

Artificial Intelligence and Its Implications for Sustainable Development in Algeria: Socio-Economic Approaches in the Context of the Knowledge Economy

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Abstract

This study aims to analyze the role of start-ups in achieving sustainable development in Algeria, with particular emphasis on its economic, social, and environmental dimensions, while linking these dimensions to the concepts of the knowledge economy and contemporary theories in the sociology of organizations and organizational studies.

The research adopts a descriptive-analytical approach and employs a field questionnaire administered to a sample of 42 respondents, including founders, executives, and employees. The findings indicate that economic performance is high, whereas social performance is moderate and environmental performance is very low. These results reveal a gap between economic success and comprehensive sustainability.

The study recommends integrating the social and environmental dimensions into start-ups' strategies, strengthening social protection systems, and promoting a culture of sustainability and environmental awareness. It also emphasizes the importance of drawing on contemporary theoretical perspectives to foster greater integration among the dimensions of sustainable development in its modern conceptual framework.

Keywords: Artificial Intelligence, Sustainable Development, Knowledge Economy.

Introduction

Analyzing Algeria's transition towards a digital and knowledge-based economy in line with the requirements of contemporary technologies highlights the need to establish a digital and knowledge-driven economic model. Achieving this objective requires the adoption of a comprehensive national vision founded on investment in education and scientific research, as well as the localization of technologies derived from artificial intelligence. Such technologies aim to reduce geographical and social disparities in access to digital resources.

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This transition also requires strengthening public-private partnerships through a new development-oriented approach that balances economic efficiency with social justice and links economic growth to sustainability. These priorities have become increasingly significant in a global economy characterized by the growing importance of innovation and the capacity to adapt. They also call for redefining the relationship between the economy and society in the age of artificial intelligence and developing a model that enhances our understanding of the dynamics of digital transformation in their human and institutional dimensions. Such an approach would provide an integrated vision of the economy of the future, based on knowledge, innovation, and social responsibility.

Artificial intelligence (AI) is also one of the most important technological pillars driving a radical transformation in the structure of the global economy. Its effects are gradually extending to developing economies, including the Algerian economy, which seeks to capitalize on this transformation as part of its efforts to diversify its productive base and overcome its historical dependence on the hydrocarbon sector. In this regard, artificial intelligence represents a strategic opportunity for Algeria to rebuild its economic model on the foundations of knowledge, innovation, and digitalization, within the framework of what is known as the “post-oil economy” (Mansour, 2020)

The Impact of Artificial Intelligence on Sustainable Development in Algeria: A Socio-Economic Approach in Light of the Knowledge Economy

Although the integration of artificial intelligence technologies in Algeria is still in its early stages, current indicators and government policies point to a gradual institutional transformation towards building a digital economy based on knowledge and innovation. The implications of artificial intelligence for the Algerian economy can be analysed through four main dimensions: the institutional and legislative dimension, the productive dimension, the sectoral dimension, and the socio-human dimension.

Accordingly, the general research question can be formulated as follows:

To what extent can start-ups contribute effectively to achieving sustainable development in accordance with the requirements of the knowledge economy?

This overarching question gives rise to several sub-questions, as follows:

How does artificial intelligence affect knowledge-based economic growth?

Is there alignment between the dimensions of artificial intelligence and the requirements of the knowledge economy?

Is it possible to formulate and achieve comprehensive development objectives without disrupting the environmental and social systems?

1. Research Hypotheses

Artificial intelligence enhances knowledge-based economic growth grounded in scientific knowledge.

There is a complementary relationship between the dimensions of artificial intelligence and the requirements of the knowledge economy.

The achievement of comprehensive development objectives depends on the stability of the social environment.

2. Significance of the Study

This study is significant in several dimensions, encompassing the various indicators of sustainable development in light of global trends associated with digital technologies and the applications of artificial intelligence. These trends are considered in accordance with the requirements of strategic planning, governance, and entrepreneurship. In this context, the significance of the study can be outlined as follows:

2.1. Economic Significance

The study evaluates the impact of artificial intelligence on knowledge-based economic growth and examines its applications in economic transactions.

2.2. Social Significance

The study seeks to determine the extent to which artificial intelligence contributes to employment, professional stability, and the inclusion of broader segments of society in ways that are consistent with the requirements of digital transformation. It also examines the integration of the environmental dimension into institutional strategies.

3. Objectives of the Study

The study seeks to achieve the following objectives:

To analyse the impact of artificial intelligence on knowledge-based economic growth and assess its contribution to employment and professional stability.

To examine the extent to which social dimensions are integrated into work organisation through the use of artificial intelligence technologies.

To analyse the extent to which environmental considerations are incorporated into artificial intelligence strategies aimed at maintaining the stability of the business environment.

4. Theoretical Approaches

This transformation can be understood through several theoretical approaches that examine the different dimensions of artificial intelligence applications within the digital economy.

From the perspective of the neoclassical school of thought, artificial intelligence represents a mechanism for increasing productive efficiency and reducing resource waste. This, in turn, enhances total factor productivity and promotes economic growth.

The New Keynesian school, by contrast, emphasises the need for state intervention to provide the necessary digital infrastructure and ensure an equitable digital transition. Such intervention is essential to prevent artificial intelligence from becoming a tool that exacerbates disparities between businesses and individuals.

The structuralist approach, meanwhile, offers a deeper understanding of the nature of digital transformation in developing countries. From this perspective, technological adoption alone is insufficient; rather, social and institutional structures must be reconfigured to accommodate and effectively integrate these technologies.

Finally, the contemporary socio-economic approach emphasises that digital transformation cannot be separated from its cultural environment. Technology does not merely generate new tools; it also creates new patterns of thinking, working, and interaction. Consequently, understanding the implications of artificial intelligence requires an integrated perspective that considers its economic, institutional, social, and cultural dimensions.

The cognitive school, meanwhile, regards artificial intelligence as a natural extension of the knowledge economy, in which knowledge itself becomes a productive process and the institution evolves from a physical entity into an intellectual structure founded on continuous innovation.

In conclusion, the fundamental elements required to understand the Algerian digital economy call for the integration of these approaches into a comprehensive vision that balances economic efficiency with social transformation. This requires considering the business environment as a subsystem of the broader social environment, with its own organizational objectives, while ensuring that it does not disrupt the value system of the social environment. This perspective is consistent with Talcott Parsons' theory of social

action, which emphasizes the stability and equilibrium of the various organizational subsystems within the overall social system.

I. Fundamental Approaches to the Use of Artificial Intelligence in the Context of the Knowledge Economy

First: Institutional Transformation and Public Policies in the Context of the Knowledge Economy

In recent years, Algeria has witnessed significant institutional transformations that have paved the way for the adoption of artificial intelligence as a driver of economic development. In 2020, the government established a delegated ministry responsible for the knowledge economy and start-ups pursuant to Presidential Decree No. 20-199 of 23 July 2020. This represented a strategic step aimed at establishing an institutional framework for developing the digital economy and promoting innovation among small and medium-sized enterprises **(Algeria, 2020)**

This initiative was subsequently followed by a series of decisions and decrees, the most significant of which include the following:

- The National Artificial Intelligence Strategy 2023–2030, announced in March 2023, which encompasses six main areas:

- Promoting scientific research in data science and artificial intelligence;

- Encouraging innovation and technological entrepreneurship;

- Establishing a national open-data system;

- Developing the legislative framework for personal data protection;

- Advancing university education and training in advanced technological fields;

- Encouraging public–private partnerships in digitalization **(Economy, 2023)**

The Algeria Digital 2035 Programme, which encompasses projects related to e-government, smart cities, e-commerce, and distance education. The programme aims to position Algeria as a regional digital hub in Africa **(Economy, 2023)**

These initiatives reflect a clear political commitment to steering the economy towards sustainable digital transformation and establishing the legislative and institutional conditions necessary for leveraging artificial intelligence to support economic growth.

Second: The Impact of Artificial Intelligence on Productivity and Economic Diversification

Through the integration of artificial intelligence, Algeria seeks to increase productivity and enhance the competitiveness of enterprises. Artificial intelligence enables the analysis of vast amounts of data, thereby facilitating more accurate decision-making in production, marketing, and distribution, as well as the development of control mechanisms applicable across economic and commercial enterprises.

Reports issued by the Ministry of Industry (2023) indicate that the implementation of intelligent control systems and robotics in certain public-sector enterprises has contributed to reducing operating costs by 18% and improving energy efficiency by 12%.

In addition, artificial intelligence (AI) makes it possible to improve predictive maintenance processes in industrial facilities through sensing and analytical systems capable of anticipating failures before they occur. This helps reduce downtime and increase actual production output **(UNIDO, 2022)**

In the agricultural sector, AI technologies are used in smart farming projects to monitor crops through satellites and unmanned aerial vehicles (drones). These applications have contributed to a 15% increase in agricultural production in selected pilot wilayas, such as Biskra and El Oued **(Al-Ramadna, 2021)**

Furthermore, AI contributes to diversifying the economic base by supporting start-ups that provide digital solutions in areas such as healthcare, energy, and financial services. By 2024, the number of officially accredited start-ups had exceeded 1,800, including approximately 400 enterprises specializing in software development and intelligent data analytics (Economy M. o., 2023)

The Finance Law of 2022 supported this trend by introducing tax exemptions for a period of five years for start-ups operating in the digital technology and artificial intelligence sectors (**Finance, 2022**)

All these indicators confirm that AI can become a genuine driver of national economic diversification and help reduce Algeria's dependence on the hydrocarbon sector, provided that human capital development and technical training are strengthened.

Third: The Impact of Artificial Intelligence on Key Economic Sectors

A. The Industrial Sector

Industry is considered one of the sectors that stands to benefit most from AI in Algeria. Major state-owned enterprises, such as Sonatrach and Sonelgaz, have begun adopting intelligent systems to monitor production, manage energy-related data, and improve predictive maintenance. AI applications have also been integrated into environmental emissions analysis and industrial safety monitoring as part of the Industrial Digital Transformation Programme 2030 (**Economy, 2023**)

B. The Agricultural Sector

In agriculture, the Ministry of Agriculture has launched pilot projects in collaboration with universities to implement AI technologies in precision farming. These initiatives include the use of remote sensing to determine the water requirements of crops and forecast agricultural production in desert regions.

Studies indicate that national agricultural output could increase by 25% over five years if these applications were gradually implemented on a broader scale (**Al-Salmi, 2022**)

C. The Financial and Banking Sector

Algerian banks have adopted AI to improve digital banking services. Institutions such as the Bank of Algeria for Foreign Trade (Banque Extérieure d'Algérie—BEA) and the Local Development Bank (Banque de Développement Local—BDL) have developed systems for risk assessment and fraud detection, in addition to deploying chatbots to facilitate customer interactions.

These applications have helped accelerate banking transactions, reduce errors, and improve the user experience (**Algeria B. o., 2023**)

D. The Education and Training Sector

The Ministry of Higher Education and Scientific Research seeks to integrate AI into the educational process through initiatives such as the “Smart University” projects, digital distance-learning platforms, and the analysis of academic performance using data-driven methods. Furthermore, new specializations, including Artificial Intelligence Engineering and Data Science, have been introduced into university training programmes.

Nevertheless, students enrolled in technology-related disciplines still account for less than 10% of the total student population (**Research, 2023**)

Fourth: Structural and Technical Challenges

Despite these positive indicators, the Algerian economy faces several structural and technical obstacles that hinder the pace of transition towards an integrated digital economy. The most significant challenges include the following:

- Weak digital infrastructure, particularly in the inland and southern regions, where fibre-optic network coverage does not exceed 35% of the national territory (**Telecommunications, 2023**)
- A shortage of technical expertise in programming and artificial intelligence. According to World Bank statistics, Algeria needs to train more than 100,000 specialists in emerging technologies by 2030 (**Bank, 2022**)
- The absence of a comprehensive legislative framework governing artificial intelligence, despite the adoption of legislation relating to personal data protection, notably Law No. 18-07 of 2018, and electronic signatures.
- Limited expenditure on scientific research, with research funding accounting for no more than 0.8% of gross domestic product (GDP), which is below the estimated global average of 2.5% (UNESCO, 2023)

Addressing these challenges requires comprehensive policies aimed at promoting digitalisation, education, and training, encouraging cooperation between the public and private sectors, and integrating universities into the industrial innovation ecosystem.

Fifth: Legal and Regulatory Frameworks

The legal system constitutes one of the key pillars for ensuring a successful transition to a smart economy, as it provides the laws and regulations necessary to govern this process. In this context, Algeria enacted Law No. 18-07 of 2018 on the protection of natural persons in the processing of personal data, which provides a legal foundation for regulating the circulation and processing of digital data.

The Ministry of Digitalisation is also currently working on the preparation of a draft national law on artificial intelligence (2024), which aims to establish standards governing the use of intelligent systems and ensure their compliance with international principles, including the following:

- UNESCO's Recommendation on the Ethics of Artificial Intelligence (UNESCO, 2023)
- The Organisation for Economic Co-operation and Development (OECD) Principles on the development of trustworthy artificial intelligence (**OECD, 2022**)
- The African Union's Digital Transformation Strategy and Charter (**Union, 2022**), which emphasise the ethical use of technology in support of African development.

Furthermore, the National Cybersecurity Strategy for 2022–2025 emphasises the importance of protecting intelligent systems against cyberattacks and ensuring data integrity. These measures contribute to strengthening the confidence of investors and users in the national digital economy (**Authority, 2022**)

I. Prospects for Developing the Digital Economy in Algeria in the Era of Artificial Intelligence

Algeria is among the countries with significant opportunities to develop a competitive digital economy, particularly in light of the global technological transformations driven by artificial intelligence. As reliance on data and intelligent technologies in resource management and production continues to increase, formulating a national strategic vision that integrates artificial intelligence into various economic and social sectors has become essential (**Mansour, 2020**)

This vision is based on developing digital infrastructure, upgrading human capabilities, and improving the legal and regulatory framework to ensure the optimal utilisation of modern technologies (**Daoud, 2022**)

First: Enhancing Industrial Productivity through Smart Factories

The industrial sector is one of the key areas that can benefit from the application of artificial intelligence (AI), particularly in production and manufacturing processes. Intelligent control systems and digital monitoring technologies help reduce human error, improve productivity, and anticipate equipment failures before they occur through the use of predictive maintenance techniques.

Furthermore, integrating AI into production lines enables real-time analysis of industrial data, allowing Algerian enterprises to transition towards a smart factory model based on automation and continuous performance analysis **(Forum, 2023)**

These efforts are supported by legal frameworks, such as Executive Decree No. 23-147, concerning the digitalization of industrial activities and the promotion of technological innovation in Algeria.

Second: Strengthening Food Security through Smart Agriculture

Artificial intelligence contributes to the development of precision agriculture through the use of sensors and satellites to assess soil fertility, monitor moisture levels, and forecast agricultural yields as part of predictive analysis and strategic planning processes.

In Algeria, food security represents a strategic priority. The use of intelligent algorithms can facilitate the efficient management of water resources and the planning of agricultural production in accordance with climate variations **([FAO], 2022)**

The Ministry of Agriculture seeks to promote digital innovation through initiatives such as the National Smart Agriculture Strategy, launched in 2023 in cooperation with the World Bank **(Bank, 2022)**

Third: Developing Digital Financial Services

The financial and banking sector is undergoing a fundamental transformation as artificial intelligence becomes increasingly integrated into credit analysis, risk assessment, and financial fraud detection. Algorithms are now capable of processing millions of transactions within a very short period, thereby improving transparency and accuracy in lending decisions.

In Algeria, major banks are working towards adopting smart banking systems by incorporating AI into mobile applications and virtual customer service platforms **(Amara, 2023)**

These efforts form part of the national financial digitalization plan adopted by the government under the Finance Law for 2024.

Fourth: Advancing the Healthcare Sector through Predictive Medicine

One of the most prominent applications of artificial intelligence in healthcare is the automated analysis of medical images and the early diagnosis of various diseases. These applications aim to facilitate diagnostic procedures, support the identification of appropriate treatment methods, and strengthen preventive healthcare.

In this context, Algeria can develop its capabilities in predictive medicine by establishing digital medical databases that rely on artificial intelligence to forecast epidemics and improve the quality of healthcare services.

Moreover, the use of surgical robots and algorithm-enhanced diagnostic analyses contributes to increasing the efficiency of healthcare services and reducing medical errors. These developments are consistent with the objectives of Executive Decree No. 21-377, concerning the digitalization of the healthcare sector and the improvement of medical information systems.

Fifth: The Transformation of Education toward Smart Learning

The education sector represents one of the fundamental pillars of building a digital economy. Artificial intelligence is revolutionizing teaching methods through adaptive learning, which enables educational content to be tailored to students' abilities and interests. Smart digital platforms also make it possible to analyze learners' performance and provide immediate feedback, thereby enhancing the quality of education from a technological perspective **(UNESCO, 2023)**

Algeria is working to implement a national strategy for digital transformation in education, aimed at digitizing curricula, developing interactive educational content using artificial intelligence technologies, and establishing specialized websites and digital platforms.

Sixth: Digital Governance and Intelligent Decision-Making

Digital governance is considered one of the future pillars for developing public administration in Algeria. Artificial intelligence enables the analysis of vast amounts of administrative data to support the formulation of public policies with greater precision, facilitate decision-making, and improve the efficiency of public services.

In 2021, the Algerian government established the National Artificial Intelligence Observatory pursuant to Executive Decree No. 21-155, with the aim of overseeing and coordinating national initiatives in this field **(Algeria O. G., 2021)**

Accordingly, the shift toward smart governance represents a qualitative leap toward strengthening digital sovereignty and ensuring transparency and accountability in public administration.

I. Requirements for the Success of Smart Digital Transformation and Its Future Directions in Algeria

Smart digital transformation constitutes one of the fundamental pillars for achieving the transition toward a knowledge-based economy in Algeria. Achieving this objective requires the establishment of a comprehensive ecosystem that integrates human capital, technology, legislation, and innovation. Digital transformation is not limited to the digitization of services; rather, it requires a profound restructuring of production and management methods, as well as the adoption of artificial intelligence as a tool for improving efficiency and strengthening economic competitiveness **(Mansour, 2020)**

First: Developing Digital Human Capital

Human capital is one of the most important pillars for the success of digital transformation, as a workforce equipped with the necessary technical skills and knowledge serves as the primary driving force behind any process of economic transformation.

To achieve this objective, particular emphasis should be placed on developing the education and vocational training systems in line with the requirements of the digital economy. This can be accomplished by integrating artificial intelligence, data analytics, and cybersecurity into university curricula **(UNESCO, 2023)**

Furthermore, applied scientific research should be supported and aligned with the needs of the national market through national and international funding programmes, including cooperation programmes with the European Union in the field of innovation, such as Horizon Europe (2023).

The National Artificial Intelligence Strategy 2023–2030 has also emphasized the importance of “training a digital generation capable of leading economic and technological transformation in Algeria” **(Economy M. o., 2023)**

Second: Strengthening Partnerships between Universities and the Private Sector

Partnerships between universities and economic enterprises constitute a vital pillar for accelerating technology transfer and transforming scientific research findings into practical applications. Artificial intelligence requires an integrated environment that brings together research laboratories, start-ups, and companies capable of transforming ideas into products and services **(Daoud, 2022)**

Algeria has sought to consolidate this approach through Law No. 20-02 of 2020 on start-ups, which grants tax and legislative incentives to innovative companies and encourages cooperation between research centers and the industrial sector.

Such integration contributes to the development of a national innovation ecosystem based on applied research, thereby narrowing the gap between academic knowledge and practical application.

Third: Promoting Financial Innovation and Supporting Start-ups

Innovation-oriented financing is considered one of the most important instruments for accelerating digital transformation.

Smart transformation requires flexible financial resources that enable start-ups to experiment, innovate, and expand their operations.

In this context, Algeria established the Start-up Support Fund under Executive Decree No. 21-145 of 2021, which finances technology projects with high added value in fields such as artificial intelligence, blockchain, and digital analytics.

Financial innovation also represents a promising area for future development through the adoption of modern financing instruments, such as venture capital and digital investment funds (OECD, 2022)

These mechanisms create a dynamic environment that supports digital entrepreneurship and reduces the economy's dependence on traditional financing sources.

Fourth: Developing Digital Infrastructure

Digital connectivity and data infrastructure constitute the physical foundation of the smart digital economy.

Without advanced communication networks and secure national data centers, effective digital transformation cannot be ensured.

Within the framework of its National Digitalization Plan 2030, Algeria seeks to expand its fiber-optic network and extend fifth-generation (5G) services, in addition to establishing national data centers to support cloud computing and the storage of sovereign data (Economy M. o., 2023)

Furthermore, Executive Decree No. 22-276 of 2022 was issued to regulate the management and protection of government data, as part of broader efforts to ensure information security and safeguard digital privacy.

Fifth: The Legislative and Ethical Framework for Artificial Intelligence

The legal and regulatory framework is considered one of the most important factors in building trust in the digital economy. National legislation should also establish precise safeguards governing the use of artificial intelligence in sensitive sectors, such as security, healthcare, and finance, thereby ensuring the ethical and responsible application of technology (Organisation for Economic Co-operation and Development (OECD, 2022)

In this context, Algeria is working on the preparation of a comprehensive law on artificial intelligence, which is expected to be enacted by 2026. The proposed legislation aims to establish mechanisms for oversight and accountability and to enhance transparency in decision-making algorithms.

Sixth: Strengthening Cybersecurity and Digital Trust

Cybersecurity is a fundamental pillar of any successful digital economy. As digital services continue to expand, the risks associated with cyberattacks that threaten government institutions and financial organizations are also increasing.

Accordingly, Algeria has developed the National Cybersecurity Strategy 2022–2026, which aims to strengthen prevention capabilities, enhance responses to digital emergencies, and establish national monitoring centers to protect government networks (Agency, 2023)

Furthermore, the National Cybersecurity Observatory was established pursuant to Executive Decree No. 22-490 to coordinate efforts across different sectors and monitor international digital threats. Ensuring a secure digital environment strengthens users' and investors' confidence in the national economy and provides a foundation for long-term digital sustainability.

Seventh: Future Prospects

Over the coming decade, Algeria is expected to experience a qualitative transformation in the structure of its national economy, with digital industries and artificial intelligence becoming major drivers of economic growth. The current shift toward a knowledge-based economy, provided that it is supported by a flexible institutional environment and modern legislation, could position Algeria as a regional hub for technological innovation in North Africa.

In general, artificial intelligence will not replace human beings; rather, it will serve as a tool for enhancing their productive and creative capacities. Through investment in digital infrastructure, scientific research, and education, Algeria can develop a sustainable, knowledge-driven digital economy that enables it to integrate into the emerging global economy and keep pace with intelligent digital transformations.

Accordingly, an artificial intelligence-driven digital economy represents an advanced stage in the evolution of the knowledge economy, in which information and algorithms become primary sources of value and fundamental pillars of sustainable development.

Therefore, investing in artificial intelligence should not be regarded as a technological luxury, but rather as a developmental necessity for securing a competitive position in the future.

I. Practical Implications for Algerian Institutions and the Value System

In practical terms, the features of digital transformation have begun to emerge through the growing dynamism of startups, which represent a meeting point between young people, technology, and the state's aspiration to renew the national economy.

Algeria has established a legal and legislative framework to support startups and has developed accelerators and incubators as platforms for fostering ideas and innovative projects. These experiences demonstrate that digitalization is no longer an optional choice but has become a prerequisite for economic survival. For example, Algerian startups are using artificial intelligence in such fields as smart agriculture, digital healthcare, and logistics services, reflecting a practical shift toward knowledge-based production.

Nevertheless, the greatest challenge remains the transformation of institutional culture, as most traditional organizations continue to rely on outdated management practices that discourage risk-taking and lack a spirit of innovation and renewal.

From another perspective, society is confronted with a new question concerning values: how can technological progress be reconciled with social justice? The rapid development of artificial intelligence may create a gap between technological elites and vulnerable social groups. This situation calls for comprehensive digital inclusion policies that ensure equal opportunities and guarantee that artificial intelligence is employed to promote development rather than generate inequalities among different segments of society.

Such policies should ensure that opportunities are accessible regardless of age, gender, or socioeconomic status, with selection and access to opportunities based on competence, within the relevant field of specialization or according to the intended use of the technology.

I. The Socio-Economic Analysis of Artificial Intelligence Applications in the Context of the Knowledge Economy

First: An Economic Analysis Perspective

The transition towards a digital economy represents one of the most significant structural transformations in the contemporary global economy. Production has gradually shifted from reliance on material resources to the use of information and knowledge as strategic assets. In the Algerian context, the economy is undergoing a transitional phase, moving away from a traditional rent-based model towards a development model that seeks to adopt digitalization and artificial intelligence as key drivers of economic growth.

The main features of this transformation are also reflected in government policies aimed at supporting businesses and developing digital infrastructure. These efforts seek to stimulate the knowledge economy and establish integrated approaches that respond to the challenges posed by digital technologies while keeping pace with changes in the regulatory environment and labour relations. They also aim to facilitate digital interaction across different administrative and organizational levels by establishing unified communication channels that promote transparency and help prevent organizational conflicts. Nevertheless, this process remains at an early stage due to limited funding, insufficient technological resources, and a shortage of highly qualified human resources in artificial intelligence and the digital economy.

At the macroeconomic level, artificial intelligence represents an opportunity to enhance productivity, reduce costs, and improve the efficiency of resource allocation. At the same time, however, it presents new challenges, particularly those associated with restructuring the labour market and transforming employment patterns.

At the organizational level, integrating artificial intelligence into production and service delivery chains provides a means of modernizing industry and developing public and financial administration. This integration creates opportunities for the emergence of a more flexible and sustainable economy.

Accordingly, the Algerian economy is gradually moving towards a hybrid economic model that combines material and digital production and lays the foundations for a new economic structure in which data constitutes a fourth factor of production alongside labour, capital, and land.

Second: A Sociological Analysis Perspective

From a sociological perspective, digital transformation represents a turning point in the social and occupational structure of Algerian society.

Technology is no longer merely a tool of production; rather, it has become a new cultural system that redefines social relationships, patterns of work, and consumption practices. Artificial intelligence has also transformed the nature of work, shifting workers from predominantly manual activities towards analytical and cognitive tasks that require digital skills. This transformation has created a gap between generations and between educated individuals and those who lack the necessary digital competencies.

Such developments may contribute to the emergence of conflicts and divisions between supporters and opponents of digital transformation, particularly in the context of resistance to organizational change. This resistance often stems from an inability to adapt to technological developments introduced into a society that has not yet fully acquired the foundations and requirements of modern technology.

Fortunately, the emergence of digital spaces, such as Facebook, YouTube, and various new digital media applications, has contributed to the emergence of a new social category of digital actors. This category includes programmers, entrepreneurs, and developers of technological solutions. These actors seek to establish new values centred on innovation, autonomy, and competition.

Nevertheless, society remains influenced by an institutional framework and value system that tend to favour job security and bureaucratic administration. This situation generates a degree of value conflict between emerging digital cultures and prevailing cultural patterns shaped by the established outcomes of socialization.

Conclusion

This analysis demonstrates that artificial intelligence is not merely a technological advancement but rather a comprehensive structural transformation affecting the economy, society, and culture simultaneously. It offers Algeria a historic opportunity to move from a rent-based economy towards a knowledge-based economy founded on innovation and data, provided that this transition is accompanied by a corresponding transformation in institutional mindsets and educational practices.

The future of the Algerian economy will likely depend on its ability to integrate digitalization with the social dimension, thereby building an intelligent economy that respects cultural specificities while embracing good governance and transparency. The success of this transformation will depend on several key factors, foremost among them the competence of human resources and the availability of digital infrastructure. Ultimately, artificial intelligence is not an end in itself, but rather a tool for redefining work, wealth, and knowledge within a productive and human-centred vision.

From this perspective, building an integrated Algerian digital economy requires an alliance between the state, in its regulatory and strategic capacities, and institutions across different sectors and fields of activity. Such cooperation must preserve a favourable business environment and take into account the existing social framework in order to establish a new development model founded on human creativity and productive knowledge.

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