does artificial intelligence work and how to train artificial neural networks?

The defeat of Garry Kasparov who was perhaps the greatest chess player the world has ever seen, by the Deep Blue computer in May 1997 represents a major turning point in the field of intelligent machine research, as the giant IBM computer at that time was able to analyze 20 million operations per second, but Kasparov accused the computer of cheating, and this match enabled the world to discover a very wonderful thing and a scientific achievement that the computer is able to play very human movements, and to deeply understand the local factors, and that it is able to improve its performance through experience, in other words it is able to learn (7 p. 165).

3.1 What is Neurons?

Neurons are the basic building blocks that make up the human brain, and they are electrically excitable cells, as they process electrical input signals and convert them into electrical output signals, as for artificial neurons used in machine learning, they simulate this behavior and are used in turn to form artificial neural networks (5 p. 169).

3.2 What is a neural network?

A neural network is a model of thinking based on the human brain, as the latter consists of a group of densely interconnected neurons, where information is processed, as the human brain integrates approximately 10 billion neurons and 60 trillion connections of synapses between them, Thus, the information processing system in the human brain can be considered very complex, as the information is stored and processed in the neural network simultaneously across the entire network instead of specifying special locations for that, and because of the plasticity, the connections between the neurons leading to the correct answers are stronger, in When those that lead to wrong answers are weakened, as a result, biological neural networks have the ability to learn through experience, which has led to the attempt to simulate a biological neural network in a computer (7 p. 166).

3.3 What are artificial neural networks?

Artificial neural networks(ANN) consist of a very simple and intertwined number of processors or what is also called neurons, which in turn are similar to biological neurons, and these artificial neurons are linked to each other by means of weighted links that pass the responses from one neuron to another Where each neuron receives a number of input signals through its connections, while it does not produce more than one output signal, as the latter is transmitted through the external communication of the neurons, while the external communication is divided in turn into a number of branches that send the same signal Branches from incoming connections from other neurons in the network (7 p. 167).

3.4 How to learn an artificial neural network?

Neurons are connected by links, each of which has a numeric weight associated with it, and these weights are the primary means of long-term memory in artificial neural networks, where the neural network learns through repeated modifications of these weights (7 p. 167)

3.5 Machine learning:

It is a branch of artificial intelligence that relies on computing, statistics and mathematics techniques to teach computer systems to recognize patterns and make decisions based on the collected data, Where machine learning techniques develop computer models that learn from the data received, and these models are used to analyze the data, provide expectations, and make decisions based on the new data sent to it, and machine learning is considered a key to analyzing and understanding big data, which is called "big analysis For data", machine learning techniques also include many models such as deep machine learning, supervised learning, unsupervised learning and reinforcement learning (8 p. 1253).

4. Artificial intelligence, applications, benefits and risks:

4.1 Applications:

Among the fields and applications in which artificial intelligence is used are the following:

4.1.1 Natural language processing (6 p. 97):

Where programs and systems are developed that have the ability to understand or generate human language, and research in natural language processing has led to the development of programming languages suitable for this purpose with the aim of making communication between humans and computers take place naturally, and this field is divided into two main parts:

- ✓ Understanding natural languages: In this field, it searches for ways that allow the computer to easily understand human language.
- ✓ Production of Natural Languages: This field searches for methods that allow the computer to produce natural language, such as producing sentences in Arabic or English.

4.1.2 Deep learning:
It is an advanced machine learning technique that uses multi-layered neural networks to better represent data (8 p. 1255).

4.1.3 Computer vision:
It is intended to provide the computer with optical sensors, so that it can recognize existing people or shapes, by developing technical methods for image analysis and face recognition in order to make the computer able to see and recognize the surrounding environment (6 p. 98).

4.1.4 Logical Reasoning:
It is the field concerned with the development of computer systems capable of using logic and reasoning to solve problems (8 p. 1255)

4.1.5 Robotics:
Robot technology is considered one of the most advanced artificial intelligence technologies in terms of applications that provide solutions to problems, as it is an electromechanical machine that receives orders from a computer affiliated with it, and it performs certain actions, and artificial intelligence in this field gives the robot the ability to move and understand the surroundings around it (6 p. 98).

4.2 Benefits of artificial intelligence:

❖ Artificial intelligence helps to enhance business capabilities in all fields, and also gives companies the ability to show all their capabilities and raise them to the highest levels, as it increases business efficiency and speed of implementation and increases its value, contributes to the continuous development of business, and increases the number of interactions with These works are due to the continuous development of related tools and software (91 صفحة 9).
❖ Artificial intelligence algorithms use real-time data, and combine different information from different sources in a way that enables it to perform complex and fast analysis and make better decisions (10 p. 710).
❖ Artificial intelligence helps to achieve progress in science and technology, allowing to address the most important problems of the world (11 p. 435).
❖ Accessibility and the enhancement of human capabilities, which is one of the humanitarian aspects in the use of artificial intelligence, which has been increasingly relied upon in recent times, and which has been able, through artificial intelligence tools, to enable people with special needs to obtain independence and productivity (12 pp. 30-31).
❖ Artificial intelligence plays an important role in many sensitive fields, such as assisting in diagnosing diseases and prescribing medicines, legal and professional advice, interactive education, security and military fields, and other fields (13 p. 462).
❖ The experience of the “Covid-19” epidemic has proven that robots can perform the necessary tasks, to face crises in cases that are considered unsafe for humans, such as the crisis of this epidemic (12 p. 34).
❖ intelligent machines relieve people of many risks and psychological stresses, and make them focus on more important and more humane things, by employing these machines to do hard and dangerous work, explore unknown places, and participate in rescue operations during natural disasters, and these machines

also have a role Effective in fields that include many complex details, which require tiring mental focus, continuous mental presence, and sensitive and quick decisions that do not tolerate delay and error (13 p. 462).

❖ With the increase in cyber-attacks on institutions and companies over the past years,

It is clear that the current approach to cyber security suffers from a chronic weakness in the ability to combat electronic threats, and through the recent attacks in which Russian hackers were able to the penetration of a number of US government agencies, as the voices of many security experts have risen and demanded a radical change in the strategies used to discover and deal with electronic threats, so that reliance on rigid sets of data is replaced by artificial intelligence models flexible and able to understand normal and possibly abnormal behavior of employees (12 p. 35).

4.3 Risks of artificial intelligence:

❖ The risk of job disappearance: A study conducted at the University of Oxford in 2013, which included 702 different jobs in America, that machines will be able to do about 47% of them in the next two decades (14 p. 99)..

❖ Lethal autonomous weapons: These are defined by the United Nations as weapons that can locate, select, and eliminate human targets without human intervention (15 p. 49).

❖ Insecurity: The disappearance of jobs, the decrease in wages due to the dispensing of a large part of the services and tasks that people used to perform, and the emergence of new technologies will lead to the loss of security and the spread of corruption of all kinds (14 p. 99).

❖ Biased decision making: Careless or deliberate misuse of machine learning algorithms for tasks such as evaluating parole and loan applications can result in decisions that are biased by race, gender, or other protected categories (15 p. 49).

❖ Human extinction: According to the scientist "Stephen Hawking", humans dominate the rest of the creatures because they have a brain with distinctive capabilities that the brains of other creatures lack, therefore, if general artificial intelligence surpasses human brains and in turn becomes super-intelligent, then it will be strong and difficult to control, and the fate of humanity depends on the actions of these devices (14 p. 99).

❖ Decreased demand for goods and services: due to the decline in the purchasing power of consumers and the loss of their jobs or the reduction of their wages, this leads to a decline in growth rates and thus a recession (14 p. 99).

❖ Artificial intelligence can fill the gap between the economies of developed and developing countries: considering the the United States and China are the two countries in the best position, as they are considered responsible for most of the activities related to artificial intelligence in the world, on the other hand, there are risks that developing economies will fall further behind, due to weak investment and digital infrastructure and talent shortages (14 p. 100).

5. Algeria's readiness to use artificial intelligence technology:

To study and analyze Algeria's readiness to use artificial intelligence technology, we relied in our study on the most important indicators of readiness, which were

obtained from the following stats website: https://www.oxfordinsights.com/government-ai-readiness-index-2022.

In the 2022 Government AI Readiness Index, we have 03 pillars:

- **Government Pillar**: AI strategy work is dominated by middle income countries.
- **Technology Sector Pillar**: AI skills are global, with future developers emerging in a diverse set of countries.
- **Data & Infrastructure Pillar**: Changes to the D&I Pillar expose which governments are taking an active role in supporting data availability

Each main pillar is in turn divided into several dimensions as follow:

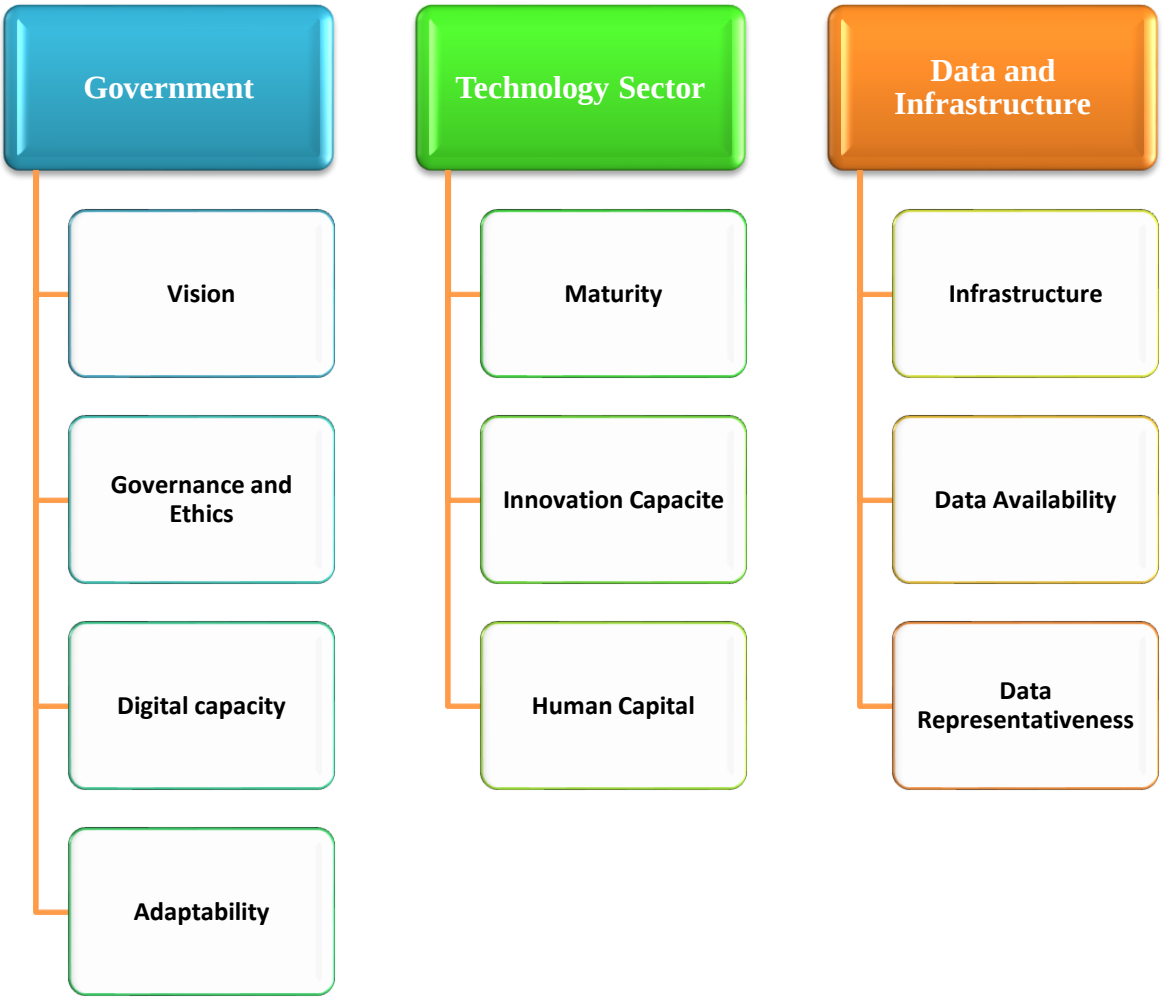

Fig.1. Main pillars and dimensions of AI Readiness Index
Source: Prepared by the researchers from the site: https://www.oxfordinsights.com/government-ai-readiness-index-2022.

In our paper, we will compare Algeria's indicators with their counterparts from different countries and different regions: European, African, North American, Asian and Arab countries.

Table 1. Artificial intelligence readiness index for different countries of the world

Country	Total	GOVERNMENT					TECHNOLOGY SECTOR				DATA AND INFRASTRUCTURE			
		Vision	Governance & Ethics	Digital Capacity	Adaptability	Total	Maturity	Innovation Capacity	Human Capital	Total	Infrastructure	Data Availability	Data Representativeness	Total
NORTH AMERICAN COUNTRIES														
USA	85.72	100.00	89.22	82.74	72.87	86.21	84.74	93.02	67.27	81.67	88.34	80.01	99.50	89.28
Canada	77.39	100.00	86.97	78.69	70.77	84.11	51.72	76.84	64.67	64.41	83.37	77.53	90.06	83.65
EUROPEAN COUNTRIES														
UK	78.54	100.00	88.07	74.17	64.99	81.81	52.67	76.61	67.43	65.57	84.14	83.91	96.68	88.24
Finland	77.59	100.00	89.19	84.33	77.69	87.80	41.50	71.73	62.89	58.71	87.95	81.91	88.96	86.27
France	75.78	100.00	84.14	84.90	63.11	83.04	49.94	67.73	60.41	59.36	85.87	78.07	90.91	84.95
Spain	67.83	100.00	62.61	72.45	52.20	71.82	37.75	51.80	56.54	48.70	83.01	79.35	86.52	82.96
ASIAN COUNTRIES														
Korea	76.76	100.00	84.46	91.58	71.23	86.82	37.46	64.14	60.26	53.96	89.27	95.64	83.59	89.50
Japan	75.25	100.00	84.68	73.05	67.14	81.22	36.62	70.95	60.71	56.09	86.17	92.82	86.37	88.45
China	70.84	78.75	100.00	73.86	82.28	58.87	57.36	66.46	55.70	59.84	82.25	62.56	76.94	73.91
India	63.67	100.00	81.72	69.44	51.17	75.58	32.65	54.01	59.08	48.58	65.40	59.45	75.65	66.83
AFRICAN COUNTRIES														
South Africa	47.74	0.00	57.33	55.62	38.63	37.90	26.06	41.50	45.25	37.60	74.42	57.36	71.43	67.73
Kenya	40.36	0.00	55.53	61.64	44.27	40.36	12.85	39.77	33.66	28.76	46.64	43.40	65.80	51.95
Rwanda	40.20	50.00	54.55	65.92	42.66	53.28	8.55	41.97	33.89	28.14	21.27	40.38	55.93	39.19
ARAB COUNTRIES														
UAE	68.54	100.00	49.35	88.91	55.84	73.53	35.33	57.41	63.83	52.19	84.77	65.91	89.07	79.92
Qatar	62.37	100.00	57.19	71.41	48.77	69.34	30.99	41.14	52.96	41.70	61.18	69.60	97.45	76.08
Saudi Arabia	61.96	100.00	46.61	87.51	61.12	73.81	29.65	39.78	59.05	42.83	62.99	74.68	70.08	69.25
Jordan	51.76	100.00	61.36	64.16	44.66	67.54	20.85	42.22	45.52	36.20	28.15	52.52	73.98	51.55
Egypt	49.42	100.00	51.42	61.10	41.32	63.46	16.83	40.98	50.42	36.07	29.24	43.98	72.93	48.72
Tunisia	46.81	50.00	55.27	55.67	33.58	48.63	36.92	54.87	21.27	39.73	49.75	26.25	58.74	79.62
Algeria	35.33	0.00	39.54	45.10	36.03	30.17	11.19	35.99	42.61	29.93	27.82	47.62	62.20	45.88

Source: Prepared by researchers through the site: https://www.oxfordinsights.com/government-ai-readiness-index-2022

Through this table, we selected samples of countries from all over the world, in order to know the level of readiness of each of them to adopt artificial intelligence technology, and then compare it with the level of readiness of Algeria to apply this technology, and then try to diagnose the dimensions that suffer from weakness, in order to develop it in the future.

According to the classification of the aforementioned site, Algeria appears in a very late rank, as it ranks 111 out of 180 countries, and to clarify and facilitate the comparison process, we will divide these countries into groups according to their geographical regions, we will compare Algeria's indicators with their counterparts from different countries and different regions: European, African, North American, Asian and Arab countries, and then represent them graphically as follows:

5.1 Readiness index of North American countries compared to Algeria:

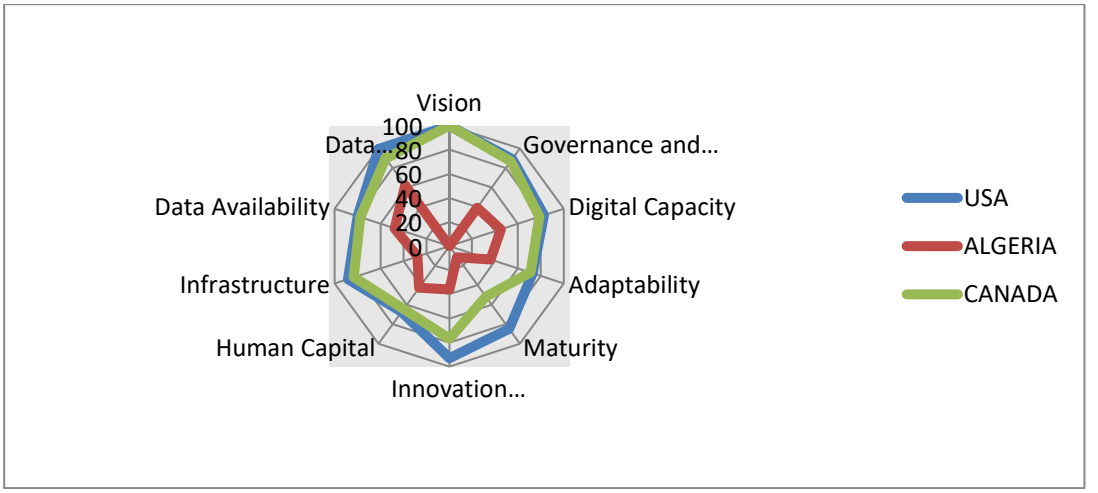

Fig.2. Algeria's readiness compared to North American countries
Source: Prepared by researchers based on Table No. 01

The graphic representation shows the vastness of the digital gap that exists between North American countries, such as Canada and the United States of America on the one hand, and Algeria on the other hand, where the United States of America appears superior in all dimensions, and it ranks first according to this site, out of 181 countries, however, the vertical oval shape of the graphic representation indicates the distinction of this category of countries and their good interest in the two dimensions of vision and the innovation capacity, while Algeria's indicators appear weak in general compared to this type of country, especially with regard to the dimension of vision, which is equal to zero, which means that there is no vision or intention to adopt artificial intelligence technology.

The graphic representation of the readiness in Algeria was not able to touch even one point of the graphic representations of these two powerful countries in this field, but rather it was below the levels of these two countries, which explains Algeria's poor readiness to adopt artificial intelligence in relation to all dimensions of the study.

5.1 Readiness index of European Countries compared to Algeria:

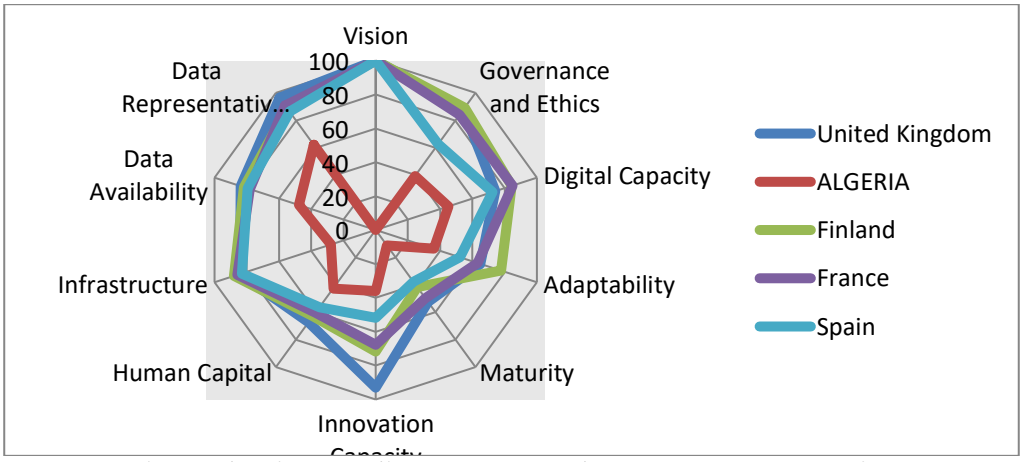

Fig.3. Algeria's readiness compared to European Countries
Source: Prepared by researchers based on Table No. 01

Through Fig.3, we notice the same thing about European countries, as they have a strong readiness to adopt artificial intelligence technology, through the level of readiness of most dimensions, similar to vision, data representativeness, infrastructure, innovation capacity, data availability and digital capacity, while these countries lack some readiness with regard to the dimensions of maturity and adaptability, while Algeria remains far from this European level of readiness.

5.2 Readiness index of Asian countries compared to Algeria:

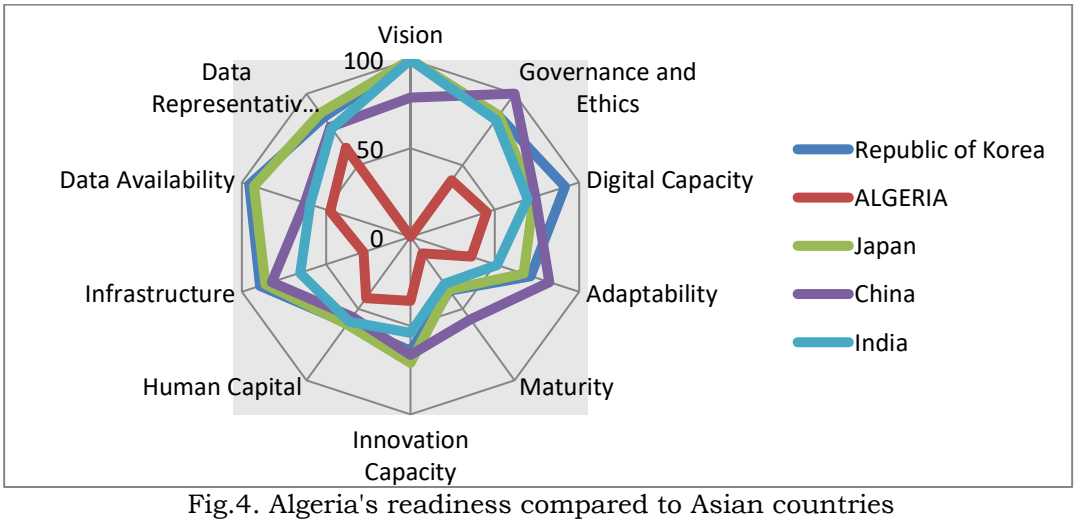

Fig.4. Algeria's readiness compared to Asian countries
Source: Prepared by researchers based on Table No. 01

Even Asian countries are far superior to Algeria regarding the level of readiness to adopt artificial intelligence technology, as these countries show advanced levels in terms of some dimensions such as vision, infrastructure, data availability,

governance and ethics, while these countries are somewhat lacking in readiness with regard to the dimensions of vision, adaptability, maturity, innovation and human capital, these explain the horizontal elliptical shape of the graphic representation, while Algeria's readiness also remains below the level of the Asian countries' readiness.

5.3 Readiness index of African countries compared to Algeria:

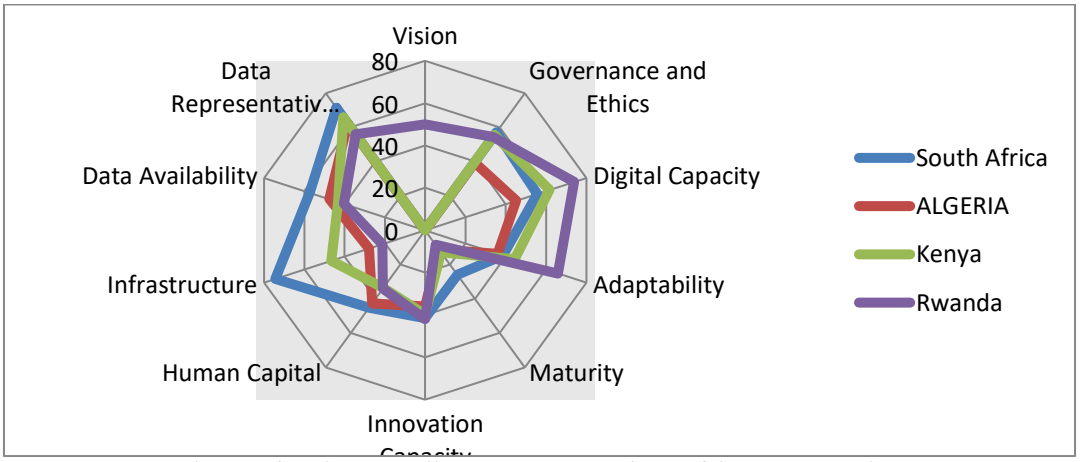

Fig.4. Algeria's readiness compared to African countries
Source: Prepared by researchers based on Table No. 01

Through the clear contact between the graphic representations of African countries and their counterparts in Algeria, it appears that the level of readiness is close between these African countries, but there is a somewhat superiority in the readiness of some dimensions in favor of African countries at the expense of Algeria, where we note the clear superiority of both South Africa and Kenya regarding Dimensions of infrastructure, data availability, data representativeness, digital capacity and governance and ethics, while Rwanda outperforms Algeria in dimensions of digital capacity, adaptability and vision, while all these African countries share weak visions, lack of maturity, lack of innovation capacity and weak of human capital.

5.4 Readiness index of Arab countries compared to Algeria:

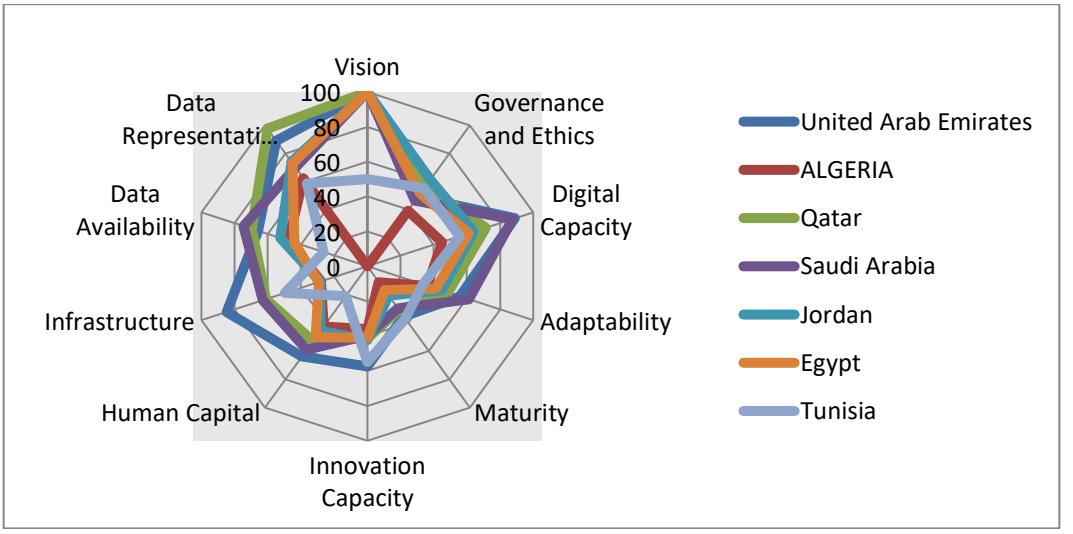

Fig.5. Algeria's readiness compared to Arab countries
Source: Prepared by researchers based on Table No. 01

We note that the Arab Gulf countries are superior in terms of readiness to the rest of the other Arab countries, including Algeria, and this superiority is evident in the dimensions of infrastructure, data availability, data representativeness, digital capacity, adaptability and human capital. that the various Arab countries share with each other that they have a vision, except for Algeria, which does not have a vision. The Arab countries in general lack maturity, the ability to innovate, and the weakness of human capital.

6. Conclusion

From the above analyzes of the graphical representations, the following conclusions can be drawn:

- There is a clear digital gap between the countries of the developed world such as the countries of North America, Europe, Asia, and even the Arab Gulf states on the one hand, and between Algeria on the other.
- Countries that do not have a clear vision regarding the adoption of artificial intelligence technology, we find that their overall readiness is disturbed, and this is similar to Algeria and some African countries, while countries that are more interested in the dimension of vision have made great strides in improving the level of their readiness, and this is similar to the developed countries in America and Europe, Asian countries, Gulf countries, and even neighboring countries such as Tunisia and Egypt.
- Most countries that are less ready to adopt artificial intelligence technology, similar to African and Arab countries, including Algeria, share the problem of poor readiness with regard to the following dimensions: Adaptability, maturity, innovation capacity and human capital, which explains the widening gap between them and the developed countries of the world.
- Through our analysis of indicators of readiness in Algeria, we found that

Algeria is still not yet ready to adopt artificial intelligence technology as required, and the use of this technology in Algeria is still somewhat limited, but Algeria is striving to develop the areas of using artificial intelligence, and the weakness of the pillars key aspects of artificial intelligence such as data and infrastructures, government and technology sector this is what limits the widespread use of this technology in Algeria.

The research paper concluded with a set of recommendations, most notably the following:

- The need to reduce the large digital gap that exists between Algeria and the leading countries in artificial intelligence technology, and try to interact with these countries, establish partnerships with them, and benefit from their experience and technology.
- The need to adopt a clear vision and strategy to adopt artificial intelligence technology as the first conditions for readiness, and then gradually develop the rest of the dimensions.
- The need to develop dimensions that depend on the human element, such as adaptability, maturity, ability to innovate, and human capital.

6. References

1. Campesato, Oswald (2020), Aritificial intelligence, Machine learning and Deep learning. Mercury learning and information, New Delhi, India.
2. Brumbauer, Josef Baker (2023), Trustworthy Artificial intelligence implementation, Introduction to the AI framework, Springer nature, Switzerland.
3. Ertel, Wolfgang(2011), Introduction to artificial intelligence, springer,London.
4. Borm, Rainer(2018), Artificial intelligence, the case against, Routledge, London.
5. Lang, Volker(2021), Digital fluency, understanding the basic of artificial intelligence, blockchain technology, quantum computing, and their applications for digital transformation, Springer, New york.
6. Souad Bouabha (2022), Artificial Intelligence: Applications and Reflections, Journal of Financial and Business Economics, University Center Abdelhafid Bou Souf, Mila, Algeria, Volume 06, Issue 04.
7. Negnevitsky, Michael (2011), Artificial Intelligence, a guide to intelligent systems, Pearson, England .
8. Sana Artubaz (2022), The Impact of Using Artificial Intelligence Applications on Improving Enterprise Performance, Journal of Humanities, M. M. El Bouaghi University, vol. 09, No. 03.
9. Linda Samoud and Suhaila Dahmani (2022), Artificial intelligence is a digital technology that leads to an emerging learning experience in Algeria, Journal of Media and Communication Studies, University of Algiers 03, vol. 02, No. 202.
10. Hisham Alaq and Hanan Duraid (2022), Artificial intelligence applications in financial institutions Portal to Operationalize Financial Inclusion, Journal of Economics and Sustainable Development, El Oued University, vol. 05, No. 01.
11. Hassan Rashid Nadhum and Avram May Iblehad (2023), Audit of AI Bias in Light of the IIA AI Audit Framework Analytical Theory Study, Journal of

Contemporary Business and Economic Studies, Ibn Khaldoun Tiaret University, Volume 06, Issue 01.
12. Khalil Saidi and Marzouk Ben Mahdi (2022), Artificial Intelligence as an Inevitable Guide in Protecting Cybersecurity (Today's Reality and Tomorrow's Wager), Al-Salam Journal of Human and Social Sciences, University of Algiers, Volume 06, No. 02.
13. Portrait of Shanbe and Said Ben Lakhdar (2022), Preparing Future Leaders Using Artificial Intelligence Techniques, Journal of Perspectives on Management Science and Economics, Masila University Volume 06, No. 01.
14. Heba Lahmar (2021), The Switch to Artificial Intelligence Among Fears and Aspirations - The Emirati Experience Model - Journal of Economics and Development, vol. 09, No. 02.
15. https://www.oxfordinsights.com/government-ai-readiness-index-2022.