

Artificial Intelligence and Labor Market Transformation in Algeria: A Foresight Study

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Received: 15/06/2025

Accepted: 17/11/2025

published: 31/01/2026

Abstract:

The study aims to examine the prospective impact of automation and artificial intelligence on the labor market in Algeria. It focuses on who using Artificial Intelligence will shape the future of labor markets in Algeria.

The result of the study reveals that up to 30% of industrial jobs, 20% of service-sector jobs, and 15% of agricultural jobs are at risk of displacement, potentially leading to the loss of approximately 1.6 million jobs in the future.

The study also reveals that digital transformation is expected to improve productivity by 20% in the industrial sector and 15% in agriculture sector, also it will generate new employment opportunities in digital and technology-fields.

So, With the aim of benefiting from the widespread of the ai the study recommande Enhancing Digital Education and Training, Encouraging Tech Entrepreneurship, Improving Digital Infrastructure in Algeria.

Keywords:

Artificial Intelligence, Automation, Labor Market, Digital Transformation.

JEL Classification Codes:

J21, J24, O33, O15, L86, E24.

I. INTRODUCTION

The rapid advancement of technology, especially with the rise of automation and artificial intelligence, has led to important transformations in the job market. Many traditional jobs are now at risk of disappearing, especially in industrial and service sectors.

Algeria like many other countries, is witnessing a rapid economic transformation due to the technological advancements and increasing of the digitization across various sectors.

The Algerian labor market is among the most affected by these changes, because many traditional jobs are facing significant challenges due to the growing reliance on automation and artificial intelligence. At the same time, these developments offer new opportunities for economic growth and the creation of jobs that need advanced skills. So, achieving a balance between embracing technology and preserving employment opportunities will become a challenge that necessitates more efforts to develop effective strategies that ensure the sustainability of the labor market with the ongoing the digital transformation era.

Research Problem

As technology continues to be widely adopted in many economic sectors, the following question arises:
how automation and artificial intelligence can impact the job market in Algeria?

Research Significance:

The importance of this research lies in:

- Analyze the impact of automation on employment market and identifying the most affected sectors.
- Explore the opportunities presented by digital transformation, such as productivity enhancement and the emergence of new job roles.
- Propose practical solutions to address the challenges of automation, including the development of digital skills and improvements in technological infrastructure.

1. Automation, AI and jobs Market:

The rise of automation is reshaping the workforce market, it also revolutionizing industries by streamlining processes and enhancing efficiency. This advances in artificial intelligence and automation have led to the modernization of many routine and repetitive tasks, particularly in manufacturing, administration, and transportation activities. However, while automation offers important benefits, such as increased productivity and cost reduction, it also raises concerns about job displacement and the need for workforce adaptation.

1.1 Automation and Routine Jobs

Technological advancements have led to the automation of many routine and repetitive jobs, particularly in industrial and service sectors. Jobs such as manual labor in factories, administrative support roles, and workers in the transportation sector are among the most vulnerable to automation. These jobs rely on repetitive tasks, making them more susceptible to being replaced by machines and intelligent software.

According to Berger & Fery (2016), about 47% of jobs in the United States are at risk of automation in the coming decades, highlighting the need for policies to retrain workers and develop their skills (Berger & Fery, 2016)

Also, some sectors may undergo a fundamental transformation in job nature, increasing the demand for skills, related to operating and maintaining automated systems, as well as developing technological solutions that integrate automation into production processes.

The digital transformation of businesses will also create new job opportunities related to data analysis and software development supporting these systems.

Also, Arjun & all (2023) suggest that the increase of automation can enhances productivity and reduces operational costs, allowing companies to redirect labor toward higher value-added roles (Arjun & al, 2023). However, the rapid shift into automation necessitates the development of new policies to ensure equal opportunities and to prevent widening economic disparities. Arjun & all (2023) indicate that the impact of automation on the workforce varies based on many factors such as educational level and digital skills, with low-skilled workers being the most vulnerable to job displacement (Arjun & al, 2023).

1.2. Artificial Intelligence and Data Analysis:

Artificial intelligence (AI) has become an essential tool in data analysis and decision-making, revolutionizing various economic and service sectors. AI enables precise and instant analysis of big data, helping businesses and organizations enhance performance and improve efficiency.

In the healthcare sector, AI has significantly improved diagnosis and treatment processes: Intelligent systems can analyze medical images and detect diseases with high accuracy, also accelerating treatment procedures and reducing medical errors. (Oluwatosin & al, 2024).

In education, AI has contributed to the development of smart learning systems that adapt to students' needs, enhance education quality and improve the learning experience (Walayat & al, 2024).

In the financial sector, a lot of financial institutions now rely on AI technologies to detect fraud, analyze economic trends, and make more accurate investment decisions. Also, the AI implementation in financial institutions can reduce risks and enhance operational efficiency (Walayat & al, 2024).

In the business world, AI technologies can help analyzing consumer behavior and predict market trends, enabling companies to make better strategic decisions.

Despite these benefits, the adoption of AI presents challenges, including the need to retrain the workforce to keep up with technological advancements. So, governments and organizations must invest heavily in digital infrastructure and training programs to ensure employees adaptation to the demands of the new job market.

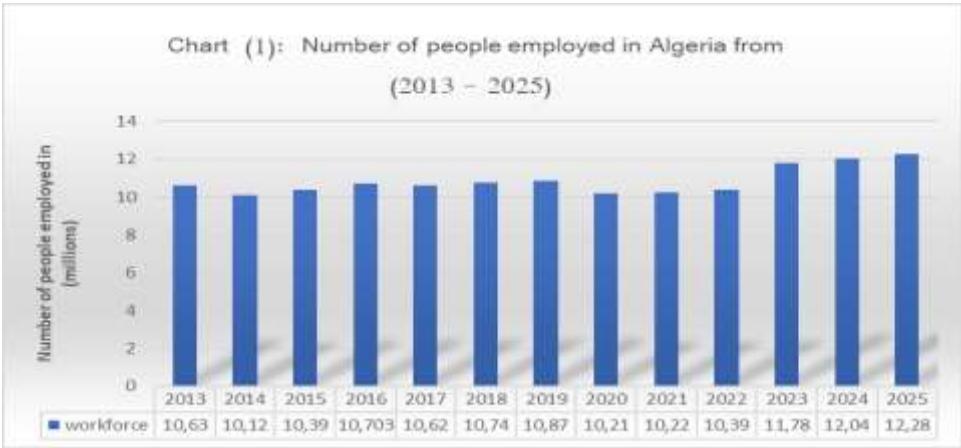
2. Analytical study of the Algerian market:

The understanding the development of the workforce is crucial to analyze the dynamics of the Algerian labor market. This subsection will highlight the key trends in labor force participation and the structural changes that have faced over recent years, as a response of economic and technological advancements.

2.1. Number of people employed in Algeria

The workforce is a key factor in measuring the economic activity of all countries, as it reflects the economy's ability to provide jobs and absorb

economically productive groups over different periods. In Algeria, the workforce has undergone significant changes during the period 2013-2025 due to economic, political, and social factors. The changes in the Algerian workforce during the period 2013 to 2025 can be observed in the following chart.



Source: Prepared by the researcher based on:
(Trading Economics, 2025)

The labor force in Algeria has experienced significant growth from 2013 to 2025, rising from 10.63 million in 2013 to 12.28 million in 2025, with minor fluctuations in between. Between 2013 and 2019, the labor force recorded gradual growth, reflecting the natural increase in the working-age population.

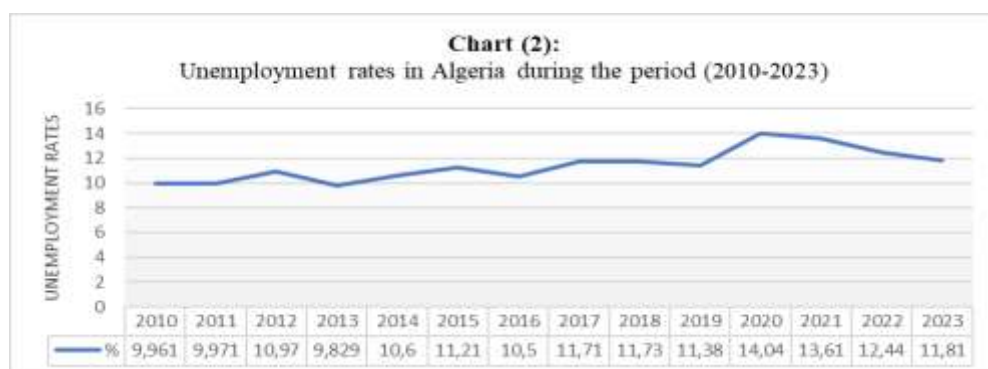
However, the COVID-19 pandemic in 2020 led to a sharp decline to 10.21 million, due to the closure of many economic sectors, followed by a slow recovery in 2021 and 2022. The period from 2023 to 2025 witness a significant rise in the labor force, driven by an increasing number of young people entering the job market and improved economic conditions.

2.2. Unemployment rates:

Unemployment remains one of the most pressing economic and social challenges facing developing nations, including Algeria, as it poses a significant barrier to achieving sustainable development. Unemployment rates not only reflect a country's economic performance but also highlight the complex mix between

government policies, global economic conditions, and internal social factors. In this context, Algeria has experienced notable fluctuations in unemployment rates between 2010 and 2023, influenced by various factors such as declining oil prices, global economic crises, the COVID-19 pandemic, and structural challenges within the Algerian economy.

The following chart illustrates the evolution of unemployment rates during this period.



Source: Prepared by the researcher based on:
(world economic outlook database, 2024)

Between 2010 and 2023, Algeria's unemployment rates experienced notable fluctuations, reflecting the labor market's sensitivity to economic and health-related changes. In 2010, the unemployment rate stood at approximately 10% and remained relatively stable within a narrow range until 2013, settling at 9.829%. However, from 2014 onward, a gradual upward trend emerged, with the unemployment rate exceeding 11% in 2015 and fluctuating around this level until the end of 2019. A significant spike occurred in 2020 when the unemployment rate surged to 14.04%, the highest recorded during the period under study, largely due to the economic repercussions of the COVID-19 pandemic, which led to widespread business closures and substantial job losses.

In the following years, the unemployment rate showed a steady decline, dropping to 13.61% in 2021, then to 12.44% in 2022, and finally reaching 11.81% in 2023. The data indicate that the sharpest annual increase occurred between 2019 and 2020, with a rise of 2.657%, whereas the most significant yearly decline was observed between 2020 and 2021, with a decrease of 0.43%.

This overall trend was shaped by several key factors, including fluctuations in oil prices (Algeria's primary source of revenue) the economic impact of the pandemic, and economic reforms that may have played a role in restructuring the labor market and stimulating employment opportunities in recent years.

2.3. Workforce distribution Across Economic Sectors in Algeria:

The services sector: the service sector has been the largest employer in Algeria since 2010, accounting for approximately 60% of the total workforce. This sector experienced a 2% increase over the past year, with relatively stable employment rates. In contrast, the industrial sector employed around 30% of the workforce,

The agricultural sector: the agricultural sector faces a significant decline, since 2010, with the percentage of workers dropping to less than 10% of the total active population by 2019 (world economic outlook database, 2024).

The industrial sector: the industrial sector is a fundamental pillar of the Algerian economy, dominated by oil and natural gas production. Most other industries rely on revenue generated from oil and gas exports as the primary source of investment capital. To reduce this dependency, the Algerian government is working on industrial diversification to mitigate budget deficits caused by falling oil prices. The industrial sector in Algeria contributed 5.6% to the national GDP and recorded a 3.1% growth in added value in 2018 (statista, 2025)

Given the challenges posed by fluctuating oil prices, Algeria is striving to boost local production and reduce imports by encouraging both domestic and foreign investments. This initiative is part of a broader strategy aimed at diversifying the national economy and decreasing reliance on the hydrocarbon sector.

II. Methods and Materials

This study adopts a descriptive and analytical methodology to examine the potential impact of automation and artificial intelligence on the Algerian labor market. It relies on both quantitative secondary data and comparative sectoral analysis to assess how technological transformations are influencing employment trends across industry, services, and agriculture.

1. Data Sources

The data used in this study were extracted from international databases, including *Statista* (2025), *Trading Economics* (2025), and the *World Economic Outlook Database* (2024). These sources provided key indicators such as employment rates, unemployment trends, sectoral workforce distribution, and GDP contributions across economic sectors.

2. Analytical Tools

- Statistical data were organized and interpreted using descriptive comparative analysis, supported by illustrative tables and charts that present the distribution of workforce figures, automation risk levels, and productivity changes across the three sectors.
- Estimates of job displacement risks (e.g., 30% in industry, 20% in services, 15% in agriculture) were derived by applying sector-specific projections from global studies to Algerian labor force figures.
- The study integrates cross-sectional comparisons between pre-pandemic, pandemic, and post-pandemic periods (2010–2025), allowing the researcher to observe the evolution of labor dynamics in Algeria over time.

3. Scope and Period

The temporal scope of the study spans from 2010 to 2025, allowing the inclusion of long-term trends, structural shifts, and the impact of external shocks such as the COVID-19 pandemic. The focus is national, covering all major economic sectors relevant to Algeria's labor market.

III. The Role of Technology and Artificial Intelligence in Reshaping the Jobs of the Future in Algeria

With the increasing reliance on automation and technology across various sectors, its impact on routine jobs in Algeria has become more evident. Jobs that involve repetitive and manual tasks, such as factory work, traditional administrative roles, transportation, and basic services, are increasingly at risk due to technological advancements and the use of artificial intelligence.

1. Analysis of the Potential Change of Technology on Routine Jobs in Algeria:

Table 1 illustrates the extent to which routine jobs in Algeria might be affected" by automation across the three main sectors: industry, services, and agriculture. The table highlight the percentage of jobs at risk of automation and the estimated number of affected jobs.

Table 1: Impact estimates of Automation on Routine Jobs in Algeria

Sector	Percentage of job at risks%	Estimated Number of Affected Jobs
Inductry	30	500.000
Agriculture	20	800.000
Services	15	300.000
Total	22	1600000

Source: Prepared by the researcher based on:

- (statista, 2025);
- (Trading Economics, 2025)

The data presented in the previous table reveal the following:

- Impact of Automation on the Industrial Sector

The table shows that 30% of industrial sector jobs are at risk of automation, amounting to approximately 500,000 jobs that may disappear or change due to the reliance on robots and smart systems in production lines. This impact is relatively high compared to other sectors since the industry heavily depends on repetitive tasks and automated manufacturing, making automation a more efficient alternative to traditional labor.

- Impact of Automation on the Services Sector

Although the percentage of jobs at risk of automation in the services sector is 20%, the number of affected jobs is the highest (800,000 jobs), making it the most impacted sector in terms of job losses. This is due to the increase use of digital

systems, artificial intelligence, and interactive programmes in administrative tasks, customer service, and retail. Additionally, the development of self-service technologies, such as electronic payments and advanced programmes in public facilities, reduces the need for traditional human labor.

- Impact of Automation on the Agricultural Sector

The agricultural sector is the least affected in terms of percentage, with only 15% of jobs at risk, equivalent to 300,000 jobs. This is because agriculture in Algeria still relies heavily on manual labor and traditional techniques. However, the use of modern equipment, such as smart tractors and drones for crop monitoring, may gradually reduce the demand for manual labor in the near future, especially in large-scale farming.

2. Analysis of the Potential Change of Technology on Key Sectors in Algeria:

Technological advancement is a crucial factor in developing Algeria's economic sectors, as it enhances productivity and improves efficiency while also posing challenges related to labor markets and digital transformation.

In the industrial sector, despite its limited contribution to GDP (5.5%), technology can boost productivity by 20% through automation and improved production lines; however, it may also reduce traditional job opportunities.

The agricultural sector, accounting for 12% of GDP, can benefit from modern technologies such as advanced irrigation systems and drone-assisted farming, leading to a 15% increase in productivity, though the challenge lies in integrating these innovations without significantly impacting traditional labor.

As for the services sector, which drives the economy with a 40% contribution, digital transformation through e-commerce and digital banking could result in a 20% job reduction, emphasizing the need to upskill the workforce to meet the demands of the digital economy. Therefore, balancing technological adoption with job preservation remains a key challenge for Algeria's economic future.

Table 2: Contribution of Sectors to GDP and the Expected Impact of Technology

Sector	Contribution to GDP %	Expected impact of technology %
Industry	5.5	Increase productivity by 20%
Agriculture	12	Increase productivity by 15%
Services	40	Reduce jobs by 20 20%
Total	57.5	Mixed Impact

Source: Prepared by the researcher based on:

- (statista, 2025);
- (Trading Economics, 2025).

The table illustrates the impact of technology on various sectors, highlighting both positive and negative effects:

- Industrial Sector:

Despite contributing only 5.5% to GDP, technology has the potential to increase productivity by 20% through enhanced production line efficiency and the adoption of advanced automated systems. While this could reduce costs and boost exports, it may also decrease the demand for traditional labor, leading to job displacement.

- Agricultural Sector:

Contributing 12% to GDP, the agricultural sector could see a 15% increase in productivity due to technological advancements such as improved irrigation techniques, drone usage, and digital soil analysis. However, given that many workers in this sector rely on traditional methods, the primary challenge will be integrating technology in a way that minimizes significant job losses.

- Services Sector:

As the largest contributor to Algeria’s economy (40%), the services sector is expected to experience a 20% reduction in jobs due to the shift toward e-commerce, digital banking, and automation in public administration. This underscores the urgent need to upskill the workforce to align with the demands of the digital economy.

3. The Future of Non-Routine Jobs:

With rapid advancements in automation and artificial intelligence, non-routine jobs are undergoing significant transformations. Unlike routine tasks, which are easily automated, non-routine jobs (such as those requiring creativity, problem-solving, and interpersonal skills) are expected to evolve rather than disappear. While technology enhances efficiency and creates new opportunities, it also demands continuous adaptation and upskilling. This shift will redefine job roles across various industries, emphasizing the growing importance of human-centric skills in the future workforce (Hussain, 2024).

3.1. Increased Productivity and Efficiency

In many fields, technology will enhance employee performance rather than replace them. For example:

- In the healthcare sector: AI can assist doctors in analyzing medical images, diagnosing diseases, and providing optimized treatment plans, making physicians more efficient instead of replacing them (Walayat & al, 2024).
- In engineering and design: Advanced AI-powered software can accelerate modeling and simulation processes, allowing engineers to focus on innovation rather than computational tasks (Arjun & al, 2023).

3.2. Enhancing Creative and Knowledge-Based Jobs

Jobs that rely on critical thinking, creativity, and innovation will be less susceptible to automation and may even flourish due to technology. For instance (Ho, 2024)

- In media and journalism: AI tools can analyze vast amounts of data, enabling journalists to produce more accurate and personalized content. However, AI cannot replace human creativity and intuition.
- In digital arts and design: While AI can generate initial designs or music compositions, human creativity remains essential in guiding these tools and crafting unique artistic works.

3.3. Growing Demand for Technical and Technological Skills

As companies increasingly rely on AI, the demand for advanced technological skills will rise. Some of the fields expected to see higher demand in Algeria include (Berger & Fery, 2016):

- Data analysis and artificial intelligence: The need for data analysts and AI engineers will grow with the advancement of predictive analytics.
- Cybersecurity: With digital transformation, companies and government institutions will require cybersecurity experts to protect sensitive data.
- system management: Sectors such as transportation and energy will require engineers and technicians capable of operating and maintaining automated systems.

VI. Conclusion:

The labor market is undergoing fundamental transformations due to technological advancements, with automation and artificial intelligence increasingly influencing the nature of jobs. This study has shown that routine jobs, particularly in industrial and service sectors, are at risk of disappearing—30% in the industrial sector, 20% in the service sector, and 15% in the agricultural sector—potentially leading to the loss of 1.6 million jobs in Algeria in the coming years. However, adopting technology can enhance productivity, with modern technologies expected to improve industrial sector efficiency by 20% and the agricultural sector by 15%. This highlights the importance of balancing digital transformation with job preservation.

Results:

With the rapid advancement of automation and artificial intelligence, labor markets across the world, including Algeria, are experiencing profound transformations. As industries increasingly integrate smart technologies, employment structures are shifting, bringing both opportunities and challenges. These technological advancements have the potential to enhance productivity and create new high-skilled job opportunities, yet they also pose risks such as job displacement and widening skill gaps. This study explores the impact of these changes on the Algerian workforce, highlighting key trends and their potential consequences, as outlined below:

- **Decline of Routine Jobs:** The study confirmed that jobs relying on repetitive tasks are increasingly vulnerable to replacement by smart systems,

particularly in the industrial and service sectors, leading to shifts in employment dynamics.

- **Growth of Non-Routine Jobs:** Demand has increased for jobs requiring analytical and creative skills, such as data analysis, software development, and smart system management, reflecting a transformation in labor market needs.
- **Impact of Technology on Productivity:** Despite concerns over job losses, technology adoption can significantly boost productivity across various sectors, potentially improving the country's overall economic performance.
- **Disparity in Technological Impact:** The effects of automation vary based on education levels and digital skills, with less than 10% of Algeria's workforce possessing advanced digital skills, increasing unemployment risks for less qualified individuals.

Recommendations:

To effectively navigate the challenges and opportunities presented by automation and artificial intelligence, Algeria must adopt proactive strategies to ensure a resilient and competitive workforce. By investing in education, entrepreneurship, infrastructure, and research, the country can foster sustainable economic growth and technological innovation. The following recommendations outline key measures to support this transition:

- **Enhancing Digital Education and Training:** Transitioning to a digital economy requires investment in education and vocational training, as studies indicate that increasing education spending by 1% could lead to 0.3% economic growth.
- **Encouraging Tech Entrepreneurship:** Providing financial and tax incentives to support start-ups in the technology sector could increase Algeria's entrepreneurship rate from 8% to 12% by 2025.
- **Improving Digital Infrastructure:** Expanding high-speed internet access and ensuring affordable digital devices is crucial, as reports from the International Telecommunication Union (ITU) suggest that a 10% increase in digital infrastructure investment could raise GDP by 1.5%.
- **Developing Policies for Workforce Transition:** Strategies should be implemented to help workers affected by automation acquire new skills that enable them to transition into non-routine jobs.

- **Increasing Investment in Research & Development:** Raising R&D spending to global standards would strengthen Algeria's capacity to develop local technological solutions, reducing dependency on foreign technology.

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