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Digital Transformation: Opportunities and Challenges of Digitization in Algeria

Chaima ARRIBI [1], Soraya BOUTARFA [2]

[1] Laboratory of Environmental Studies and Sustainable Development, University of Echahid Cheikh Larbi Tebessi, Tebessa (Algeria), chaima.arribi@univ-tebessa.dz

[2] Laboratory of Environmental Studies and Sustainable Development , University of Echahid Cheikh Larbi Tebessi, Tebessa, (Algeria), soraya.boutarfa@univ-tebessa.dz

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Abstract:

This study primarily aimed to highlight what is increasingly referred to as digital transformation and the adoption of modern digital technologies. This has become one of the challenges and objectives for Algeria in the current era, where it has recently become a necessary requirement to keep pace with the age of technology and to improve services across various sectors. In the context of this transformation, Algeria has faced, and continues to face, issues of weak infrastructure and a lack of training opportunities in digitization. Through description and analysis of data, our study concluded that Algeria is striving to provide a conducive environment that aids in optimally leveraging the opportunities available amidst digital transformation by facilitating and providing chances to enhance innovation and boost the economic sector and governmental efficiency, as well as to create job opportunities in technical and innovative fields. This research paper will elaborate extensively on Algeria's situation in the realm of digital transformation.

***Keywords**: Digital Transformation; Digitization; Information and Communication Technology; Digital Readiness Index.*

***Jel Classification Codes:** 033; 032; 039.*

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Corresponding author: ARRIBI Chaima (Algeria), chaima.arribi@univ-tebessa.dz

1. Introduction:

Algeria is currently experiencing a transitional period characterized by rapid technological changes, or what is known as digital transformation, which has recently become a significant challenge and an exceptional opportunity for Algeria. In light of exploring the main opportunities and challenges facing this transformation, understanding the potential effects of these challenges on the national economy and government has become more important than ever before, with a focus on how to improve public services through plans and strategies that the Algerian government intends to adopt to deal with the process of transforming to digitize administration and the economy and overcome the potential challenges faced.

To propel the economy, it is imperative for Algeria to invest in modern technologies to enhance the efficiency of government services, which facilitates accessibility, increases effectiveness, opens up prospects for industrial development, and creates new job opportunities, thereby supporting economic growth.

The main barriers to digital development in Algeria primarily include inadequate infrastructure, a lack of training, and increased security risks, necessitating enhanced security and data protection for both government and personal data. From this point, the state must focus on how to turn these challenges into opportunities that benefit the country and improve the structure of digital transformation to boost development and innovation in the era of digitization.

1.1. Study Problem:

The research problem presented stems from the following question: "What are the opportunities and challenges of digitization in Algeria in the context of digital transformation?"

2.1. Study Objectives:

The study aimed to understand and analyze the fundamentals necessary for adopting digitization, especially exploring and investing opportunities in economic, social, and organizational aspects, as well as reviewing the measures imposed for the success of digital transformation and thus turning challenges into opportunities and exploiting them optimally.

2. Digital Transformation

2.1 Definition of Digital Transformation:

In this context, we will refer to the various definitions known for digital transformation as follows:

Digital transformation is defined as: the process of converting data and information from a written, paper form to a digital form for electronic processing, storage, and management by a computer, thereby becoming digitized content that can be electronically circulated on the local network and the international information network. (Ahmad, 2020)

It was also defined as: "Digital transformation was previously associated with data upgrading, i.e., converting data from traditional forms to digital. With the spread of digital technology, the concept has expanded to include three stages: digitization (the process of converting from analog wave to digital wave), digitalization (the process of upgrading economic relationships and processes using digital technology that provides innovative opportunities for value creation and income generation), and digital transformation (a profound transformation of business processes, competencies, and business models to fully leverage the potentials of digital technology and its impact on the company's activities and customers, and market situation)." (Vyshnevskyi & Kniazev, 2020)

In another definition by Accenture: "Today's business success requires a digital transformation that focuses on the customer, starting by prioritizing a superior and convenient

customer experience and aligning organizations, processes, and technology to position them" (Bardan, 2018).

Digital transformation relies entirely on digital technologies and technology to improve and transform processes and activities in an organization or society from a traditional or analog form to a digital form, requiring the use of modern technology such as cloud computing, artificial intelligence, the internet, data analysis, mobile applications, automation, social networks, and other digital tools and technologies, not forgetting the training and qualification of human resources on how to use this technology.

2.2 Objectives of Digital Transformation:

As we know, every change, policy, or new methodology intended to be adopted has outlined objectives to achieve, and thus the objectives of digital transformation can be listed as follows: (Duarte, 2018)

- **Socially:**
  - Enhance culture, evolution, and innovation to the benefit of society and the country;
  - Establish a digital society and communications and change training methods and acquire new skills for digital elevation;
  - Affordability and enhancing the protection of digital data transparency, independence, and trust by establishing infrastructures that achieve sustainability and ensure their management.
- **Economically:**
  - Implement new and innovative business models;
  - Increase income generation, productivity, and added value in the economy;
  - Improve the regulatory framework and technical standards.
- **Digital Transformation Main Goals:**

Digital transformation has become a necessity for institutions due to the significant changes happening in the world, all leading to the development of creative thinking, productivity enhancement, and achieving desired goals through:

- ✓ Rapid data collection and analysis, improving and streamlining operations, which leads to business efficiency and faster decision-making in case of faults;
- ✓ Enhancing customer interaction with services and products provided by the organization or administration through digital technology to ensure fast access to information and services;
- ✓ The necessity to coexist and adapt to digital transformation in light of changes occurring in the external, technological, and competitive environment, increasing the ability to innovate and encouraging a spirit of creativity and development within institutions.

2.3 Importance of Digitization:

- ✓ Digitization has become a key player in many aspects of our daily lives and in various industries and sectors. Its importance lies in the following:
- ✓ A strategic decision for companies that contributes to their growth and performance through the digitization of operations, resources, and operational methods (Henriette, Feki, &Boughzala, 2016);
- ✓ Enhancing the capabilities of human resources in using digitization and increasing technological efficiency is a crucial step in digital transformation (Savić, 2020);
- ✓ Transparency and enhancing information security through encryption technologies and access management. (Santos Pereira, Durão, Moreira, &Veloso, 2022)

2.4 Motivations for Digital Transformation:

There are typically three main motivations for digital transformation: (Ben Said &Redif, 2022)

- ➢ **Increased costs and budget pressures:** The significant decline in revenues for many countries, especially oil-producing ones, especially after 2014, made reducing their spending a top priority. Therefore, they resorted to cost-saving measures and executing government operations more effectively and found an opportunity in digital technology for this;
- ➢ **Customer and citizen requirements:** The spread of media and social communication technologies among populations has led to demands for a higher level of government services and products and provided new communication channels for government institutions to know the requirements of citizens and customers and their opinions, which led to the development and upgrading of their digitization aspect;
- ➢ **Government directives:** Given that the government adopts a top-down planning approach in its decisions and in order to activate its plans more quickly and effectively, it finds itself obliged to include digital transformation programs within its list of priorities within the strategic vision and national plans.

2.5 Digital Transformation Strategies:

A digital transformation strategy is defined as "a concept that focuses on coordinating various digital transformation processes to identify priorities and goals when applied within institutions" (Pelletier & Raymond, 2020), and also defined as "a designed plan adopted at the institutional level to build a correct digital culture, and considered processes that act as an interface to coordinate between various digital activities" (Korachi&Bounabat, 2020).

Accordingly, the most important digital transformation strategies can be listed as follows: (Al-Hadi, 2021)

Figure 01: Strategies for Successful Digital Transformation

Source: El Hadi, M. (April 2021). Challenges and strategies of digital transformation for government services and business establishments. Egyptian Association for Information Systems and Computing Technology Journal, pp. 9-13.

- **Strategy for Clarifying Vision:**

It is necessary to start by identifying the outcomes needed first instead of reaching the needs when they appear, as this guides technology choices towards greater long-term value. Successful digital transformation begins with defining outcomes and articulating them in measurable, concrete terms of what establishments and interests want to achieve.

- **Strategy for Enhancing Leadership Collaboration:**

This is done by encouraging the active participation of leaders in the decision-making process related to digital transformation through holding social sessions and interactive workshops for discussion and collective decision-making among different departments, forming integrated work teams, defining their roles and responsibilities to ensure effective cooperation, including providing training programs for leaders to keep up with digital transformation and their impacts, improve their digital skills, and enhance the culture of innovation for applying new ideas and technologies, with ensuring the provision of the necessary financial and technological resources to achieve the goals of digital transformation.

- **Strategy for Building Digital Transformation:**

Success in the field of digital transformation creates strong competition between institutions and governments, where institutions and governments need a clear path and concrete evidence of success when adopting new technologies.

The participation of leaders and businessmen in the field of digital transformation represents actual progress for the society in terms of exchanging successes and achievements, where smart financing to achieve digital transformation is an essential part of sustainable strategies, allowing for

the use of modern technology in the process of improving efficiency and saving costs, thereby enhancing sustainable digital transformation initiatives and increasing the resilience of institutions and contributing to enhancing the ability to adapt to rapid changes in the technological environment.

- **IT Modernization Strategy:**

Modern information technology is currently the heartbeat of institutions as it helps various institutions in improving the services they perform, supporting targeted economic recovery, as well as increasing creativity and the possibility of enhancing cybersecurity. Therefore, when attempting to build a modern digital transformation, it is essential to identify technology partners who contribute to reducing the burdens of embodying an infrastructure with precision and imposing security significantly, focusing on artificial intelligence, and using cloud environments dedicated to government interests. The encouragement of using cloud computing technology facilitates the experience and guides spending on developers without the need for deploying new capabilities.

2.6 Digital Transformation Opportunities:

For achieving leadership and pioneering in the digital world, the country must adopt a living system that loves continuous learning and achieving new additions. It is essential to try to predict the future and organize among the important opportunities, among which we mention: (Burak&Fatih, 2022)

- **Innovation:** Digital transformation helps institutions take initiatives that increase the value of their products and services and also helps to be open to change and creativity and invest in innovative ideas. Sağlam emphasized that for companies to be in a sustainable competitive environment, they must transform to innovation strategies and design new ideas and products; (Sağlam&İnan, 2021)

- **Agility:** To adapt to the rules of the digital world, you must have the speed of change and future vision, and try to turn the threat into an opportunity and benefit from it.

- **Productivity and Profitability:** When examining performance indicators such as resource use, production capabilities, and sales figures, it shows that costs have decreased, and profitability has increased. Digital transformation increases efficiency by reducing time in used operations.

- **New Market Opportunity:** Digitization has created the possibility of diversification and facilitated customer capabilities on digital platforms. Therefore, it has become necessary to develop digital sales by using e-marketing strategies, developing web pages, and using influencers specialized in marketing through social media to facilitate access to markets and audiences and attract new customers.

- **Competitive Advantage:** Using new-generation technologies and making the digital environment ready gives the company a competitive advantage, especially with the virtual market becoming the markets unlimited, especially if the company is innovative compared to other competing institutions and offering several choices for purchasing and payment, which creates loyalty among the customer and makes it distinctive from others.

- **Research and Development:** Research and development are among the most critical processes that should be in every institution or company, especially since it does not cost extra to shorten the time through virtual simulation, testing, and improvements on the product and testing its quality before launching it in the market.

- **Added Value:** Any development in the institution increases the creation of added value to ensure sustainable development and increase profitability for companies, especially in the context of the green environment, i.e., working and developing environmentally friendly and low-cost products, all of which fall under the framework of innovation and research and development through digital transformation to develop products with added value using innovative approaches and digital practices.

- **Quality Perspective:** It is known that the new generation production systems, which are called Industry 4.0, are adopting a qualified, low-cost, controllable, and sustainable quality approach with the help of digital technologies, where the traditional understanding of quality provides the transition to an innovative and sustainable approach with digital transformation.

2.7 Digital Transformation Challenges:

The challenges of digital transformation can be listed as follows: (Gracey and others, 2021)

- ✓ The lack of technical skills of individuals working in the organization is considered a fundamental factor that must be taken into account during the formulation and preparation of the digital strategy;
- ✓ Organizational Culture: Which is a mix of beliefs, values, norms, and myths considered as a problem that hinders the digital transformation process unless it is based on openness to change;
- ✓ Coordination: Meaning, if good communication is not maintained between different levels, the digital transformation process fails, so it is necessary to precisely define roles and levels;
- ✓ Weakness of the IT and communication technology infrastructure related to its equipment, technologies, obsolescence, and limitation;
- ✓ Inefficiency and lack of experience of organizational staff and their lack of competence in dealing with the basics and requirements of digital transformation;
- ✓ Laws and regulations often constitute an obstacle that frustrates the effectiveness of digital transformation, making it slow, which results in losses for the institution.

3. Manifestations of Digital Transformation in Algeria:

3.1 Analysis of the Main Indicators of IT and Communication Infrastructure:

- **Fixed and Mobile Telephony in Algeria:**

Table 01: Development of the number of fixed telephone users in Algeria between 2023-2013

Year	Number of Users
2013	3,138,914
2014	3,098,787
2015	3,267,592
2016	3,404,709
2017	4,100,982
2018	4,158,518
2019	4,616,310
2020	4,784,306
2021	5,097,095
2022	5,576,193
June 2023	5,913,444

Source: National Source for the Phone and Internet Market in Algeria www.arpce.dz, Accessed on January 9, 2024, at 19:38.

Table 01 illustrates the significant growth in Algeria's fixed telephone market from 2013 to June 2023, particularly notable in 2022 and the first half of 2023, with an impressive increase of 337,252 users in just six months. This growth, predominantly among residential users who constituted 92.23% of the total at the end of June 2023, underscores a 7.77% utilization rate among institutions. The sustained expansion in fixed telephony reflects the escalating demand by individuals and businesses, bolstered by technological advancements and enhancements in Algeria's communications infrastructure.

Mobile Telephone:

Table 02: The Evolution of the Number of Mobile Telephone Users in Algeria from 2013 to 2023.

Year	Number of Users
2013	39,517,045
2014	43,298,174
2015	43,227,643
2016	47,041,321
2017	45,845,665
2018	47,154,264
2019	45,425,539
2020	45,220,000
2021	47,015,757
2022	49,018,766
June 2023	48,915,484

Source: National Observatory for the Mobile Phone Market in Algeria www.arpce.dz. Accessed on January 9, 2024, at 20:01.

The data indicates a robust growth in mobile phone usage from 2013 to June 2023, driven by the escalating necessity for mobile networks which are integral to daily activities. This surge is

attributed to substantial enhancements in the wireless network infrastructure, coupled with the proliferation of technology devices, which cater to the needs of diverse societal segments.

- **Fixed Internet and Third and Fourth Generation Services in Algeria:**

  - **Fixed Internet:**

Table 03: The Evolution of the Number of Fixed Internet Users in Algeria from 2013 to 2023.

Year	Number of Users
2013	1,283,400
2014	1,599,500
2015	2,262,259
2016	2,859,550
2017	2,850,000
2018	3,259,465
2019	3,569,176
2020	3,778,801
2021	45,944,974
2022	49,454,057
June 2023	50,182,538

Source: National Observatory for the Mobile Phone Market in Algeria www.arpce.dz. Accessed on January 9, 2024, at 20:01.

The table portrays a dramatic rise in fixed internet usage from 2013, culminating in over 50 million users by mid-2023. This surge is driven by technological advancements, enhancements to infrastructure, the integration of optical fibers enhancing connectivity speeds, and the commitment of service providers to deliver superior services across urban, remote, and rural areas.

  - **Third Generation Internet:**

Table 04: The Evolution of the Number of Third-Generation Internet Users in Algeria from 2015 to 2023.

Year	Number of Users
2015	16,684,667
2016	25,214,732
2017	21,592,863
2018	17,422,312
2019	11,989,157
2020	9,944,671
2021	7,272,657
2022	3,137,367
June 2023	5,715,552

Source: National Observatory for the Mobile Phone Market in Algeria www.arpce.dz. Accessed on January 9, 2024, at 20:01.

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Source: National Observatory for the Mobile Phone Market in Algeria www.arpce.dz. Accessed on January 9, 2024, at 20:01.

The table shows that from 2015 to 2017, there was a noticeable increase in third-generation internet users, with an increase of approximately 5 million users. In 2016, the number rose to more than 25 million users, attributed to improved services, communications, offers provided, and expansion in providing infrastructure.

However, there was a significant decline in 2018 due to the emergence of new technologies like third-generation internet or new competitors or the deterioration of living conditions with the emergence of the national movement.

From 2019 to June 2023, with the emergence of the coronavirus, this affected the third-generation internet, especially with the appearance of fourth-generation internet quality, where most users migrated to fourth-generation internet during the health quarantine and curfew, which offered better quality and service than the third generation, which suffered from fluctuations in its usage.

- **Fourth Generation Internet:**

Table 05: The Evolution of the Number of Fourth-Generation Internet Users in Algeria from 2016 to 2023.

Year	Number of Users
2016	1,464,811
2017	9,867,671
2018	18,920,289
2019	24,922,271
2020	28,125,102
2021	34,507,542
2022	30,128,222
June 2023	39,571,768

Source: National Observatory for the Mobile Phone Market in Algeria www.arpce.dz. Accessed on January 9, 2024, at 20:01.

The table illustrates a significant noticeable growth in the number of fourth-generation internet users from its first appearance in Algeria in 2016 to 2023, from 1,464,811 users to 39,571,768 in the first half of 2023. This indicates a qualitative leap, reaching 18 million users in 2018, explaining the decline in third-generation internet users and representing a qualitative development in fourth-generation service as it is a new service, and society likes renewal.

While there was a decrease in 2022 to 30 million users, a decrease of about 4 million users, possibly due to the entry of new technologies leading to the decrease in the number, and perhaps due to economic conditions in addition to technology fluctuations and also the economic conditions effect, to rise again in the first half of 2023 to 39 million users, documenting the expansion of fourth-generation internet and the increase in its quality, indicating reliance on fourth-generation internet in all commercial, economic, political, cultural fields, and more.

- **E-Government Index**

Table 06: Progress Index in E-Government for Algeria from 2010 to 2022

Year	2010	2012	2014	2016	2018	2020	2022
Index Score	0.3181	0.3608	0.3106	0.2999	0.4227	0.5173	0.5611
Ranking	131	132	136	150	130	120	112

Source: Regulatory Authority for Post and Electronic Communications in Algeria www.arpce.dz. Accessed on January 9, 2024, at 20:30.

The table shows a gradual progress in the E-Government Index from 2010 to 2022, from 0.3181 to 0.5611 and from ranking 150 in 2016 to ranking 112 in 2022. This indicates Algeria's awareness of the need to develop and enhance the E-Government Index, which is a composite index of three standard indicators: the telecommunications infrastructure index, the human capital index, and finally, the online service index.

Despite the noticeable progress, fluctuations in its ranking and position over the years are observed, which could be due to local factors affecting the overall performance of e-government or rapid advancements by other countries. A significant leap was noted in 2018, where the index rose to 0.4227 due to improvements in infrastructure.

While the results are positive and considered opportunities to enhance e-government and increase economic development, there are still challenges to the improvement process, such as new policies, funding, training, organizational culture, etc. This does not deny the government's commitment and determination to devote efforts to developing skills to ensure continuous improvement in the future.

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June 2023	39,571,768

Source: National Observatory for the Mobile Phone Market in Algeria www.arpce.dz. Accessed on January 9, 2024, at 20:01.

The table illustrates a remarkable growth in the number of fourth-generation internet users in Algeria, escalating from 1,464,811 users in 2016 to 39,571,768 in the first half of 2023. This

represents a qualitative leap, particularly notable in 2018 when the user base reached approximately 18 million. This growth not only accounts for the decline in third-generation users but also marks a significant advancement in the quality of fourth-generation services.

Despite a temporary decrease to 30 million users in 2022, possibly due to the advent of new technologies and economic fluctuations, there was a resurgence in user numbers in the first half of 2023. This resurgence documents the expanding reliance on fourth-generation internet across various sectors including commercial, economic, political, and cultural fields, reflecting a broader trend of technological adoption and integration.

- **E-Government Index**

Table 06: Progress Index in E-Government for Algeria from 2010 to 2022

Year	**2010**	**2012**	**2014**	**2016**	**2018**	**2020**	**2022**
Index Score	**0.3181**	**0.3608**	**0.3106**	**0.2999**	**0.4227**	**0.5173**	**0.5611**
Ranking	**131**	**132**	**136**	**150**	**130**	**120**	**112**

Source: Regulatory Authority for Post and Electronic Communications in Algeria www.arpce.dz. Accessed on January 9, 2024, at 20:30.

This table reveals a steady progression in Algeria's E-Government Index from 2010 to 2022, enhancing from a score of 0.3181 to 0.5611, and improving in ranking from 150th in 2016 to 112th in 2022. This trend underscores Algeria's commitment to developing and enhancing its E-Government capabilities, which are measured by a composite index comprising the telecommunications infrastructure index, the human capital index, and the online service index.

Despite the observed fluctuations in ranking over the years, potentially influenced by local challenges and rapid advancements in other nations, a significant improvement was noted in 2018, attributed to infrastructural enhancements. While these results highlight positive strides towards enhancing e-government services and fostering economic development, ongoing challenges such as policy reform, funding, training, and organizational culture remain. These factors underscore the government's resolve to continue developing capabilities and ensuring sustained improvements in e-government services in the future.

3.2 Digital Readiness Index:

The Digital Readiness Index (DRI) was inaugurated in 2002 and has consistently marked its presence annually. Each year, a dedicated team rigorously reviews data and conducts a comprehensive assessment to pinpoint new indicators of digital evolution. This Index classifies 134 economies, analyzing their performance across 60 variables. The 2023 Network Readiness Index (NRI) model retains its foundational structure, which is composed of four main pillars: Technology, People, Governance, and Impact, each further divided into three sub-pillars.

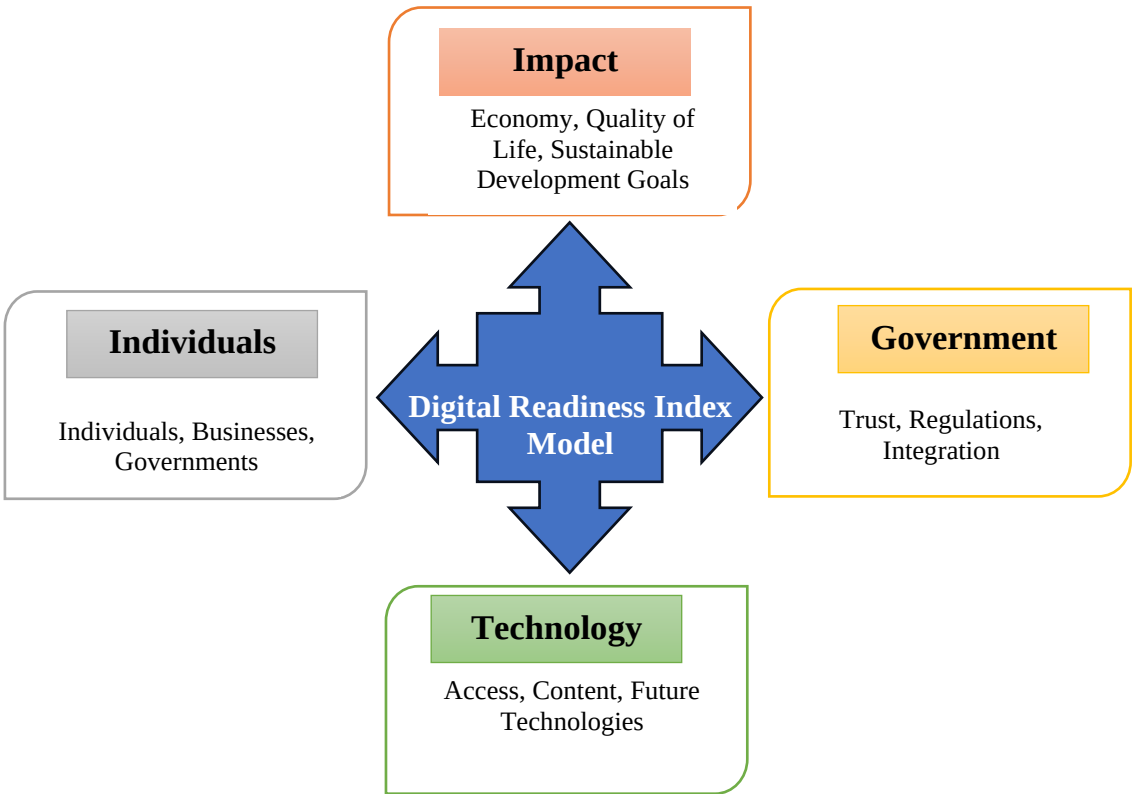
This holistic methodology now integrates contemporary issues such as artificial intelligence, underscoring its significance in both present and future technological landscapes, as well as highlighting the critical role of the digital economy in driving sustainability.

The formulation of the NRI 2023 report adheres to three fundamental principles established by the NRI Technical Advisory Group in 2019, aimed at ensuring the model's relevance for the future:

- **Continuity:** Maintaining alignment with the core components of the NRI from previous iterations.

- **Relevance:** Addressing contemporary challenges related to the deployment of information and communication technologies that previous models may not have fully captured.
- **Future-proofing:** Designing the NRI model to remain applicable and effective regardless of evolving technology trends.

Figure 02: Digital Readiness Index Model for 2023



Source: Network Readiness Index, p. 01, time 23:00

- **Technology:** Serving as the cornerstone of the networked economy, the Technology pillar aims to evaluate the readiness of a country's technological infrastructure to engage in the global economy. This goal is pursued through three sub-branches:
  - **Access:** Examining accessibility to information and communication technology.
  - **Content:** Delving into the nature of digital technology, expenditure on technology, applications, and contributions to scientific and applied articles.
  - **Future Technology:** Assessing the country's commitment to investing in emerging technological advancements.

- **People:** This pillar reflects the capability and efficacy of the country's populace in leveraging technology optimally, evaluated through three dimensions:
  - ✓ **Individuals:** Focusing on individual usage of technology and participation in the digital economy.
  - ✓ **Businesses:** Exploring how businesses integrate and utilize IT to derive benefits.

- ✓ **Governments:** Assessing government efforts in utilizing technology to serve society and the state effectively.

- **Impact:** This pillar measures the readiness of society to foster and enhance the digital economy, evaluating participation across various sectors in three specific areas:
  - ✓ **Economy:** Gauging the economic impacts observed within the country due to digital transformation.
  - ✓ **Quality of Life:** Assessing the social impacts that emanate from digital economic activities.
  - ✓ **Achieving Sustainable Development Goals:** Evaluating the broader impacts of the digital economy on vital aspects of life, including health, education, and more.

- **Governance:** Critical for establishing a secure and robust network for users, this pillar involves the regulatory frameworks that aid in bolstering the economy through three aspects:
  - ✓ **Trust:** Measuring the degree of security and user trust within the digital network.
  - ✓ **Regulation:** Assessing the governmental role in fostering the adoption and growth of the digital economy.
  - ✓ **Inclusion:** Evaluating the extent of diversity and inclusiveness within the digital economy among various countries.

By adhering to these structured assessments, the Digital Readiness Index aims to provide a comprehensive and forward-looking analysis of each country's capability to navigate and thrive in an increasingly digital global landscape.

➢ **Digital Readiness Index Ranking for Selected Countries in 2023**

Table 07: Ranking of Some Countries According to the Digital Readiness Index for 2023.

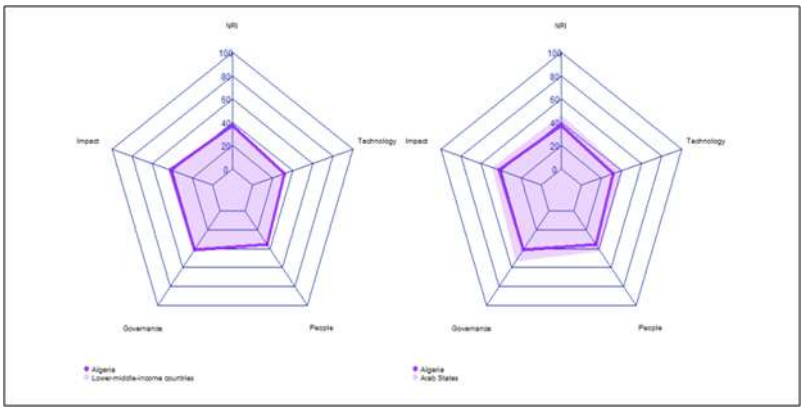
Country	NRI Ranking	Index Score	IncomeLevel
United States of America	1	76.91	High
Singapore	2	76.81	High
Finland	3	76.19	High
Denmark	8	74.06	High
Canada	11	71.99	High
France	15	70.17	High
China	20	67.31	AboveAverage
Spain	26	64.77	High
United ArabEmirates	30	62.43	High
Malaysia	40	56.72	AboveAverage
SaudiArabia	41	56.14	High
Turkey	47	53.22	AboveAverage
Bahrain	51	52.48	High
Egypt	81	44.07	BelowAverage
Lebanon	96	39.70	BelowAverage

Algeria	103	37.52	BelowAverage
Nigeria	106	35.73	BelowAverage
Mali	123	28.37	Low
Burundi	134	20.62	Low

Source: Network Readiness Index, p. 01, time 23:00

The 2023 Digital Readiness Index once again assessed 134 countries, with the United States retaining its top ranking, albeit with a slight decline in the index score from the previous year's 80.3 to 76.91. Meanwhile, Singapore maintained its ranking while Sweden fell to fifth place, thereby elevating Finland to the third position. In the Arab region, the United Arab Emirates led, securing the 30th position with an index score of 62.43, followed by Saudi Arabia. Notably, Algeria's ranking deteriorated from 100th in 2022 to 103rd in 2023, with its index score decreasing from 39.48 to 37.52, positioning it alongside Burundi at 134th place.

Figure 03: Algeria's Ranking Among Arab Countries and Among Lower-Middle-Income Countries

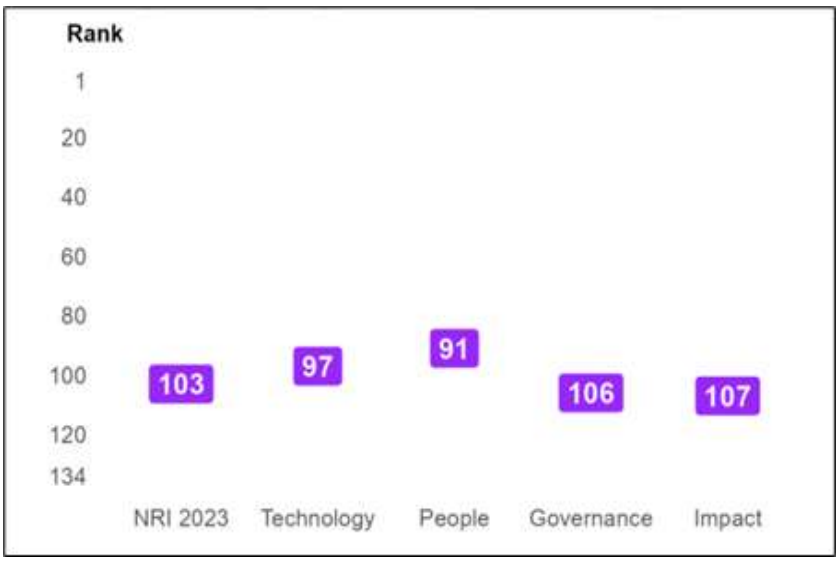


Source :https://download.networkreadinessindex.org/reports/countries/2023/algeria.pdf , p 03 , time 23:20

- **Algeria's Comparative Ranking:**
  - Among lower-middle-income countries, Algeria stands 23rd, surpassing the average score in four indicators: content, people, governments, and regulation.
  - Within the Arab nations, Algeria is ranked 12th, a position influenced by its geographical attributes.

- **Algeria's Performance in Sub-Indices of Digital Readiness:**
  - In the broader e-Government Index, Algeria ranks 103rd out of 134 countries, with specific area rankings as follows: 91st in People, 97th in Technology, and 106th and 107th in Government and Impact respectively.
  - There is a pronounced need for Algeria to prioritize enhancements in the Impact dimension initially, followed by the Government sector to bolster its overall digital readiness.

Figure 04: Algeria's Ranking According to the Sub-Indices of Digital Readiness



Source:https://download.networkreadinessindex.org/reports/countries/2023/algeria.pdf, p. 03, time 23:20

Algeria holds the 103rd position in the e-Government Index among 134 countries. It ranks 91st in terms of Individuals, 97th in Technology, and places 106th and 107th in Government and Impact respectively. A strategic priority for Algeria should be to focus on enhancing the Impact dimension initially, followed by significant improvements in the Government sector.

- **Strengths and Weaknesses of Algeria's Digital Readiness Indicators for 2023**

Table 08: Strengths and Weaknesses of the Digital Readiness Index Indicators for the Year 2023.

Sub-Dimension	Ranking	Sub-Dimension	Ranking
People	62	Integration	98
Economy	90	Access	101
Future Technology	91	Quality of Life	102
Content	92	Contribution to Sustainable Development Goals	106
Government	92	Business	111
Regulation	96	Trust	117

Source:https://download.networkreadinessindex.org/reports/countries/2023/algeria.pdf, p. 02, accessed on January 9, 2024, at 23:30.

In terms of the sub-dimensions of the Digital Readiness Index, Algeria has shown commendable performance in several areas. Specifically, it ranks 62nd in People, 90th in Economy, and 91st in Future Technology. Additionally, both Content and Government are ranked at 92. Given these standings, Algeria should adopt a strategic approach to bolster its performance in Sustainable Development Goals, Business, and Trust. It is important to recognize that each sub-dimension interrelates and influences the overall ranking, necessitating a holistic and coordinated improvement strategy across all dimensions.

- **Strong and Weak Digital Readiness Indicators for Algeria in 2023**

Table 08: Strengths and Weaknesses of the Digital Readiness Index Indicators for the Year 2023.

Strong Indicators	Ranking	Weak Indicators	Ranking
E-commerce Legislation	**1**	**Sustainable Development (Quality Education)**	**74**
Rural Gap in Using Digital Payments	**3**	**Electronic Access to Financial Accounts**	**123**
Scientific Publications on Artificial Intelligence	**28**	**Freedom of Personal Decisions**	**125**
Internet Traffic via Mobile Broadband within the Country	**32**	**Expenditure on Computer Software**	**126**
Spread of the Gig Economy	**33**	**Quality of Regulation**	**130**
International Internet Bandwidth	**36**	/	/
Domestic Market Size	**40**	/	/
Annual Investment in Communication Services	**42**	/	/
Government Encouragement of Emerging Technologies	**42**	/	/
ICT Skills in the Education System	**45**	/	/
Sustainable Development Goals (Health and Well-being)	**50**	/	/

Source:https://download.networkreadinessindex.org/reports/countries/2023/algeria.pdf, p. 04, accessed on January 9, 2024, at 23:45.

E-commerce legislation ranks first among Algeria's strong performance indicators, while the rural gap in using digital payments highlights the disparity in technology adoption. Weak points include challenges in the quality of regulation and freedom of personal decision-making, pinpointing areas crucial for policy enhancements and strategic improvements to boost Algeria's standing in the global digital readiness landscape.

Conclusion:

Digital transformation has become a critical and mandatory characteristic for all countries in the twenty-first century, as digital technology has infiltrated all aspects of life. In Algeria, digital transformation has created significant opportunities in terms of enhancing development and economic independence, as well as improving the life of society.

This can be achieved by implementing well-thought-out strategies for the application of digital transformation in its entirety, taking into account the challenges, policies, and effective procedures to ensure that everyone benefits from this technological advancement while minimizing potential risks.

What has been observed in this study regarding Algeria's practical side is:

- ✓ Algeria and its society's reliance on information and communication technology as a means to increase the economy and achieve welfare;
- ✓ Concerted efforts are being made to apply digitization across various sectors, including education, government, and others;

- ✓ Algeria possesses databases and modern technology that assist in the implementation of digital transformation;
- ✓ A noticeable annual development in the Information and Communication Technology (ICT) index, as seen in the results up to the statistics of June 2023;
- ✓ Increased enhancement of e-government across various sectors, both private and governmental, leading to the achievement of digital transformation in Algeria;
- ✓ Algeria's progress according to the Digital Readiness Index in terms of the performance of individuals, the economy, and future technology indicates the existence of a practical application of digitization.

Some recommendations for Algeria to work on include:

- ✓ The government and the private sector should invest in enhancing and supporting the digital infrastructure with high-quality, modern technology to ensure sustainability over many years.
- ✓ Develop training and educational programs to improve the digital skills of the workforce and prepare the youth for the digital future by encouraging creativity and innovation through scientific curricula that include programming and information security, particularly concerning technology and artificial intelligence.
- ✓ Establish clear and effective digital governance policies that ensure transparency, protect data, and facilitate digital transformation in government services.
- ✓ Support technological innovations and startups by providing tax incentives, funding, and technical assistance.
- ✓ Develop a national cybersecurity strategy to protect digital infrastructure and personal and institutional data.

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