

JEL Classification Codes: F01, O33, O57.

Introduction:

The huge expansion of the digital economy at the present time is an unparalleled opportunity to accelerate economic development and economic progress in various developed and less developed countries alike.

Soon, digital technology played a decisive role in addressing the health and economic crisis, building resilience and mitigating the severity of the impact of the economic recession left by the Corona epidemic, especially in the year 2020, This is due to the fact that modern technology has made it possible to use digital data, applications and software on the Internet and apply them in various fields of life and economic ones in particular.

This made various countries accelerate and compete in order to advance the digital economy and meet the various conditions for its establishment, then subject this path to periodic evaluation and highlight the strengths and weaknesses in order to improve performance, Many international and regional classification bodies and organizations have undertaken this assessment, by building indicators based on a set of criteria to measure the performance of different countries, and achieving comparison that allows for its evaluation in order to reduce the digital gap between them. Among these indicators, we find the Arab Digital Economy Index, through which we will analyze Algeria's performance and compare it with the top eleven of the Arab countries.

Study problematic: Based on the above, the problem of the study can be put forward as follows:

What is the reality of the performance of the digital economy in Algeria and the main weaknesses in this performance in the light of the Arab digital economy index during the period 2018 and 2022?

Study Hypothesis: the following hypothesis may be raised:

Algeria's performance in the Arab digital economy index is very weak compared to other Arab countries over the years. One of the main sources of this weakness is the lack of good digital infrastructure.

Study importance: The importance of the study lies in the desire to improve Algeria's performance in the Arab Digital Economy Index, which starts from analyzing its reality and its most important obstacles, especially since this index has completed its third edition, which allows for a meaningful comparison with the rest of the Arab countries.

Study objectives: This study aims to examine the reality of the digital economy in Algeria and compare it with the rest of the Arab countries, in light of the Arab digital economy index and its most important developments during the period from 2018 to 2022, which allows shedding light on the most important aspects of its weak performance in the index, including providing recommendations that contribute to improving the situation.

Previous studies:

(Adjal & Ziad, 2022) aimed at introducing the digital economy, its requirements and its main challenges, comparing to some Arab countries by analyzing the Arab digital economy index for the year 2020. The study concluded that the United Arab Emirates ranks first in the Arab world, where its results were closer to the international normative index adopted in the report to compare between Malaysia and Singapore, as a result for their technological superiority, which promotes competitive advantage, and such a degree of similarity in terms of GDP compared to some Arab states.

(Abida,2022) illustrated the role of digital economy in supporting sustainable development in Algeria as an important substitutes to the Hydrocarbon-dependent economy. The study also briefly indicated a situation of the digital economy in Algeria, based on the “Arab digital economy index” for the year 2020, it concluded that Algeria is digitally promising because it is attractive to investment, however it needs digital activation, and more investments to maximize the capabilities of its infrastructure .

(Madani, Khechida, & Bousemaha, 2021) defined the industrial innovation policy in favor of digitizing the economy in the world, through which they review the theoretical and experimental new aspect

that digital technology has contributed as an innovative tool for the economy in the world, highlighting the Arab reality in this field, and comparing digital innovation in some countries of the world, with the help of the “Enabling Digitalization Index” (EDI) for the year 2018, developed by Euler Hermes experts, The study found that the digital economy is an instrument for innovation and that the degree of global interest and engagement with the new knowledge economy in developed and emerging countries is large and wide in all sectors, as it distinguishes them with a competitive ability in digital creativity.

Study methodology: To analyze the problematic of the study, the descriptive analytical approach and the comparative approach were relied upon, in addition we use statistics to study annual reports.

Study axes: This study is divided into the following axes:

- The concept of the digital economy and its components;
- The Arab Digital Economy Index: Origins and Pillars;
- The most important results of the Arab Digital Economy Index and the location of Algeria;
- The reality of the digital economy in Algeria in the light of the Arab index for the years 2018, 2020 and 2022.
- Evaluating Algeria's performance and its weaknesses according to the most important sub-indicators of the Arab digital economy.

Firstly. The concept of the digital economy and its components:

The term digital economy appeared for the first time in a book by Canadian businessman Don Tapscott entitled “The Digital Economy, Promise and Peril in the age of Networked Intelligence” in 1996, and since then there is no broad or unified consensus on its definition, especially since technological progress is taking a rapid turn. And it is done in our time with technologies that were unknown at that time.

1. The concept of digital economy:

The Organization for Economic Co-operation and Development (OECD) defined the digital economy as “reliant on, or significantly

enhanced by the use of digital inputs, including digital technologies, digital infrastructure digital services and data, it refers to all producers and consumers, including government, that are utilizing these digital inputs in their economic activities”. (OECD, 2020, p. 39)

Economic and Social Commission for Western Asia (ESCWA) also defines the digital economy as “the pervasive use of information and communication technologies (ICT) in social and economic endeavors, leading to expended opportunities, economic growth and improved public service delivery”. (ESCWA, 2018, p. v)

Thus, the concept of the digital economy is linked to the growing and rapid impact of digital technology and the digital revolution through its use in various fields and economic activities, as a major supporter of innovation and competitiveness among countries at the present time.

As defined by Bukht and Heeks, “that part of economic output derived solely or primarily from digital technologies with a business model based on digital goods or services”. (Bukht & Heeks, R., 2017, p. 13)

2. Components of the digital economy:

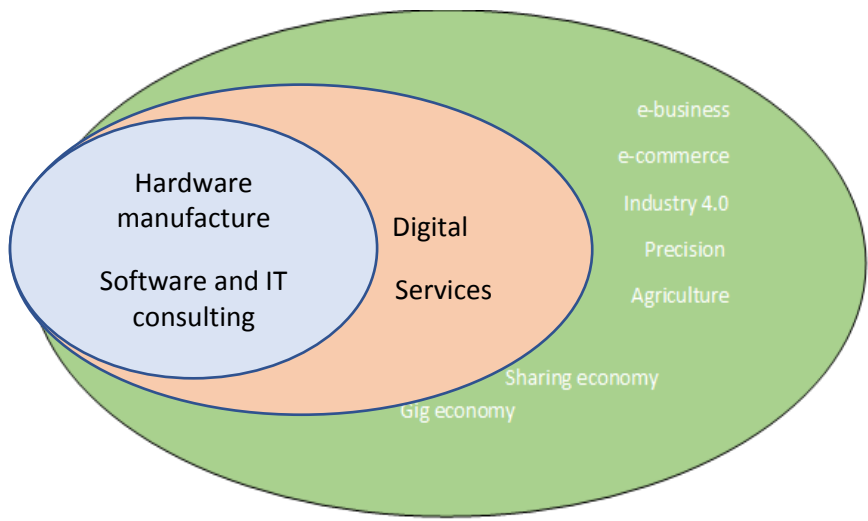
The digital economy was divided into three components (UNCTAD, 2019, p. 4) (as shown in **Figure N°01**):

2.1. Core aspects or foundation aspects of the digital economy, which includes fundamental innovations (semiconductors, processors), core technologies (computers and communications devices) and enabling infrastructure (Internet and telecoms networks).

2.2. digital and information technology sectors, which produce key products or services that rely on core digital technologies, especially digital platforms, mobile applications and payment services, and innovation in these areas has a significant impact on the digital economy.

2.3.A wider set of digitalization, which includes those where digital products and services are being increasingly used such as electronic commerce...

Figure N°01: Components of the digital economy:



Core: Digital (IT/ICT) sector
Narrow scope: Digital Economy
Broad scope: Digitalized economy

Source : (UNCTAD, 2019, p. 6)

Secondly. The Arab Digital Economy Index: Origins, Dimensions and Pillars:

In terms of methodology and in general, there is no unified indicator or evidence at the global level to measure the importance of the digital economy between countries, but despite this, it is noted through a number of regional indicators that there is a relative similarity in terms of the most important criteria used in its measurement.

The Arab countries collectively base their index on the index formulated by the Arab Union for Digital Economy, affiliated to the Council of Arab Economic Unity in the League of Arab States, within the framework of the Arab vision for the digital economy. So far, three

reports have been prepared covering the years 2018, 2020 and 2022, measuring the extent of development achieved by the Arab countries in the field of transformation towards the digital economy and the extent of its integration in various economic sectors and activities.

1. The emergence of the Arab Digital Economy Index:

The idea of establishing the Arab Index for the Digital Economy began in 2018, with the participation of various parties such as Harvard University, the World Bank, experts from the United Nations, the British Digital Government and the Organization for Economic Co-operation and Development... (Gohneim, 2021, p. 2)

A number of international and UN reports have been adopted as a source of data, which evaluates the performance of 22 Arab countries based on their readiness for digital transformation and their ability to benefit from the digital economy. The index is based on its analysis of the performance of various Arab countries in the field of digital economy on five dimensions and nine pillars or axes that include 43 sub-indicators (ARABFDE, 2022, p. 50).

Each of the pillars contributes to the total value of the index (out of 100 points) in each of the countries. The total value of the index determines the arrangement of each country, its position and status in the Arab region. Point 100 represents the best performance and point 00 is the worst performance, and each pillar is given equal weights.

The Arab countries were compared by using another indicator which includes two countries :Singapore and Malaysia, the success of their digital transformation systems is the reason behind the selection of these two countries, and also because they are developing countries similar to the Arab countries. (ARABFDE, 2022, p. 26)

2. Dimensions of the Arab Digital Economy Index:

It consists of five main dimensions that can be summarized as follows (ARABFDE, 2022, p. 46):

2.1. Digital government:

It meets people's needs by providing the delivery of public services and amplifying the digitization efforts to improve efficiency and transparency within the government sector.

2.2. Digital foundations:

To offer the necessary foundations for a vigorous digital system that includes infrastructure, policies and regulations, digital skills, financing and governance. These areas are critical to the development of the digital system on the global.

2.3. Digital Readiness of the Citizen:

The citizen should be the focal point of the digital transformation system. The digital technologies should improve the citizen of life including the marginalized groups and minorities.

2.4. Digital innovation:

Innovation must be treated as a catalyst to digitalization as the new digital technologies such a 3D printing, artificial intelligence, big data, and cloud computation have led to revolution in concepts and creation of new sources of value added for many industries.

2.5. Digital Processes:

The business sector will be the largest beneficiary of the digital transformation processes, as these processes will increase the value added to the consumer, improve cost efficiency, and will establish a larger customer base by providing more opportunities to access new markets.

3.Pillars of the Arab Digital Economy Index:

The index is based on nine digital pillars that have a great relationship with the aforementioned dimensions and can be shown through the following table:

Table N° (1): Dimensions and pillars of the Arab Digital Economy Index:

dimension	pillars
Digital Government	Pillar One: Institutions Fourth Pillar: Digital Government
Digital Foundations	Pillar Two: Infrastructure
Digital Readiness of the Citizen	Pillar Three: Workforce
Digital Innovation	Fifth Pillar: Innovation Sixth Pillar: Knowledge and Technology
Digital Business	The seventh Pillar: Market Forces The eighth pillar: Financial market growth
multidimensional	The ninth pillar: sustainable development goals.

Source: (ARABFDE, 2022, p. 49)

It is noted that the various pillars of the index are divided into different strategic dimensions, with the exception of the ninth pillar, sustainable development, which is linked to the various strategic dimensions of the indicator.

Thirdly. The most important results of the Arab Digital Economy Index and the location of Algeria:

According to the three-year indicators covered by the Arab Digital Economy Index in 2018, 2020 and 2022, the ranking results show that there are three groups of countries, which are the group of leading countries in the digital economy, the group of promising countries and

the group of countries that need to strengthen their digital infrastructure capacities.

The following table shows the ranking of the various countries in the Arab Digital Economy Index for the three years since its inception:

Table N° (2): Ranking of countries according to the Arab Digital Economy Index during the years 2018, 2020 and 2022:

Country	Rank in 2018	Rank in 2020	Rank in 2022	Index value 2022	The data used in the ranking
UAE	1	1	1	71.37	Complete
Qatar	2	2	3	65.05	Complete
Bahrain	3	4	4	64.89	Complete
Saudi Arabia	4	3	2	66.07	Complete
Oman	5	5	5	61.64	Complete
Kuwait	6	6	6	61.30	Complete
Jordan	7	7	7	57.67	Complete
Lebanon	8	11	11	51.92	Complete
Morocco	9	8	8	54.86	Complete
Tunisia	10	9	9	54.03	Complete
Egypt	11	10	10	52.36	Complete
Algeria	12	12	12	46.55	Complete
Iraq	13	13	13	33.64	Incomplete
Djibouti	14	19	16	28.06	Incomplete
Mauritania	15	15	14	29.95	Incomplete
Syria	16	14	17	26.06	Incomplete
Yemen	17	16	15	28.90	Incomplete
Sudan	18	17	18	25.53	Incomplete
Comoros	19	20	19	24.34	Incomplete
Somalia	20	21	21	23.57	Incomplete
Libya	21	18	20	23.70	Incomplete
Palestine	22	22	22	23.11	Incomplete

Source: Adapted according to (ARABFDE, 2018) (ARABFDE, 2020) (ARABFDE, 2022)

It can be seen from the above table that the six different countries of the Gulf Cooperation Council lead the level of the “leading countries” group, according to the classification of the Arab Digital Economy Index for the various evaluation years available between 2018 and 2022.

The United Arab Emirates ranked first during all years of evaluation, with 71 points of the index value, followed by Saudi Arabia during the year 2022. As for the second group, which is the group of promising countries, it also included six countries, led by Jordan and the last Algeria, with 46 points of the index value during the year 2022, compared to 41 points and 35 points during the years 2018 and 2020, respectively.

It is very far from the value of the index of the leading country (71 points). That is, there is a digital gap between them estimated at about 25 points, and a digital gap with the comparison countries, namely Indonesia and Malaysia, of about 32 full points. As for the third and last group, it included ten countries, and they are countries that share many characteristics, the most important of which is their suffering from instability, whether at the security, political or economic levels. It is also the same group whose data on the various pillars and indicators of the general index of the Arab digital economy has not been completed since its inception.

This makes us consider that Algeria's ranking in the 12th rank among the Arab countries available on the various data for preparing the index, and among the countries that are experiencing stability at various levels, is tantamount to its ranking in the last rank in the general index. It is sufficient to appreciate the importance of the challenges that Algeria

should face in the field of transition to the digital economy and benefit from its gains. Therefore, the comparison in the remainder of the study will be limited to 12 Arab countries that make up the first group, which includes six countries, and the second group, which also includes six countries, including Algeria.

Fourthly. The reality of the digital economy in Algeria in the light of the Arab index:

By analyzing the reality of the digital economy in Algeria and through the remainder of the study, the comparison will be restricted only to the Arab countries that make up the first and second groups, which number twelve.

List the countries that were evaluated in the index with incomplete data and those that suffer from security, political and economic instability, which are the ten countries of the last group, as previously mentioned.

Table N° (3): Algeria's performance through the various pillars of the general index and its comparison with the average performance in the rest of the Arab countries:

	2018		2020		2022		2022
Pillars	Rank	I.V*	Rank	I.V	Rank	I.V	Overall mean
Institutions	12	33.98	12	31.31	12	50.15	65
Infrastructure	12	32.45	11	37.63	8	42.33	49.4
Workforce	10	52.29	11	59.66	9	57.86	49.5
Digital government	12	42.27	12	32.62	11	51.73	67.2

Innovation	12	34.72	11	28.82	12	43.54	50.5
Knowledge and technology	-	44.39	12	10.58	12	14.05	23
Market forces	12	31.63	12	28.47	12	14.05	23
Financial markets growth	12	35	12	-	12	59.23	77.6
Sustainable development	8	65.87	7	62.05	7	71.71	71.8
The total value of the indicator	12	41.40	12	35.5	12	46.55	57

***I. V: Indicator value**

Source: Adapted according to the reports of the Arab digital economy for the years 2018, 2020 and 2022

The general average of the performance of the Arab countries in each of the pillars of the Arab Digital Economy Index and includes 12 Arab countries, namely the Gulf countries, in addition to Jordan, Lebanon, Egypt, Tunisia, Algeria and Morocco.

It is noted from the above table that Algeria's ranking during the years of comparison and the value of the index obtained in most of the pillars of the general index of the Arab digital economy was very weak and less than the general average and it is lagging behind among the various Arab countries.

It obtained the last rank in five pillars out of nine, which are the pillar of institutions, innovation, technology, market forces, and the growth of the capital market. It also achieved the penultimate rank in the digital government pillar, while its performance in the rest of the pillars was

between the seventh rank (sustainable development) and the ninth rank (work force), during the year 2022.

Also, compared to the rest of the years, there has been no noticeable change in Algeria's ranking in the various pillars, except for its transition from the last rank in 2018 in the infrastructure pillar to the eighth rank in 2022, and here it is noted that despite the improvement in Algeria's performance in this pillar, which is the most important pillar that The Arab Digital Economy Index is built on it, as it is a catalyst for other pillars such as innovation, knowledge and technology, but none of that happened in the case of Algeria. On the contrary, the lowest point achieved by Algeria was in the pillar of knowledge and technology with a point of 14 and the pillar of innovation with a point of 43% during the year 2022.

It reflects its performance in the Global Innovation Index (GII), where it ranked 128 out of 131 countries classified in the innovation output index, and rank 120 in the general index (Dutta, Lanvin , B, & Wunsch-Vincent, S, 2021, p. 43)

As for the best performance of Algeria according to the value of the index, this was in both the pillars of institutions and digital government, with an improvement between the years 2020 and 2022 of about 20 points per cent for each. However, despite this improvement, the rank of Algeria in these two pillars has not changed much, and it has remained ranging between the penultimate rank (institutions) and the last rank (digital government), which indicates that various other Arab countries have improved in these two pillars more than one level. Algeria improved.

Fifthly. Evaluating Algeria's performance and its weaknesses according to the most important sub-indicators of the Arab digital economy:

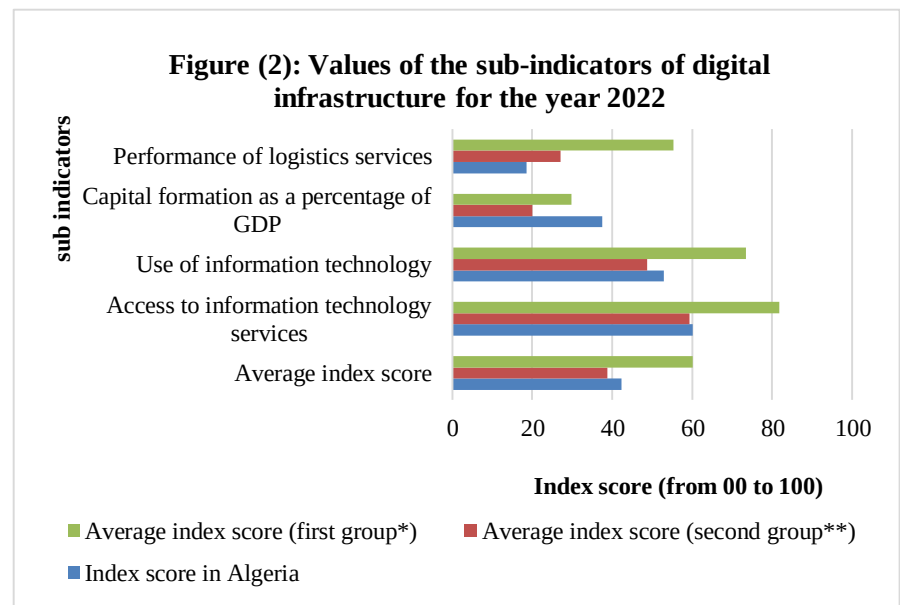
In the following, we will shed light on the study and analysis of Algeria's performance according to the various sub-indicators of the most important pillars of the index, in comparison with the group of Arab Gulf countries, which are called in the Arab report the leading countries, numbering six, in addition to the group of countries to which Algeria belongs, which are the six Arab countries in which the levels of The digital economy is called in the Arab report the group of promising countries. As for these pillars, they are:

1. Infrastructure Pillar:

This pillar is a reflection of the tangible infrastructure of the following sectors: transportation, telecommunications, logistics services and IT networks in a given country. A developed infrastructure network will facilitate more trade, investment, productivity, access to knowledge. This in turn will lead to an economic growth at the country's and region's level. (ARABFDE, 2022, p. 133)

It can be seen from Figure (2) that Algeria's performance in the sub-indicators of the digital infrastructure pillar was better on average compared to the constituent countries of its group, especially with regard to the use of information technology services and access to them. The Global Innovation Report considers it a strength as Algeria achieved the rank of 75 and 76 in the world, respectively (Dutta, Lanvin , B, & Wunsch-Vincent, S, 2021, p. 43). As for the weakest performance, it was in the logistics services index, in which Algeria scored only 18

percent, compared to the average of its group, which is 27 percent, and the average of the Gulf countries group, with an index value of 60 percent.



*Include: UAE, Saudi Arabia, Qatar, Bahrain, Oman, and Kuwait.

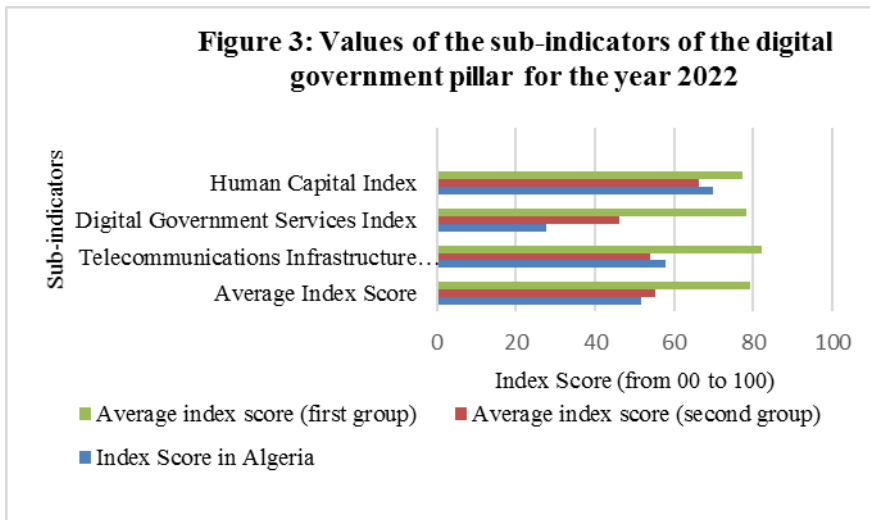
**Include: Jordan, Morocco, Tunisia, Egypt, Lebanon, and Algeria.

Source: Prepared by the researcher based on the (ARABFDE, 2022)

2. Digital Government Pillar:

The level of performance of the digital government is one of the important tools for measuring the extent of the development of the digital economy in the country, as it allows knowing the extent of the willingness and ability of government institutions to use information and communication technology to provide public services to various individuals.

It can be seen from Figure (3) that there is a wide digital gap between the group of Arab Gulf countries and the rest of the other Arab countries, with 24 points.



Source: Prepared by the researcher based on the (ARABFDE, 2022)

It is also noted that Algeria's performance in this pillar is less than the average value of the index obtained by the Arab countries that make up the second group, including Algeria. The reason for this delay is mainly due to Algeria's poor performance in the most important index in this pillar, which is the digital government services index (27.6 points), compared to the countries of the first group (78.3 points) and the countries of the second group (46.1 points).

Perhaps the biggest challenge awaiting Algeria at the present time is to remedy this delay in terms of the “digital” approach of the government to the citizen and his satisfaction. The irony here is that Algeria is ahead of the various countries of the second group in the field of the human capital index and the infrastructure index, which are considered the most important pillars for improving performance in the digital government services index, but we did not notice the existence of this effect in the case of Algeria.

Likewise, the poor performance of Algeria in this sub-indicator (digital government services) means that it is very far from achieving acceptable performance in other detailed index such as the digital government spending index, the citizen satisfaction index with digital government services, the digital government procurement index, and the

open government data index, which is the trend adopted by developed countries and a number of emerging countries at the present time.

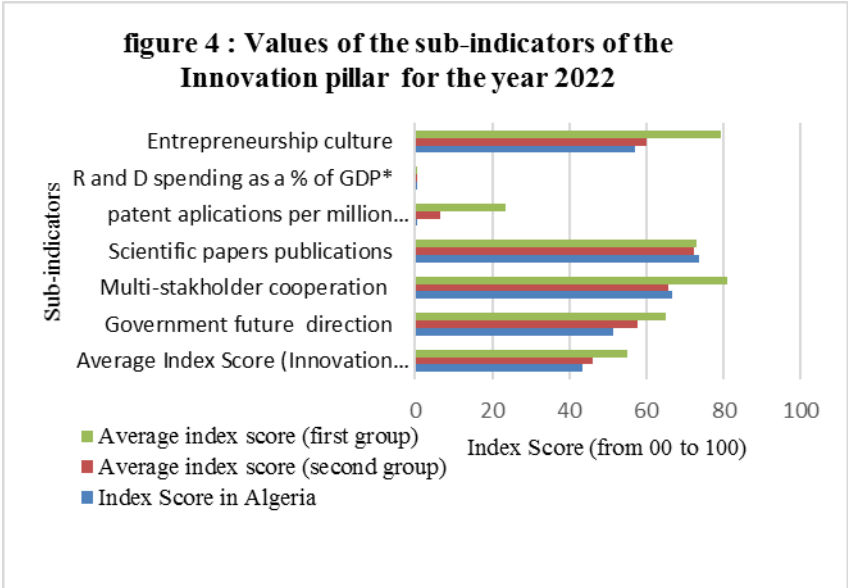
Algeria in this field globally is very weak, according to the GEMS index issued by the United Nations. Algeria achieved the tenth rank in the Arab world in 2022, and surpasses only the countries affected by civil wars, with an index value of 19 percent, which is a much lower value than the Arab average (34 percent). Decreased compared to 2021 (ESCWA, 2022, p. 13)

It also at 127 in the global ranking in the index of government services on the Internet, and at 112 in the index of e-government development in 2022. (UNDESA, 2022, p. 63)

3. Innovation Pillar:

Innovation is also considered one of the basic components for evaluating any trend towards adopting the digital economy, as it is considered its vital nerve. Innovation is also considered one of the most important opportunities that can be relied upon to build a competitive advantage on the micro and macro levels instead of relying on the rentier competitive advantages in the traditional economy. It is very important to use Information and communication technologies to achieve this.

It is noticeable from Figure (4) that there are two main sub-indicators in which various Arab countries achieved the lowest performance. As for the patent index, it is noted that the gap between Algeria and the rest of the Arab countries, especially the first group, is very wide, so that Algeria's performance is the weakest among all the Arab countries, according to the latest edition of the Arab Digital Economy report, by achieving 0.5 points percent, compared to an average of 6.6 percent for the rest of the countries of the second group, which could be mainly due to the emigration of talents abroad, the weak relationship between universities and economic operators, and the weakness of financial support in this field... On the other hand, Algeria achieved the best performance on average compared to the various Arab countries in the index of published scientific papers.



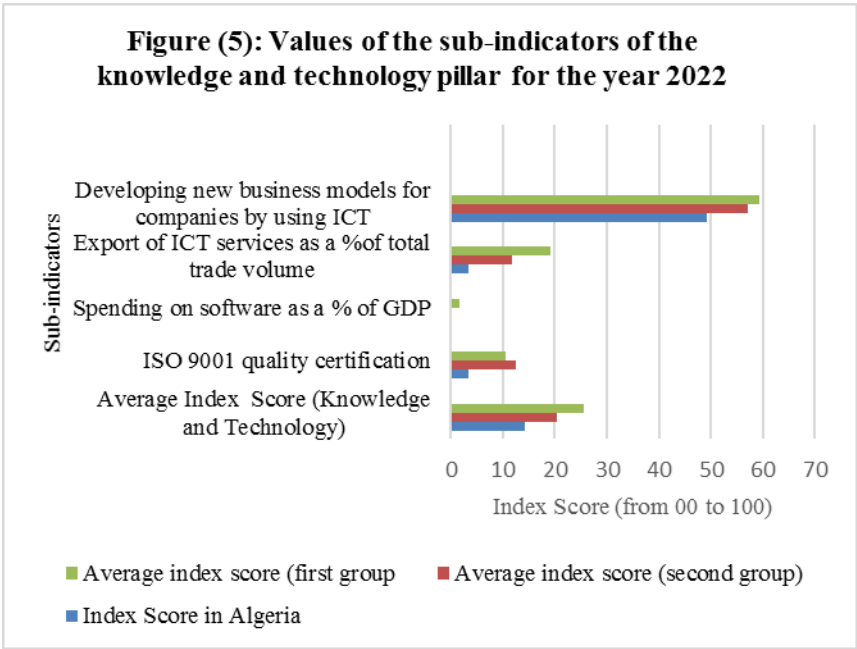
*R & D spending statistics from the Global Innovation Report 2021

Source: Prepared by the researcher based on the (ARABFDE, 2022)

4.Knowledge and Technology Pillar:

One of the objectives of this pillar is to measure the rate at which countries absorb emerging and digital technologies (ARABFDE, 2022, p. 142)

This pillar shows the weak performance of the various Arab countries in most of its sub-indicators, but Algeria's performance was the weakest of all, as shown in Figure 5.



Source: Prepared by the researcher based on the (ARABFDE, 2022)

According to the various sub-indicators of this pillar, the index of spending on computer software, which is measured as a percentage of the country's gross domestic product, stands out. It is one of the most important weaknesses in the Arab region, and Algeria in particular, with a value of 0.1 percent of the index, while globally, Algeria ranked 120 out of 131 countries. (Portulans Institute, 2022, p. 5)

This weakness is explained by the lack and weakness of business companies and government departments in Algeria that give priority to investment in business intelligence and big data analysis techniques, which misses out on important gains in terms of profits and competitive position and in terms of adapting to market conditions. As for the importance of organizations obtaining the ISO 9001 certificate and the indicator of the percentage of exports of information and communication technology services, Algeria ranked last with 3.3 percent and 3.4 percent, respectively, far from the average in its group (12.5 percent) and (11.5 percent) on respectively.

Each of these sub-indicators is important in improving the country's performance in the digital economy index.

Conclusion

The performance of any country in its attempt to transform into a digital economy is linked to an integrated and intertwined set of elements, including digital infrastructure, digital government, innovation, knowledge and technology, as each country seeks to highlight and improve its position among various countries, both at the regional and global levels.

At a time when a number of Arab countries were able to relatively improve their levels of performance in the digital economy, namely the Arab Gulf countries in particular. However, Algeria has not yet moved to improve its performance, despite the opportunities it offers to get rid of the oil dependency that has characterized its economy for more than six decades, and there is no improvement during the study period between 2018 and 2022, but it has shown a decent position behind all the other Arab countries that make up its group. They are Jordan, Lebanon, Egypt, Tunisia and Morocco, leaving a vast digital gap between them. The field of comparison should not be expanded to include other Arab countries exhausted by security and economic instability.

One of the most important aspects of weakness that characterizes Algeria in its attempt to transform into a digital economy is its poor performance in digital government services, as it is in the last ranks in the Arab world and globally, and great challenges await it in this field to raise it, including interest in spreading government spending digitally, and measuring the extent of citizens' satisfaction with digital government services, digital government procurement, open government data...

As for the innovation pillar, it is noted that there is a wide gap between Algeria and the rest of the Arab countries, especially the first group in the patent index. In addition, its performance in the index of spending on computer software, which is measured as a percentage of the country's gross domestic product, is one of the most important

weaknesses in the Arab region and Algeria in particular, with a value of 0.1 percent of the index, while globally, Algeria ranked 120 out of 131 countries. Finally, with regard to organizations obtaining the ISO 9001 certificate and the indicator of the percentage of exports of information and communication technology services, Algeria occupied the last rank in the Arab world by a large margin.

Recommendations:

The recommendations of this study can be mainly focused on addressing some of Algeria's weaknesses in the general index of the Arab digital economy:

- Making greater efforts in the field of digital government services, achieving the unified national portal for e-government, implementing various public services using digital platforms, and gaining citizen confidence.
- The use of digitization to facilitate the procedures for performing business, as well as facilitating the procedures for establishing business companies, accessing loans, and granting privileges to innovative companies.
- The transformation of the digital economy in Algeria can be through the employment of oil revenues in projects that support technology and innovation and sponsorship of scientific research, which will positively affect the various aspects of the well-being of individuals.
- The use of digital technologies to facilitate the access of individuals and families to subsidized goods and services in the most effective manner and at the lowest costs.
- Encouraging foreign direct investment, especially through partnership in technology sectors, and paying attention to the production of technological goods and services and stimulating their exports.
- Raising the rate of absorption in the use of modern and digital technologies, including artificial intelligence applications.

- The need to expand the level of awareness among business companies of the importance of moving towards digital business and the use of business information analysis software, while encouraging innovative startups and companies led by people with scientific and professional backgrounds in the field of technology and digital.

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