

Challenges of the Algerian labor market in light of technological transformations - A sociological approach -

رهانات سوق العمل في الجزائر في ظل التحولات التكنولوجية
- مقارنة سوسيولوجية -

Samir MAKHLOUF ^{1*}, Hanane BOUNIF ²

¹ Université Mohamed Boudiaf, M'sila, samir.makhlouf@univ-msila.dz.

² Université Mohamed Boudiaf, M'sila, hanane.bounif@univ-msila.dz

مخبر تخطيط الموارد البشرية وتحسين الأداء

Received Date:23/09/2025

Acceptance Date:11/03/2026

Abstract

This article aims to analyze the impact of rapid technological transformations on the labor market and the social organization of work in Algeria, from a sociological and organizational perspective. Like other societies, Algeria faces profound challenges driven by digital transformation, which is no longer a mere technical choice but a structural force reshaping work patterns, the nature of professional relationships, and the roles of actors within organizations. The article examines how the Fourth Industrial Revolution—with its technologies such as artificial intelligence, automation, and cloud computing—is generating new jobs based on digital skills, while simultaneously threatening traditional jobs that can no longer meet the demands of the digital economy. It also highlights the widening digital divide and its effect on rising unemployment among unskilled groups. Furthermore, the article focuses on how digitization is redefining the distribution of roles within Algerian organizations, moving from traditional hierarchical structures toward more flexible models based on networks and remote work.

Keywords: Labor Market; Digital Transformation; Social Organization of Work; Digital Economy; Fourth Industrial Revolution.

ملخص:

يهدف هذا المقال إلى تحليل أثر التحولات التكنولوجية المتسارعة على سوق العمل والتنظيم الاجتماعي للعمل في الجزائر، من منظور سوسيولوجي تنظيمي. فالجزائر، على غرار بقية المجتمعات، تواجه تحديات عميقة فرضها التحول الرقمي، الذي لم يعد مجرد خيار تقني، بل أصبح قوة بنيوية تُعيد تشكيل أنماط العمل، طبيعة العلاقات المهنية، وأدوار الفاعلين داخل المؤسسات. يتناول المقال كيف تؤدي الثورة الصناعية الرابعة - بما تحمله من تقنيات مثل الذكاء الاصطناعي، الأتمتة، الحوسبة السحابية - إلى خلق وظائف جديدة تركز على المهارات الرقمية، مقابل تهديد الوظائف التقليدية التي لم تعد تواءم متطلبات الاقتصاد الرقمي. كما يرصد اتساع الفجوة الرقمية، وتأثيرها على تصاعد البطالة وسط الفئات غير المؤهلة. ويركز المقال كذلك على فهم الكيفية التي تعيد بها الرقمنة توزيع الأدوار داخل المؤسسات الجزائرية، من خلال الانتقال من التنظيمات الهرمية التقليدية إلى أنماط أكثر مرونة، قائمة على الشبكات والعمل عن بعد.

كلمات مفتاحية: سوق العمل؛ التحول الرقمي؛ التنظيم الاجتماعي للعمل؛ الاقتصاد الرقمي

*Corresponding author.

Challenges of the Algerian labor market in light of technological transformations - A sociological approach -

1. Introduction

This study carries significant importance given the current social and economic context in Algeria, where technological transformations intersect with long-standing structural challenges in the labor market, such as unemployment, weak training systems, and institutional fragility. Understanding the implications of these transformations goes beyond the economic dimension; it extends to the social and organizational structures of work within institutions. The value of this research lies in highlighting how technology is reshaping patterns of work and professional relationships, producing both challenges and opportunities that demand effective organizational and social responses.

Like many other societies, Algeria is undergoing profound shifts in the structure of its labor market, driven by rapid technological change that is reshaping the economy, employment, and the organization of institutions. These changes are no longer merely technical phenomena; they have become structural forces altering the very nature of work and models of industrial relations, generating transformations in the social organization of production spaces.

In the Algerian context, these transformations intersect with existing structural imbalances in the labor market, such as high unemployment rates, limited institutional flexibility, insufficient vocational training, and the widening gap between educational attainment and labor market needs. This is evident in the heavy reliance of many enterprises—particularly small and medium-sized ones—on traditional models of work that no longer align with the requirements of a digital economy. This stands in stark contrast to the growing demand for digital and specialized technical skills, which remain scarce in the local market. Engaging with digital transformation has thus become an issue that extends beyond economic considerations, fundamentally reshaping the social and organizational structures of work. Employment models, working conditions, and industrial relations are being subjected to deep restructuring, involving the redistribution of roles and authority within organizations and the imposition of new forms of regulation and control grounded more in digital standards than in traditional rules.

This landscape raises central sociological questions regarding the ability of Algeria's social organization of work to adapt to such transformations. It is crystallized in the following main question:

How do technological transformations affect the social organization of work in Algeria, and what challenges and prospects do they create for the labor market under these changes?

Accordingly, this study aims to:

- Analyze how technological transformations (digitization, artificial intelligence, automation) are reshaping the social organization of work within Algerian institutions.
- Understand the impact of these transformations on the dynamics of professional relationships, the distribution of power, and patterns of interaction among actors in the workplace.
- Develop a critical sociological perspective that can contribute to shaping public and organizational policies supporting adaptation to digital transformations while preserving social cohesion within work environments.

2. Concepts of the Study

2.1. Labor Market: “It is the domain where the supply of labor, represented by job seekers and the unemployed, meets the demand for labor, represented by institutions and employers. Within this space, skills and competencies are exchanged for wages, commonly referred to as conditions of employment.” (Ibrahim, 2020, p. 7.)

Operational Definition of Labor Market Challenges : The labor market is understood as an economic and social space that serves as a meeting point between the supply of labor—represented by individuals seeking employment opportunities—and the demand for labor—expressed by institutions and employers in search of qualified workers. Within this market, skills and competencies are exchanged for wages, commonly referred to as conditions of employment. However, this market is not devoid of complex challenges, including the rapid pace of technological change, the widening gap between educational outputs and labor market requirements, the limited practical experience of job seekers, and rising unemployment rates. These dynamics compel actors within the labor market to continuously adapt in order to maintain equilibrium between supply and demand.

2.2. Technological Transformations: This term refers to the ongoing changes in the field of technology and its applications, aimed at addressing challenges and fostering development across various domains. (Al-Kaabi, 2024, p. 21.)

3. The Dialectical Relationship Between Technology and Social Organization

Social change has always been at the core of societal movements since the dawn of history. It is not a matter of choice but rather an existential necessity imposed by the evolution of life and the shifting of circumstances. Human experience has shown that societies which remain on the margins of change and resist it eventually find themselves excluded from the pathways of development and progress, and may even face decline or marginalization. At the heart of this change lies technology, one of its most powerful driving forces. Its impact is no longer confined to the technical sphere; it extends to social and organizational structures, alongside other influential factors such as demographic, economic, and cultural dynamics.

The literature and research confirm that technological transformations are not limited to the development of tools and technical methods but extend to encompass lifestyles and social relationships in all their dimensions. In this context, many scholars emphasize that technological advancement reshapes social interactions within families and communities, directly influencing modes of thinking and communication, as societies gradually transition from traditional models to those increasingly linked to digital spaces. Technology has become an integral part of our social fabric, bringing about a profound transformation in the ways we communicate and interact—whether within the family, in the workplace, or across broader community settings.

Geography and time no longer pose barriers to social interactions, as technology has transported us into virtual spaces that largely define our social relationships. At the institutional level, traditional hierarchical structures alone are no longer sufficient to meet contemporary demands. The rise of digital tools and remote work has introduced new organizational models based on flexibility, networks, and temporary projects, rather than exclusive reliance on permanent positions. With these changes, the distribution of power within institutions has become more closely tied to the ability to process data and manage technical knowledge, rather than to conventional notions of administrative authority.

Nevertheless, these transformations are not viewed solely through the lens of efficiency and speed; there is also an unavoidable human and social dimension. The growing use of smart devices and digital platforms has reduced face-to-face presence and direct communication within families and communities. Family gatherings have become less common, often replaced by virtual interactions—sometimes distant and detached. This new reality has reshaped the nature of social bonds, rendering them at times less profound and, in other instances, more fragile.

Conversely, this digital expansion has been accompanied by the emergence of new forms of social vulnerability. The digital divide—between

those who possess technological skills and tools and those who lack them—has deepened new forms of inequality, whether in employment opportunities, education, or even social participation. In the labor market, we are witnessing the rise of professions that scarcely existed a few years ago, such as app developers, cybersecurity specialists, and digital content creators, while other, more traditional occupations are gradually disappearing due to automation. This shift does not merely entail the replacement of one set of skills with another; rather, it redraws the relationship between worker and institution, between human effort and automated intervention, and between what is material and tangible and what is virtual and digital.

The same applies to education, which is no longer confined to traditional classrooms. The widespread availability of digital learning platforms has created unprecedented opportunities for individuals to acquire new skills, engage with diverse cultures, and construct alternative educational pathways. This development is fundamentally reshaping the contours of socialization and the accumulation of knowledge capital. (Diak, 2017)

In conclusion, the relationship between technology and social organization is neither linear nor simple; it is a complex dialectical interplay where empowerment coexists with threat, and opportunity with challenge. Ultimately, it depends on the choices made by societies and institutions—whether to harness these tools in the service of humanity and the enhancement of well-being, or to allow them to deepen social and economic divides.

4. Global Contexts of Technological Transformation and Its Implications for Work

The World Economic Forum held in Davos, Switzerland, featured in-depth discussions on the impacts and challenges of what has come to be known as the “Fourth Industrial Revolution.” Participants at the forum focused on understanding the dynamics of this revolution, characterized by the integration of a set of advanced technologies across various spheres of life. Among the most prominent features of this technological revolution are the spread of artificial intelligence technologies, the development of cloud computing, and the growing use of robotics and intelligent systems.

This convergence of technologies represents a qualitative shift in how work and production are organized, as intelligent systems and cloud-based solutions have become an integral part of institutional infrastructures. Consequently, they are reshaping the very nature of jobs, management practices, and patterns of relationships within the labor market. (Ben Azza & Mouwafaq, 2023)

It is evident that the transformations brought about by the Fourth Industrial Revolution are no longer mere technological leaps observed from a distance; they have become a tangible reality that strongly asserts itself in the way we work, organize our institutions, and even relate within workplace

Challenges of the Algerian labor market in light of technological transformations - A sociological approach -

environments. This is no longer simply about introducing new devices or software; rather, it reflects a profound shift in our very understanding and practice of work, where the boundaries between the role of humans and the role of technology have become less clear than ever before.

Modern work environments are undergoing profound transformations as a result of the rapid technological shifts imposed by the Fourth Industrial Revolution. Technology is no longer merely a tool; it has become a driving force reshaping the very nature of work and the operational mechanisms of institutions. The growing use of artificial intelligence, cloud computing, automation, and virtual reality has required adaptation to the new demands of the labor market. At the same time, these transformations have brought about a range of positive and negative implications, affecting both employment and the social organization of work. (Said, 2024)

4.1. Positive Impacts of Technological Transformations on the Labor Market

- The integration of artificial intelligence and machine learning into various work and production activities.
- The widespread use of cloud computing for data storage and remote system management.
- The accelerated adoption of virtual and augmented reality technologies in fields such as training, design, and marketing.
- Enhancing production efficiency through automation and intelligent robotics, which reduces errors and increases productivity.
- The emergence of new, more flexible work models, such as remote work.
- The creation of new jobs in multiple fields, including database management, cloud computing, cybersecurity and digital system protection, big data analytics, and artificial intelligence development.

4.2. Negative Impacts of Technological Transformations on the Labor Market

- The gradual disappearance of many traditional jobs, particularly those dependent on manual labor.
- The widening digital divide between groups capable of adapting to technological changes and those lacking digital skills.
- The vulnerability of digital infrastructure to risks such as cyberattacks and security breaches.
- Rising unemployment rates among workers unqualified for the requirements of the digital economy.
- The threat to the stability of certain traditional sectors that have been unable to adapt to digital transformations.

5. Features of Technological Transformations in the Algerian Labor Market

A study by Maria Boubberka, Sabah Fadel, and Hassan Derrar (2022) examined the development of the information society in Algeria within a broader investigation of digital transformation and the knowledge society. Algeria has chosen digitization as a strategic solution to diversify and stimulate the growth of its economy. The foundations of the digital economy in Algeria were laid in the early 2000s with the adoption of Law No. 2000-03 of August 5, 2000, which established the general rules for postal and telecommunications services, aiming to introduce competition into the telecommunications sector.

The strategies adopted by Algeria to advance information and communication technologies have included several key areas:

- Reviewing institutional and regulatory frameworks.
- Restructuring operational structures.
- Improving and developing telecommunications infrastructure.

The primary objective of the public authorities was to adopt information and communication technologies in order to modernize their operations and produce more competitive goods and services. In 2001, revenues from the ICT sector represented approximately 0.9% of the GDP, equivalent to an average annual consumption of about 16 USD per capita—reflecting a modest but clear beginning toward embracing the digital economy. (Maria, Sabah, & Hassan, 2023)

6. The Impact of Technological Transformation on the Algerian Labor Market

In the study by Ghericia Zouaneb, Nasreddine Beddi, and Lakhdar Adouka, entitled *L'impact des TIC sur l'emploi en Algérie : Investigation empirique auprès des entreprises des TIC*, an analysis of its content reveals that the impact of technological transformation on the Algerian labor market can be summarized as follows: (Ghericia, Nasreddine, & Lakhdar, 2015)

- Creation of new jobs: the ICT sector has contributed to generating direct employment within technology-based enterprises, particularly in software companies, internet services, telecommunications, and maintenance.
- Emergence of new and specialized skills: demand has increasingly targeted university graduates, especially in computer science, programming, networking, data analysis, and cybersecurity.
- Transformation of traditional occupations: classical jobs have become faster, more organized, and more dependent on digital tools and technological solutions.

Challenges of the Algerian labor market in light of technological transformations - A sociological approach -

- Change in recruitment channels: the internet has become the primary medium for recruitment processes, with companies relying on digital platforms to advertise job opportunities and select candidates.
- Positive impact on qualified employment: technological transformation has strongly supported the hiring of highly skilled individuals, while reducing opportunities for low-skilled labor, reflecting the effect of “skill-biased technological change”.
- Promotion of entrepreneurship and self-employment: digital transformation has fostered the emergence of startups in software development, application design, e-commerce, and digital services.
- Increase in job opportunities linked to technology investment: firms with stronger financial positions and longer operational histories achieve better recruitment outcomes, indicating that sectoral growth is directly tied to technological investment.
- Environmental and regulatory constraints: despite the opportunities, challenges remain regarding institutional frameworks, bureaucratic barriers, and insufficient digital infrastructure, which hinder the expansion of the labor market in this sector.

As demonstrated in the study by Hadjar Khalfallah and Khaled Bendjellou (2023), entitled *The Reality of Digital Transformation in Algeria: An Analysis of International Indicators*, digital transformation in Algeria has begun to generate tangible effects on the labor market, both in terms of employment patterns, job nature, and the skills required. An analysis of the development of digital infrastructure, the expansion of e-commerce, and the advancement of entrepreneurship and innovation reveals that the Algerian labor market is undergoing gradual transformations that reflect a dual trajectory, combining promising opportunities with profound structural challenges. (Hadjar & Khaled, 2023)

- **Digital infrastructure as a driver of labor market transformation:** The study showed that the expansion of Internet use and the development of third- and fourth-generation services have contributed to creating a preliminary environment for the emergence of digital economic activities, leading to the creation of new job opportunities in areas such as technical support, application development, digital marketing, and Internet services. However, challenges related to low Internet speed and uneven geographical coverage continue to hinder the full transition to digital work patterns.
- **E-commerce and electronic payment as a new source of employment :** The data indicate that e-commerce in Algeria has experienced accelerated growth, particularly since 2020 due to the repercussions of the COVID-19 pandemic, which has contributed to generating new employment opportunities in areas such as e-store

management, logistics services, digital marketing, and the development of e-payment solutions. Nevertheless, limited trust in online transactions and weak digital literacy among large segments of citizens have remained obstacles to fully capitalizing on this growth in the labor market.

- **Entrepreneurship and innovation as drivers of sustainable employment :** The study points out that the growing number of start-ups reflects a notable dynamism toward creating innovative digital business models. However, the low level of investment in research and development, coupled with the significant decline in the number of patents, highlights the fragility of Algeria's technological innovation environment. This limits the capacity of these enterprises to generate a qualitative transformation in the labor market by creating high-value jobs based on knowledge and technology..

The findings of the study reveal that the impact of technological transformation on the Algerian labor market is reflected in the emergence of new employment sectors and the creation of emerging economic opportunities. However, this transformation also exposes fundamental challenges related to weak digital infrastructure, a shortage of skilled labor, and the slow pace of structural reforms. Accordingly, the future of the Algerian labor market will depend on the ability of public policies to accelerate the digital transformation process, foster innovation, and retrain human capital to meet the requirements of the digital economy.

7. Reshaping the Social Organization of Work within Algerian Institutions

Algerian institutions have undergone profound structural and organizational transformations in recent years, driven by a set of interrelated factors imposed by both internal and external contexts. Digitization, automation, and the implementation of artificial intelligence have become firmly embedded in the workplace, contributing to the reshaping of professional relationships and production patterns within these institutions. Furthermore, a wave of economic reforms aimed at transitioning toward a knowledge-based economy has led to a comprehensive reassessment of the roles of actors within organizations and the very nature of jobs. At the same time, policies of openness, the promotion of entrepreneurship, and the partnerships between universities and economic institutions have generated a new dynamic in the work environment, one built on innovation, flexibility, and adaptability to the demands of a rapidly changing labor market. Moreover, the pressures of globalization and rising competitiveness have heightened the need to reconsider work organization not only at the technical level but also at the social and cultural levels within institutions.

Challenges of the Algerian labor market in light of technological transformations - A sociological approach -

From this perspective, the discussion of the "reshaping of the social organization of work" necessarily entails an analysis of the transition of institutions from traditional organizational models based on hierarchy and conformity to more interconnected and flexible models that emphasize the values of collaboration, creativity, and participation. Work is no longer confined to direct interaction among individuals within a shared physical space; digital communication tools and remote work have become fundamental components of the production process.

This transformation is reflected in the redistribution of roles and tasks, as well as in the emergence of new professions such as data analysts, digital transformation managers, and content creators. It has also driven the adoption of hybrid work models that combine physical and virtual presence. These changes have required a fundamental restructuring of organizational frameworks, shifting from rigid models to more flexible ones built on rapid adaptation and continuous interaction with technological and market developments.

Accordingly, analyzing this phenomenon necessitates the use of multiple approaches: a sociological approach to understand the evolution of social relations and power dynamics in the world of work; an organizational approach to examine the impact of these changes on institutional structures and management mechanisms; and a technological approach to illustrate how digitalization has become a central driver in reshaping the nature and content of work.

While these transformations create opportunities for improved productivity and efficiency, they also pose serious challenges, including the threat to certain traditional jobs, weakened organizational belonging, and the spread of digital isolation. This calls on actors in organizational and social fields to critically examine these transformations and anticipate mechanisms of adaptation in order to balance technological progress with the preservation of social cohesion within organizations.

Sociological and organizational literature converges on the view that technological transformations today constitute a central determinant in reshaping the social organization of work within institutions. Numerous studies, both global and local, have addressed this phenomenon, emphasizing that digitalization is no longer an option but a necessity for reconstructing work patterns and professional relationships.

In this regard, Manuel Castells' seminal work *The Rise of the Network Society* (Castells, 1996) provides a foundational reference for understanding the impact of digitalization on social and organizational structures. Castells demonstrates that the transition to a network society fundamentally altered work patterns in favor of more flexible structures that rely on decentralized

flows of information and network-based coordination, rather than rigid hierarchies.

Similarly, the study by Zammuto and Griffith (2007), entitled *Information Technology and the Changing Fabric of Organization*, highlights how the integration of information technology has brought about fundamental transformations in organizational structures. Organizations have become flatter and less centralized, with the rise of virtual teams and the adoption of new models of interaction and collaboration within institutions (Zammuto, Griffith, Majchrzak, Dougherty, & Faraj, 2007.)

All of this literature emphasizes that redesigning the social organization of work is not merely a technical or administrative process, but rather a complex social undertaking. It requires changes in structures, roles, professional relationships, and patterns of interaction within the organization, as well as a reengineering of organizational culture to align with the demands of the digital age.

8. Conclusion

In light of the theoretical analysis, it is clear that technological transformations now constitute a decisive factor in reshaping the social organization of work within Algerian institutions. The effects of digitization and automation are no longer confined to technical aspects but have deeply penetrated the social and organizational structure of the labor market. On the one hand, these transformations have led to the emergence of new work models based on flexibility, remote work, and the increased use of digital skills, thereby creating job opportunities in technology and digital entrepreneurship. On the other hand, this shift has widened the gap between skilled and unskilled labor, putting pressure on institutions that still rely on traditional bureaucratic models.

Accordingly, the social organization of work in Algeria is undergoing a gradual transition from a hierarchical bureaucratic model to more networked and flexible forms. However, this transition faces structural barriers such as weak digital infrastructure, a shortage of qualified human resources, and slow institutional change. The main challenge lies in the capacity of public policies, educational institutions, and economic organizations to adapt their strategies to meet the demands of the digital economy and to reduce the digital divide in order to strike a balance between technological progress, social justice, and professional stability.

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Challenges of the Algerian labor market in light of technological transformations - A sociological approach -

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