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Technological change and its implications for human resource management: an analytical study in the algerian context

ABSTRACT

This study examined the impact of technological change on human resource management (HRM) within organizational contexts, with particular emphasis on the Algerian environment. The objective was to analyze how technological transformation influences HRM practices, organizational performance, and the human dimension of work. A qualitative analytical methodology was adopted, based on a review of contemporary theoretical frameworks and the examination of socio-organizational dynamics associated with automation, digital transformation, and technological adaptation. The findings indicated that technological change significantly reshapes HRM functions, including recruitment, training, and performance management, while simultaneously generating challenges such as skills gaps, labor market polarization, and resistance to change. The study also revealed that the success of technological transformation depends largely on the ability of organizations to integrate human resources as active agents in the change process, considering cultural and institutional factors. Furthermore, effective leadership and participatory management approaches were identified as critical in reducing resistance and enhancing organizational adaptability. The study concluded that technological change is not merely a technical process but a socio-cultural transformation requiring a balance between efficiency and human values, particularly in developing contexts such as Algeria.

Keywords: Technological change; human resource management; digital transformation; automation; organizational change.

El cambio tecnológico y sus implicaciones para la gestión de recursos humanos: un estudio analítico en el contexto argelino

RESUMEN

El presente estudio examinó el impacto del cambio tecnológico en la gestión de recursos humanos (GRH) dentro de las organizaciones, con especial énfasis en el contexto argelino. El objetivo fue analizar cómo la transformación tecnológica influye en las prácticas de GRH, el desempeño organizacional y la dimensión humana del trabajo. Se adoptó una metodología cualitativa de carácter analítico, basada en la revisión de marcos teóricos contemporáneos y en el análisis de dinámicas socio-organizacionales relacionadas con la automatización, la transformación digital y la adaptación tecnológica. Los resultados evidenciaron que el cambio tecnológico reconfigura significativamente las funciones de la GRH, incluyendo el reclutamiento, la capacitación y la gestión del desempeño, al tiempo que genera desafíos como brechas de habilidades, polarización laboral y resistencia al cambio. Asimismo, se determinó que el éxito de la transformación tecnológica depende en gran medida de la capacidad de las organizaciones para integrar a los recursos humanos como agentes activos del cambio, considerando factores culturales e institucionales. Se concluye que el cambio tecnológico no es únicamente un proceso técnico, sino una transformación socio-cultural que requiere equilibrio entre eficiencia y valores humanos.

Palabras clave: Cambio tecnológico; gestión de recursos humanos; transformación digital; automatización; cambio organizacional.

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Mudança tecnológica e suas implicações para a gestão de recursos humanos: um estudo analítico no contexto argelino

RESUMO

Este estudo analisou o impacto da mudança tecnológica na gestão de recursos humanos (GRH) em organizações, com ênfase no contexto argelino. O objetivo foi examinar como a transformação tecnológica influencia as práticas de GRH, o desempenho organizacional e a dimensão humana do trabalho. Foi adotada uma metodologia qualitativa de caráter analítico, baseada na revisão de marcos teóricos contemporâneos e na análise das dinâmicas socioorganizacionais relacionadas à automação, transformação digital e adaptação tecnológica. Os resultados demonstraram que a mudança tecnológica reconfigura significativamente as funções da GRH, incluindo recrutamento, treinamento e gestão de desempenho, ao mesmo tempo em que gera desafios como lacunas de competências, polarização do mercado de trabalho e resistência à mudança. O estudo também revelou que o sucesso da transformação tecnológica depende da capacidade das organizações de integrar os recursos humanos como agentes ativos do processo, considerando fatores culturais e institucionais. Conclui-se que a mudança tecnológica não é apenas um processo técnico, mas uma transformação sociocultural que exige equilíbrio entre eficiência e valores humanos.

Palavras-chave: Mudança tecnológica; gestão de recursos humanos; transformação digital; automação; mudança organizacional.

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INTRODUCTION

The world today is witnessing a remarkable technological surge, in which the pace of modernization has accelerated dramatically. Keeping pace with this evolution has become exceedingly difficult, particularly for countries lacking a historically accumulated technological and industrial base. This contemporary technological acceleration in business environments raises an existential challenge that extends well beyond mere adoption of tools and machinery. While Industry 4.0 promises enhanced efficiency, it simultaneously creates a profound gap between the demands of machines and the values and culture of the human

workforce. At the same time that organizations pursue automation to reduce operational burdens, employees face the risk of 'skill displacement' and sharp labor market polarization — between high-skill, high-wage jobs and low-skill, low-pay positions lacking job security. Reports indicate that 80% of technology transformation projects fail — not due to the ineffectiveness of technology itself, but because of the absence of strategic alignment and resistance to change stemming from fears of losing professional identity and employment. Human resource management has consequently shifted from its role as a 'strategic partner' to becoming a rigid instrument of evaluation and classification, treating human beings as passive production inputs. Technological change further deepens the 'digital divide,' marginalizing less-educated groups and older workers from the modern production cycle.

Despite numerous attempts at technology transfer, success has eluded many countries — a reality that is particularly evident in the Algerian case. As a developing nation, Algeria sought to join the technological race, viewing technology simultaneously as both a means and an end in building a robust industrial base, following the example of industrially advanced nations at the time (the Soviet Union and the United States of America).

The Algerian state's strategic vision aimed at establishing a solid industrial base grounded in technological mastery and developed by national competencies. This orientation, which prevailed during the 1970s and 1980s, ultimately ended in failure despite considerable efforts — owing to numerous factors beyond the scope of this study. The world, however, waits for no one. The contemporary digital revolution has imposed unprecedented challenges on organizations; technological change is no longer merely an external variable, but a fundamental driver that is reshaping organizational structures and management strategies. Even technologically advanced industrial nations (Germany being a prime example) are struggling to keep pace with the speed of change, falling behind emerging powers such as China — which currently leads the world in technology and industry, not by chance, but as the result of years of deliberate planning. The Chinese did not merely import products and transfer technology; they understood it, assimilated it, and then built their own industry upon it.

It is worth noting that total reliance on Human Resource Information Systems (HRIS) and virtual reality in training may reduce costs, but it risks eliminating the direct human interaction essential for building organizational culture and fostering loyalty. The gap between 'machine efficiency' and 'human uniqueness and its needs' places HR professionals before the challenge of managing the paradox of 'efficiency and protection' — that is, machine efficiency on the one hand, and the protection of human resources and the preservation of their role in a digital world that recognizes only immediate results on the other. Technological change is therefore not a purely technical solution, but a fundamental reconceptualization of 'work' itself, requiring a careful balance between organizations' need for effective deployment and consideration for the human resource — both those already within the institution and those yet to be recruited.

Research Question: In light of organizations' adoption of technological change, how can human resource management fulfill its role as an 'agent of change' — one that seeks to maximize productive benefit while simultaneously protecting employees and avoiding increased pressure upon them, particularly within the Algerian context?

I. Conceptual Framework

1.1 Technological Change

The concept of technological change is among the most extensively studied contemporary topics, yet a stable and universally agreed-upon definition has remained elusive, with considerable ambiguity and varying interpretations persisting in the literature. The following review examines several definitions relevant to the aims of this study.

Prakash Shrestha, in his study titled 'Technology and Human Resource Management: Some Observations,' defines technological change as 'a process of converting inputs into outputs, consisting of knowledge, procedures, tools, and systems' (Shrestha, 2021, p. 52).

This conceptualization implies that any modifications introduced to workplace technology will exert a profound impact on how the entire work system is managed.

The study further clarifies that technology in the modern work environment is not merely a collection of physical tools, but an integrated system that brings together work activities, information, and people to ensure organizational performance. Technological change, as described in the study, encompasses developments in the areas of automation, computing, robotics, information technology, and artificial intelligence — all of which have fundamentally transformed organizations' internal processes. This rapid change is viewed as an enabler of long-term growth and efficiency for both organizations and their human resources.

Kim et al. offer a theoretically rich definition of technological change, describing it as 'a socially recognized package of material and cultural characteristics created to achieve practical goals' (Kim et al., 2021, p. 230).

This perspective underscores that technological change is not simply about hardware tools, but is rather a construct that interacts with culture and society in the pursuit of specific goals.

Within the contemporary organizational context, technological change is understood as 'not merely a technological upgrade, but a fundamental transformation in how organizational functions operate and how they align with organizational objectives.'

Rapid technological change is described as the force that has produced 'a new gap in automation, artificial intelligence, machine learning, and digitization', leading to radical transformations in how organizations operate and in the nature of available employment (Ruiyao, 2023, p. 17).

1.2 Human Resource Management

Human resource management (HRM) is the beating heart of an organization's activities and the governance of its available resources. The field of HRM has acquired significant importance owing to the vital role it performs. Arriving at a fixed or precise definition of HRM is admittedly difficult, given the continuous evolution this field undergoes.

The Institute of Personnel Management in the United Kingdom has defined HRM as 'that part of management concerned with people at work and their relationships within the organization' (Al-Qahtani, 2008).

HRM may also be defined as 'the totality of procedures and policies relating to the selection, appointment, motivation, and training of employees at all levels, along with the provision of conditions necessary to retain them, foster their loyalty, and lead the organization to the highest levels of productivity. It may equally be understood as the decisions and actions concerned with managing employees at all levels, including those decisions pertaining to the implementation of strategies designed to create and sustain competitive advantage' (Al-Ma'aytah, 2013).

1.3 Digital Transformation

Digital transformation transcends the mere adoption of new technologies; it is a comprehensive socio-technical process that fundamentally reconstitutes the organization and its relationship with the human element. The scholarly literature offers multiple relevant definitions.

One strand of research defines digital transformation as 'the state in which companies use digital technologies to innovate or modify existing business models and processes, and to support the transformation of organizational structures, resources, and relationships with internal and external stakeholders' (Plekhanov et al., 2023, p. 822).

This definition's focus on transforming 'organizational structures' and 'internal relationships' implies a redistribution of organizational authority and roles within the institution, as well as the emergence of cross-functional work teams. In essence, digital transformation constitutes a re-engineering of organizational relationships and structures.

Digital transformation has also been defined as 'a comprehensive effort to revisit the core processes and services of government beyond traditional digitization efforts, evolving from a mere transition from analogue to digital toward a complete review of current policies, processes, and user needs' (Mergel et al., 2019, p. 83).

This definition emphasizes that technology is not the only element subject to change; individuals, policies, and especially leadership must also undergo fundamental transformation for digital change to be achieved. It further requires shifts in bureaucratic and organizational culture, employee mindsets, and competencies.

1.4 Automation

The scholarly literature presents multiple definitions of automation, ranging from purely technical to socio-economic dimensions linked to human resources. Automation is generally viewed as a dynamic process aimed at enhancing human capabilities or substituting technical effort for routine manual and cognitive labor.

Lievano-Martínez defines automation as 'the simulation and subsequent replacement of human labor by software' — representing a category of software that mimics everyday human interactions with computers to perform rule-based activities (Lievano-Martínez et al., 2022, p. 137).

This definition assigns particular importance to the improvement of human work, especially in service and administrative domains, thereby enabling employees to focus on the development of their skills and creative capacities.

Within the context of industrial revolutions, automation is defined as 'the continuous technological development that gradually transforms manufacturing processes through the introduction of mechanization, electricity, and digitization' (Szeszák et al., 2025, p. 3).

II. The Acceleration of Technological Change and Its Impact on Human Resources in Business Organizations

It has become increasingly apparent that digital transformation has surpassed the phase of gradual adoption, reaching what may be described as a 'point of maximum acceleration' — compressing years of development into mere months, particularly in the aftermath of the COVID-19 pandemic.

The effects of this acceleration manifest in the following dimensions:

2.1 The Skills Gap and Labor Market Disruption

The World Economic Forum's Future of Jobs Report 2025 projects that technological advancement will generate 170 million new jobs by 2030, while displacing 92 million existing positions, placing organizations before the challenge of bridging widening skills gaps (Nastase et al., 2025, p. 3). The real challenge lies in the capacity of the economic and social system to manage this transition smoothly. Without a carefully conceived strategy to address these skills gaps, the historical opportunity represented by 170 million new employment prospects could be transformed into social upheaval driven by inequitable access to these positions.

2.2 Labor Market Polarization

Technology is producing a 'polarization' of employment: demand is rising for both high-skill, high-wage and low-skill jobs, while mid-skill occupations are contracting — threatening the employment stability of a substantial segment of the workforce (Ruiyao, 2023, p. 17). This dynamic stems from the fact that engagement with new technology demands advanced competencies commensurate with its complexity, thereby increasing demand for highly skilled

labor. Manual, non-routine tasks remain less susceptible to automation, whereas the middle-skilled workforce performing routine tasks in production and administrative processes becomes the primary casualty of technological change. To address these realities, labor market policies must be reconsidered through the reinforcement of lifelong learning pathways and the reskilling of mid-level workers.

2.3 The Transition Toward Industry 5.0

Technologies such as artificial intelligence (AI), automation, and digitization have catalyzed a shift from the exclusive focus on efficiency and automation characteristic of Industry 4.0, toward an emphasis on human-machine collaboration and human-centered innovation (Industry 5.0) (Nastase et al., 2025, p. 6). Industry 4.0's emphasis on comprehensive automation and technical efficiency largely neglected the human element; Industry 5.0 emerged to remedy this by integrating the human dimension as a fundamental component of the value chain. This transition is grounded in theories of synergistic complementarity between human intelligence and artificial intelligence — rather than a substitutive relationship — thereby redefining innovation as a participatory process that augments human capabilities.

2.4 The Dissolution of Physical Boundaries

Digital technology has contributed to the emergence of new work modalities — such as remote work and the 'gig economy' — dismantling the physical boundaries of organizations, while simultaneously raising concerns regarding the 'dark side' of this transformation, including the blurring of boundaries between personal life and work, and techno-stress (Adisa et al., 2024, p. 2). The COVID-19 pandemic constituted one of the pivotal junctures that illuminated this dissolution of organizational physical boundaries, demonstrating that remote work had become feasible — a defining feature of contemporary technological change in the domain of labor and employment.

III. The Significance of Human Resource Management in the Introduction of New Technologies

Human resource management (HRM) functions as the strategic 'bridge' between technological change and its practical implementation, serving as the primary determinant of the success or failure of digital transformation. Its significance is evidenced by the following:

3.1 Elevated Failure Rates

Studies indicate that 80% of digital transformation initiatives fail to deliver on their promises, and that 42% of organizations regard the implementation of digital HRM systems as either a failure or only a partial success (Lick, 2000). This may be attributed to the inability of HRM systems to adequately comprehend the scale of technological change and to manage the human element's response to — and engagement with — that change in an optimal manner.

3.2 Human-Related Causes of Failure

Digital transformation most commonly fails not because of the technology itself, but owing to an absence of strategic alignment, employee resistance to change — driven by fear of job loss — and insufficient support from senior leadership (Sanjeev & Natrajan, 2025). Employees feel threatened by the prospect of losing their positions to new technology, while organizational leadership frequently fails to accompany this change with adequate explanation, support, and communication to the workforce, or to highlight the importance of employees' roles in the transformation process.

3.3 Managing the Efficiency-Empathy Paradox

The strength of HRM lies in its capacity to manage the tension between the pressing need for digital efficiency (automation and data analytics) and the human desire for empathy, trust, and fairness — to ensure that the workplace is not 'dehumanized' (Chitrao, 2015). Organizational alienation in industrial settings is a longstanding issue whose effects persist to this day; with any technological change, early signs of employee discontent emerge, driven

by the perceived growing primacy of machines over human beings — a dynamic that often provokes resistance to change.

3.4 The Role of HRM as a Change Agent

HRM plays a vital role in reshaping and upgrading competencies to empower the workforce to operate within intelligent systems, thereby reducing the risks of digital exclusion (Ajay, 2023, p. 479). One of the most critical success factors in technological change is the active involvement of human resources in the process — achieved through training and capacity-building oriented toward the transformation being sought.

Ultimately, the organizations most likely to thrive are those that succeed in managing their human resources and crafting a synthesis between technological and digital efficiency on the one hand, and distinctive human capabilities — such as creativity, emotional intelligence, and technological accompaniment — on the other. This integration substantially increases the probability that organizations will achieve their strategic objectives.

IV. Behavioral and Socio-Organizational Dimensions of Technological Change and Automation

From the perspective of organizational sociology, the transition to high levels of automation poses significant challenges to human performance and its role within managerial and productive processes. These challenges may be outlined as follows:

4.1 Satisficing Behavior

Experts sometimes tend to accept the first 'good enough' solution offered by an automated system in order to reduce cognitive effort — a disposition that may yield unsatisfactory outcomes under challenging conditions. Machines exist, after all, to achieve the highest possible standard of solutions, not merely to deliver adequate outcomes (Kaber, 2018, p. 12).

4.2 Organizational Transformation

Contemporary automation demands intensive information management and the emergence of new levels of coordination between sovereign bodies and private actors to ensure compliance and accountability (Hofmann, 2025, p. 5).

The success of automation in modern organizations depends on a balance between 'machine efficiency' and 'human control,' to ensure that the human operator is not entirely excluded from the control loop.

Excessive delegation to machines must be avoided, as it leads to the erosion of the human operator's situational awareness. The balance between machine efficiency and human control is not merely a technical choice, but a sociological imperative for preserving human agency within the operational structure of the organization.

The necessity of change in modern organizations is an unavoidable reality — indeed, an existential imperative — as underscored by numerous scientific sources. A broad range of determinants and drivers compels organizations to adopt technological change.

4.3 Internal and External Drivers of Technological Change

These factors are aimed at improving the operational and financial structure of the organization:

The pursuit of enhanced operational efficiency constitutes the primary driver of transformation; technology aims to make processes faster and more precise. Advanced technologies are expected to substantially increase labor productivity through the automation of routine tasks that, under normal circumstances, consume incalculable quantities of time and effort.

Cost reduction also plays a central role. Technology — and automation and cloud-based systems in particular — rationalize costs and reduce administrative and operational

expenditures (Cabrera et al., 2008). Studies indicate that 'operational change' fundamentally drives cost reduction and accelerated data processing.

Quality improvement is another critical factor. Technological change contributes to raising the quality of products and services; the deployment of digital HRM systems, for instance, ensures high-quality outputs and consistent, transparent results (Shrestha, 2021, p. 52).

External factors are equally compelling. These concern environmental and technological pressures that oblige organizations to adapt to global and local developments — especially at a time of accelerating innovation. In the digital age, technology adoption has become a decisive factor for organizational survival (Al-Qassem et al., 2025, p. 1). Technological progress has intensified industrial competition, compelling companies to innovate continuously to maintain their market position in a world increasingly dense with competitors.

The development of information and communication technologies — particularly following the rapid emergence of artificial intelligence, machine learning, and the Internet of Things — constitutes a powerful technological driver that is reshaping and reorganizing organizational structures (Khatoon et al., 2025; Yusof et al., 2022). This continuous evolution renders legacy tools increasingly ineffective and imposes their permanent upgrading.

Regulatory requirements and associated risks also constitute significant external drivers, including the necessity of complying with evolving legislation (such as data protection and privacy laws) and the legal requirements imposed by regulatory bodies.

V. Models of Technological Change Management

The management of technological change is a complex socio-technical process that extends beyond the mere introduction of new tools to encompass the reconstitution of culture and human interactions within the organization. While classical models provide the theoretical background, contemporary research focuses on strategic frameworks appropriate to the digital age.

According to the scholarly literature, the contemporary models of technological change management and their associated human dimensions are as follows:

5.1 The Three-Stage Model of System Selection and Implementation

This model proposes that the successful integration of technologies — such as HRIS systems — proceeds through stages that are fundamentally centered on the human element (Manekar, 2024, p. 96):

Adoption Phase: This phase begins with a needs analysis to identify precisely what is required by the organization and its members.

Implementation Phase: This encompasses the formation of project teams, software testing, and the addressing of privacy and security concerns.

Institutionalization Phase: This constitutes the critical phase, in which the focus is placed on change management through the initiation of human resource training programs — to ensure the integration of technology into the organizational work culture.

5.2 The Participatory Approach and Sensemaking

Research emphasizes that technological change is not a mechanical act, but rather an organizational learning process that requires 'actors' (managers and employees) to engage with technology and shape it in accordance with their own needs and objectives (Adisa et al., 2024, p. 13). This model relies on the involvement of employees in the selection and implementation of tools, to minimize the gap between the technical system and practical organizational reality.

VI. Human Resource Recruitment in the Context of Technological Change

Technological change has transformed recruitment and selection practices, as organizations have shifted from traditional methods to data-driven digital strategies leveraging platforms to access talent.

6.1 The Emergence of New Digital and Technical Competency Requirements

The Fourth and Fifth Industrial Revolutions have necessitated a complete redefinition of the talents and competencies required, as traditional skills are no longer sufficient for success in complex environments:

Redefining Talent: Current developments demand greater emphasis on digital literacy, adaptability, and continuous learning as core competencies for navigating the challenges of the evolving industrial landscape (Khatoon et al., 2025, p. 2).

The Professional-Technical Blend: Employees are increasingly required to possess a unique combination of technical and professional skills, along with the ability to read, understand, and professionally engage with complex technical reports and software documentation (Shrestha, 2021, p. 53–54).

Digital-Age Skills: An urgent need has emerged for specialized competencies such as data analysis, programming, and AI ethics — requiring HR functions to recruit individuals possessing a 'digital mindset' (Khatoon et al., 2025, p. 15–16).

Technological Integration: Mastery of how to integrate and apply technologies in the workplace has become a fundamental requirement for attracting high-value human resources (Rodríguez-Sánchez et al., 2019, p. 13).

VII. The Sociology of Technological Change in the Algerian Context

Technological change in the Algerian environment constitutes an inevitable necessity imposed by global transformations and the shift toward a knowledge economy. However, this trajectory is characterized by specificities inherent to the Algerian context and the Algerian individual — who, since independence, has lived through numerous socio-professional upheavals that have shaped the experience of technology with a distinctive character, oscillating between acceptance and rejection. Government engagement has also been inconsistent, beginning with the importation of technology from its countries of origin without any corresponding cultural or social adjustment for the workers who would operate these machines. Following the ensuing failures, a succession of technological and industrial strategies emerged, culminating in digital transformation and digitization.

7.1 The Problem of 'Stage-Skipping'

Sociological analysis reveals that Algeria adopted a policy of importing 'turnkey factories' without adequate consideration of cultural specificity, resulting in a gap between the material technology and the requisite industrial spirit. This trajectory — described by sociologist Djamal Gharid as 'stage-skipping' — prioritized the building of the factory over the development of the human being (Naimi & Khreibesh, 2024, p. 160). It appears that the policymakers of that era did not consider that technology is a composite of culture, environment, and human interaction — and that what succeeds in one society may prove unsuitable in another. Japanese technology, for instance, is the product of the fusion of the Japanese mentality with the demands of its land and geography, yielding a technology attuned to the Japanese context rather than the Algerian one.

7.2 Digitization as a Governance Instrument

Algerian organizations — particularly in the higher education sector — are witnessing a strategic digital transformation through systems such as 'Progress,' which aims to modernize administration and enhance performance (Qaddash et al., 2021, p. 493), and to implement a paperless policy. This initiative is inscribed within a broader context of expenditure rationalization and the leveraging of technological change in governance and the improvement of public services for end users.

7.3 Implications of Technological Change for Human Resources

Technological change has brought about fundamental transformations in the functions of human resources within Algerian organizations of all types — whether service-oriented (such as Algérie Télécom), industrial (such as food processing enterprises), or public institutions (such as universities):

Job and Competency Restructuring: Digital advancement has broadened the scope of data processing and created a need for qualified human competencies aligned with the demands of the Fourth Industrial Revolution (Cherifi & Amer, 2022, p. 345). Technological change has also contributed to the restructuring of positions and the emergence of new tasks requiring a 'digital mindset' (Abd al-Mawla & Al-Ayeb, 2021, p. 639). Unlike previous eras in which recruitment was often based on social connections, digital transformation is impartial and demands human resources possessing genuine technological skills and knowledge of automation.

Continuous Training and Reskilling: Training has become the primary instrument for closing the gap between current performance and new technical requirements; field studies confirm that training in modern technology leads to increased worker effectiveness (Naimi & Khreibesh, 2024, p. 163). The success of digitization systems such as Progress has been directly linked to the training programs developed for administrative staff (Qaddash et al., 2021, p. 498). Training, beyond its operational necessity, provides professional support to workers and fosters their awareness of their own significance in accompanying and ensuring the success of technological change.

Performance Improvement and Competitiveness: Studies have demonstrated a statistically significant effect of technological change on competitive performance (in terms of quality, cost, and flexibility) within institutions such as Algérie Télécom, where trained competencies contribute to the delivery of innovative services (Saadaoui, 2025, p. 66–72).

7.4 Socio-Cultural Challenges and the Problem of Resistance to Technological Change

From a sociological perspective, human resources in Algeria face pressures arising from the collision between technological values and indigenous cultural identity. This may be illuminated through the following dimensions:

Values and Identity Conflict: The 'localization' of imported technology sometimes produces a cultural chasm; workers feel that technology threatens their acquired interests or professional identity, necessitating a process of 'negotiation' between local culture and incoming technical systems (Abd al-Mawla & Al-Ayeb, 2021, p. 625). This is of paramount importance, as it determines the success of the entire enterprise, and may constitute a principal reason for the failure of previous attempts. Sociological and anthropological researchers, as well as economists, may play a significant role in addressing this dimension.

Resistance to Change: Resistance among Algerian workers manifests in various forms — including outright rejection and procrastination — most commonly rooted in fear of the unknown or misperception of the objectives of change (Qaddash et al., 2021, p. 498). Although this is a universal phenomenon, it is more acute in environments that have not produced the technology in question, where the human resource invariably views it with suspicion and mistrust.

Functional and Material Obstacles: Technological transformation in Algeria faces challenges related to weak communications infrastructure and a shortage of specialized technical personnel capable of maintaining modern systems (Naimi & Khreibesh, 2024, p. 165). Despite Algeria's considerable efforts to develop technological systems and train and develop executive cadres, numerous difficulties continue to impede the modernization trajectory. Success ultimately depends on the human element's capacity to keep pace with, absorb, and then direct the massive and unrelenting digital momentum — steering it toward achieving

mastery and control over institutions and propelling them toward greater competitive strength and productive capacity.

CONCLUSION

On the basis of the foregoing, it may be concluded that technological change is no longer a strategic option that organizations elect to pursue; it has become an existential necessity mandated by the requirements of competitive sustainability in the modern economy. What the analytical study reveals, however, is that the success of this transformation cannot be measured by indicators of technical input alone, but by the organization's capacity to reconstitute the symbiotic relationship between machine capability and human value. Human resources — far from being a dependent variable in the equation of digital transformation — remain the foundational pillar upon which the continuity and cultural cohesion of the organization depend.

This article contributes to the elaboration of a theoretical framework for technological change by elucidating the socio-technical dimension that is often obscured in traditional literature — particularly within the Algerian context, which embodies specific challenges in the form of a localization gap between imported technology and local professional identity. The analysis has demonstrated that resistance to change is not a transient behavioral reaction, but a structural expression of value dissonance between technical and cultural logics — a reality that calls for the adoption of a complementarity-based methodology in place of ready-made, dependent approaches.

Based on the foregoing, the following recommendations may be advanced:

Adoption of a cultural adaptation model in technology transfer, seeking to integrate the human resource as an active partner in generating solutions rather than a passive recipient.

Participatory governance and the construction of effective participation mechanisms that reinforce the role of workers within automated work environments.

Investment in human capital and the transformation of training from a technical response into a predictive strategy that anticipates future skill requirements.

This study opens promising research avenues, most notably: examining the impact of generative artificial intelligence on the dynamics of organizational relations within the Algerian environment, and developing measurement indicators for 'human digital maturity' that go beyond purely technical indices.

The success of technological change in Algeria is contingent upon the 'humanization of the technical process' — that is, the integration of technology within a cultural context that respects the cultural identity and human needs of employees, ensures their effective participation, and refrains from treating technology as externally imposed tools that have come to compete with workers in their professional roles.

LIMITATIONS OF THE STUDY

This study presents several limitations that should be acknowledged. First, the analysis focused primarily on the Algerian context, which may limit the generalizability of the findings to other socio-economic and institutional environments. Second, the study relied predominantly on a qualitative and analytical approach, without extensive quantitative validation, which may restrict the empirical measurement of the observed relationships. Third, the complexity of technological change and its socio-cultural implications may not be fully captured through the selected theoretical frameworks. Despite these limitations, the study provides relevant insights into the interaction between technological change and human resource management.

FUTURE STUDIES

Future research should incorporate quantitative methodologies to empirically test the relationships between technological change, human resource management, and organizational performance. Comparative studies across different countries and regions are also recommended to identify contextual differences and similarities. Additionally, further research may explore emerging technologies such as artificial intelligence, machine learning, and generative AI, particularly their impact on workforce transformation, organizational culture, and human-centered management models in developing economies.

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AUTHOR CONTRIBUTIONS

Youssouf Khellaf: Conceptualization, theoretical framework development, manuscript drafting, and final revision.

Achouri Djamal-Eddine: Methodological supervision, validation of arguments, and critical review of the manuscript.

Attia Walid: Literature review, data analysis, and drafting of analytical sections.

Zitouni Aiboud: Editing, formatting, reference management, and proofreading.

CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest related to this study. The research was conducted independently and without any financial or commercial influence that could affect its objectivity.

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