

Artificial intelligence in Romania's labor market: structural challenges and strategic perspectives in the digital transition

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Abstract: Artificial intelligence (AI) is driving profound transformations in the global labor market and organizational environments, accelerating automation and digitalization. While the overall impact is largely positive—through increased efficiency and the reduction of repetitive tasks—the digital transition in Romania faces significant challenges. This paper, based on a qualitative thematic analysis of academic literature, theoretical works, and recent statistical and industry reports, identifies four major obstacles: low levels of digitalization and below-average digital skills compared to the EU, a shortage of IT specialists, the absence of coherent public policies, and a potential gap between the business community's stated interest in digital transformation and current practices. Furthermore, the current organizational culture, characterized by limited openness to innovation and opaque decision-making, slows AI adoption. Drawing on the reviewed studies, the paper proposes strategic directions to accelerate digital transformation: promoting the importance of measures for effective adaptation, investing in education and continuous training, developing soft skills, and fostering collaboration between the public and private sectors. The findings highlight the need for an integrated approach in which education, public policy, and organizational culture are aligned to fully harness AI's potential and close the gap with other European countries. Given the current limited state of research in the field and the limited number of available sources, the study results should be treated with caution and should be supported by further empirical studies that provide greater clarity on how artificial intelligence is implemented and managed in Romanian organizations.

Keywords: Artificial intelligence (AI), Digital Transition, Digital Skills, Public Policy, Organizational Culture.

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Introduction

Some of the most significant factors influencing the global labor market are digital transformation and the integration of artificial intelligence (AI) [1]. While AI is often linked to benefits such as increased efficiency, automation of repetitive tasks, and enhanced support for strategic decision-making, its implementation also raises important structural concerns and challenges. These include shifts in the required skill sets, the adaptation and evolution of the workforce, and changes to organizational structures and models [2].

In Romania, there is a limited understanding of how AI adoption affects the labor market and the organizational environment. However, companies in the IT and tech sectors have begun to integrate digital solutions and utilize AI tools in areas such as recruitment, training, and performance management [3,4].

This article aims to provide a thorough examination of the impact of artificial intelligence on the Romanian labor market, while also addressing gaps in current research. The primary research question addressed is: *What challenges and strategic perspectives emerge from the integration of AI into the organizational environment in Romania?*

Literature review

Conceptual framework

The beginning of the 21st century is characterized by changes in all social structures, the size and impact of which exceed previous developments. This period of unprecedented metamorphosis is defined in the specialized literature as the “fourth industrial revolution” [5]. This revolution “is characterized by the proliferation of increasingly complex technologies that bring together the physical, digital, and biological worlds (e.g. 3D printing, robotics and the Internet of Things)” [5].

In this context, digital transformation, which refers to metamorphoses regarding the form, functions, and mode of operation of an organization through the adoption of digital technologies [6], has become an imperative for the proper functioning and success of organizations.

Artificial intelligence is one of the most important technological branches under discussion due to the consequences, both positive and negative, that it generates in contemporary society, but also the changes that it is expected to produce in the not too distant future. It refers to the ability of digital computers or robots to perform tasks that were previously performed by humans [7].

Digital transformation is significantly driven by the widespread adoption of artificial intelligence across various sectors of life. This transformation is playing a crucial role in the unprecedented changes we are observing in the labor market, challenging the established norms and structures we once relied upon. The considerations outlined pertain to enhancing operational efficiency and the automation of repetitive tasks. Furthermore, the changing or the emergence of new job roles necessitates a reevaluation of the skills required, along with addressing the need for workforce reskilling [8].

In light of the significant transformations occurring, it is essential to provide a conceptual overview of the labor market, as it plays a pivotal role in these developments. The labor market is defined as "one of the main components of the market economy, along with the goods market and the capital market, relating - in particular - to the labor force" [9]. The labor force constitutes the total working population and is best understood through two perspectives: demand and supply [10]. In the context presented above, in Romanian labor market is expected a labor shortage due to a potential imbalance between market needs (demand) and the skills and knowledge of the workforce (supply) [11].

Review of global and local studies

Process automation and efficiency in contemporary organizations

Global literature indicates that AI use enhances organizational performance and process efficiency by automating routine, repetitive tasks once performed by humans and can free employees to focus on higher-value strategic activities [12]. In Romania, artificial intelligence is predominantly employed for the enhancement of administrative automation, streamlining human resource processes (onboarding, training), and optimizing performance management [3,4, 13]. Moreover, a study conducted on 253 Romanian employees concluded that only 10% of them use intelligence-based tools at work [14].

Although these initiatives contribute to increased operational efficiency, AI is not yet leveraged to its full potential [13]. According to [13], it is predominantly employed for repetitive tasks within certain processes and less for creative solutions and experimentation, compared to other EU countries. Moreover, in terms of AI implementation and usage, Romania is primarily a consumer of technology rather than a creator of solutions and new methods. This approach highlights a notable gap when compared to the practices of global leaders in the field, indicating significant potential to expand the utilization of artificial intelligence.

Impact of AI on workforce skills and reskilling

Considering the demand for various skills and competencies in the workforce, recent international studies have revealed that the rise of artificial intelligence is significantly altering these indicators. Reskilling and upskilling are considered important for adapting to the current organizational environment, with an emphasis on both technical and analytical skills [7], as well as human-centric skills, necessary in the context of automating repetitive tasks [15].

In Romania, initial evidence shows the same trends. Companies with a presence in Romania such as UiPath and Endava have implemented AI training programs to maximize digital skills and the use of AI tools among their employees [3, 4]. Moreover, a recent study conducted with 253 employees in Romania revealed that 75% of respondents believe organizations have acknowledged the significance of skills in this area and are willing to invest in employee training initiatives. A similar proportion of employees also recognize the necessity of such training for their own professional development [14]. In contrast, in another study on young people's perception of artificial intelligence, over 50% of them stated that they have limited knowledge related to artificial intelligence, which does not come from the education system or the workplace, but from the online environment (Facebook, YouTube, sources of questionable relevance) [16]. Moreover, a recent Eurostat survey [17] indicated that Romania ranks lowest among EU member states in terms of basic digital skills among the population aged 16 to 74. Furthermore, the country also has the lowest percentage of companies providing training to enhance digital and AI skills.

Structural challenges and workforce polarization

The implementation of artificial intelligence at the organizational level has potential implications, including the possibility of layoffs. This is particularly relevant for low-skill positions, which may be eliminated as a result of automation processes, especially in industry, manufacturing and services [12, 15]. Additionally, digital transformation may lead to the creation of new jobs that require specific skills, for which, unfortunately, the education system is not adequately prepared to develop [5]. These issues create challenges for labor market planning and public policies, highlighting the need for effective measures to reskill and retain the workforce.

The conclusions of studies in Romania have highlighted the same concerns. According to a PwC study, forecasts show that annually between 5 and 10% of low-skilled jobs will be affected by the changes brought about by the development of artificial intelligence [18]. Also, in another study [14], 25% of the employees participating stated that there will be changes in the landscape of jobs, by eliminating automated ones, and another 55% that new jobs will appear. Another study [16] explored Romanian students' perspectives, as the future workforce, on the implications of adopting artificial intelligence, reporting similar conclusions. Asked to decide whether AI would lead to the disappearance of jobs or whether it would create new ones, 67% of them stated that the first scenario was more likely.

This scenario of the disappearance of jobs, especially low-skilled ones, is further intensified by various structural challenges within the Romanian labor market [13]. These challenges heighten the concerns of key stakeholders, including job seekers, employees, employers, and public institutions involved in this field.

In terms of the level of digitalization, Romania is among the last places in Europe, both in terms of the business environment (few organizations have developed digital technology, and generally those are large, in the IT/technical field, and with a global reach), and in terms of public services. At the same time, Romania also registers a level below the European average in terms of infrastructure capacity for the efficient application of artificial intelligence: storage capacity and computing and analysis power of systems and ranks last in terms of information technology specialists [13].

Regarding the Romanian education system, a study concluded that it is not adapted to the current and future needs of the labor market [18]. Also, 30% of employees participating in the study stated that there is no correspondence between their formal training and the activities they carry out at work. Also, the majority of respondents, especially the low-skilled ones, are unsure about the skills they will need in five years to perform their tasks at work. Moreover, the organizational culture currently reflects a lack of support for this transition, as it does not emphasize the promotion of innovation and collaboration. Participants also suggest a lack of communication and decision-making transparency, which can accentuate already existing inequalities [18].

Although the Romanian Government approved the National Strategy for Artificial Intelligence (SN-IA) in 2024, which aims to effectively implement AI in public institutions, the business environment, and education [19], projects are still ongoing, and there is no concrete evidence of its effectiveness. In this context, the ability of organizations in Romania to effectively adapt to digital transformation and reduce possible unwanted consequences, especially in relation to employees, seems to be put to the test.

Strategic perspectives and best practices

International literature suggests that an efficient adaptation requires a holistic approach to integrating AI. In this context, a virtual system called Industry 4.0 has been proposed [15]. As Li explains, "I4.0 is a virtual reality fusion system based on traditional manufacturing and transformed with cyber-physical systems, the Internet, the Internet of Things (IoT), and Industrial Internet of Things (IIoT), artificial intelligence, machine learning, hyper-converged infrastructure, deep learning, virtualization, and more to create an intelligent production system." [15]. This paradigm integrates traditional technological methods with innovations driven by digitalization and AI, complemented by an education system based on lifelong learning, in which the development of both hard and soft skills is equally important for creating an efficient production ecosystem and preparing a workforce capable of performing in the new digital reality. According to this vision, if the principles are applied effectively, technological progress will not lead to high unemployment rates, although many jobs are destined to disappear; instead, it will generate new forms of employment and opportunities for workforce requalification.

Organizations in Romania have already started implementing some practices in this direction. For example, UiPath has established centers of excellence in automation to enhance employee capabilities [3], while Endava has integrated AI-based tools and applications across its entire organizational structure [4]. They have also adopted a series of policies on artificial intelligence -ethical adoption and use of AI, elimination of risks associated with AI, transparency in the use of AI, and informing employees [3, 4]. However, these policies remain largely declarative, reflecting a gap between the stated organizational commitments and their actual implementation in daily practices.

Simultaneously, studies involving key stakeholders in Romania (employees and employers) suggested various solutions and best practices for effectively adapting to the changes brought about by artificial intelligence [13, 18]. Managers should build an organizational culture that promotes initiative, innovation, and transparent decision-making. Employees also need to understand and prioritize knowledge and skill development so that they are prepared to perform roles that no longer resemble today's. At the same time, managers need to focus on developing soft skills, which robots do not have, especially for unskilled employees, for whom the risk is greatest [13]. A change in the vision of the ideal candidate is also recommended, with a greater emphasis on their talent, to maximize the correspondence between the skills necessary to perform a job and those possessed by the employee, ensuring effective adaptation [18]. Therefore, there seems to be a growing awareness of the

need to reconsider change management strategies and measures, even though there is not much evidence of their implementation.

Methodology

This study employs a qualitative thematic analysis to synthesize current research on artificial intelligence (AI) adoption and organizational change, with a particular focus on Romania. The analysis first identified key concepts and recurring themes in international studies and theoretical literature, and then descriptively compared these themes with findings from local studies, official statistics, and reports to highlight similarities, differences, and contextual implications. The decision to also provide a brief overview of global studies stems from two main considerations. First, there is a notable lack of research in this area in Romania. Second, it is important to recognize that global trends have significant implications at the local level.

The study draws on a total of 19 sources, including peer-reviewed empirical studies, theoretical articles and books used to define key concepts, as well as official reports from international organizations (e.g., OECD, Eurostat) and industry publications from companies such as PwC and UiPath. Only sources relevant to AI adoption, digital transformation, or organizational change, published between 2019 and 2025 and available in English or Romanian, were included. Blogs, non-academic articles, and studies unrelated to organizational contexts were excluded. Approximately half of the sources are international and half are local.

The literature search combined academic databases, such as Mendeley and Google Scholar, with targeted searches of institutional and industry websites, using keywords including artificial intelligence, digital transformation, workforce, labor force, AI adoption, and Romania. Titles and abstracts were screened for relevance, and the full texts were examined to extract key themes and concepts, ensuring a comprehensive and balanced overview of both global and local perspectives.

This study relies exclusively on secondary sources, which may limit generalizability. Findings should be interpreted as a synthesis of existing literature, theoretical insights, and official data rather than original empirical research. Future empirical studies are recommended to validate these conclusions and explore local nuances in AI adoption and organizational change.

To mitigate potential biases arising from reliance on secondary sources, the study included a diverse set of materials: peer-reviewed empirical studies, theoretical works, official statistics, and industry reports. Inclusion and exclusion criteria were clearly defined, and both international and local sources were considered to provide a balanced and comprehensive perspective.

The findings have been integrated to provide a comprehensive analysis of Romania's labor market and its unique circumstances, offering valuable insights for stakeholders and decision-makers.

Results and further discussions

The analysis of the literature regarding AI adoption and implementation in Romanian organizations highlighted several aspects of interest, contributing to a better understanding of the current organizational landscape.

Regarding the degree of AI implementation, compared to global trends, the Romanian organizational environment seems to be only a technology consumer, not a developer. AI is implemented mainly for repetitive, administrative tasks, without a major impact at the organizational level [13]. This approach may be based on the awareness of the importance of a responsible use of AI. On the other hand, in the context of a workforce with low digital skills [16, 17], the low number of IT specialists, as well as some structural challenges - poorly digitized infrastructure [13], outdated education system, rigid organizational culture, with a low level of decision-making transparency and collaboration [18] - the approach may be motivated by the recognition of the risks of extensive use in the context of the absence of the means and resources necessary for optimal adaptation. Therefore, this study contributes to the understanding of the Romanian organizational environment's positioning in terms of AI adoption and implementation.

Following the analysis of AI implementation levels, the next findings focus on the way Romanian organizations address the need to develop AI-related skills among employees. In line with international trends [7, 15], there is a general awareness among both employees and employers in Romania of the need to reconfigure roles and provide retraining in the context of the digital transition. While a study indicates that employers express willingness to adapt their workforce [14], in practice, only some companies—for example, those in the IT and tech sectors—have implemented AI training programs [3, 4]. According to statistics [13, 17], Romania is well below the European average in relation to both the level of digital skills among the active population as well as the percentage of companies that have implemented training to develop these skills among employees. Overall, however, the information remains fragmented and sometimes contradictory.

Therefore, we can suggest that the position of the Romanian organizational environment in relation to the need to train employees in the current context generated by technological progress is marginal and neutral, based, rather, on declarative and less actionable policies. However, we must also take into account sectoral and

organizational differences, given that the analysis showed practical measures taken by companies in the IT/tech field. It is possible that, given their field of activity and a higher degree of use of AI, these companies have both the information and the means to understand the need and apply effective measures. Thus, future studies should target the differences between companies in relation to their size and spread, as well as the field of activity, to better understand how companies position themselves in relation to the need to adapt the workforce to the context generated by artificial intelligence.

Concerning the impact on jobs, the perspective of Romanian organizations is consistent with the international one [12, 15], according to which the automation of repetitive tasks would mainly affect jobs with routine tasks and a low level of specialization [18, 16]. The situation seems to be all the more worrying in Romania as the aforementioned structural challenges may represent obstacles to optimal adaptation and the avoidance or reduction of possible negative effects. Therefore, in an overall assessment, the organizational environment in Romania seems to lack the necessary means to manage the changes brought about by the automation of repetitive tasks.

In relation to the management of these changes and metamorphoses, Industry 4.0 [15] is promoted internationally and promises a combination of traditional methods and technological progress, with an emphasis on an optimal and responsible adaptation to the risks associated with the workforce. In Romanian organizations, although there are implementations of these policies and measures [3, 4], these seem to be isolated examples. The analysis highlighted a consciousness and recognition of the importance of the values and measures promoted by this vision among Romanian organizations [14, 19], but which are, rather, at the level of recommendations, not necessarily in the form of current practices. Taken together, these findings suggest that the Romanian organizational environment is still in an early stage of aligning with the Industry 4.0 paradigm, where awareness exists but practical integration remains limited. This gap between understanding and implementation suggests structural and cultural barriers that prevent the full adoption of AI-driven transformation. Strengthening collaboration between public institutions and the private sector could accelerate the diffusion of good practices and support a smoother adaptation process for the workforce.

Conclusion

This paper analyzed the current state of artificial intelligence implementation in Romanian organizations, as well as the structural challenges and strategic perspectives for optimal adaptation. Although generally in line with international trends, the organizational environment in Romania seems to be a passive actor, focused on the controlled, limited consumption of technology, not an active one, involved in its extensive development and implementation. This positioning may be determined, on the one hand, by the structural challenges mentioned in this analysis, such as the low degree of digitalization and digital skills, and the lack of collaboration with public institutions. On the other hand, given that the solutions and measures presented are more often found in the form of recommendations and examples of good practice and less as current practices at the organizational level, we can speak of an insufficient awareness of the importance of managing changes and challenges generated by artificial intelligence.

By identifying the positioning of Romanian organizations in relation to global trends and the potential discrepancy between declarative intentions and effective measures, this study contributes to understanding the main transformations and challenges associated with the adoption of artificial intelligence. From a practical standpoint, the findings emphasize the need for coordinated action among policymakers, businesses, and educational institutions. Policymakers should promote coherent public strategies that encourage collaboration between the private and public sectors—for instance, by expanding initiatives such as the National AI Strategy [19] to include targeted reskilling schemes and innovation vouchers for small and medium-sized enterprises (SMEs) implementing AI solutions. Organizations should prioritize the development of internal training programs and partnerships with universities or professional associations (e.g., AI competence centers, digital innovation hubs) to ensure continuous employee upskilling. Furthermore, the education system should align curricula with labor market needs by introducing interdisciplinary modules in data literacy, AI ethics, and digital transformation management, thus preparing students for emerging roles in the AI-driven economy.

While this study offers practical implications for policymakers, organizations, and education, it is important to acknowledge its limitations. The document analysis may not fully capture organizational realities due to the relatively low volume of current research on the topic and the reliance on secondary quantitative studies. Incorporating empirical research conducted by the author could have provided a deeper understanding of the phenomenon. More research is needed in this direction to better understand the positioning of Romanian organizations in relation to managing these challenges. Future studies should be based on empirical research that sheds light on the relationship between policies promoted in the public space (statements) and practices implemented at the organizational level (reflecting current measures), in relation to the type of organization and the field of activity.

References

- [1] OECD. (2023). *OECD Employment Outlook 2023: Artificial intelligence and the labour market*. OECD Publishing. <https://doi.org/10.1787/08785bba-en>
- [2] Smith, N. (2025). *AI and jobs, again*. Noahpinion. Available from: <https://www.noahpinion.blog/p/ai-and-jobs-again>
- [3] Irimia, F. (2023). *How UiPath robots save 7,400 hours per week for our employees*. UiPath. Available from: <https://www.uipath.com/blog/automation/uipath-automation-coe-q2-fy24>
- [4] Endava. (2024). *Endava We Care Sustainability Report 2024*. Available from: <https://www.endava.com/hubfs/Endava%202024/Who%20We%20Are/sustainability/Endava%20We%20Care%20Sustainability%20Report%202024.pdf>
- [5] Rotatori, D. et al. (2020). The evolution of the workforce during the fourth industrial revolution. *Human Resource Development International*, 24(1), 92–103. <https://doi.org/10.1080/13678868.2020.1767453>
- [6] Gong, C. (2021). Developing a unified definition of digital transformation. *Technological Forecasting and Social Change*, 166, 120649. <https://doi.org/10.1016/j.technovation.2020.102217>
- [7] Chen, H. et al. (2021). Explore success factors that impact artificial intelligence adoption on telecom industry in China. *Journal of Management Analytics*, 8(1), 36–68. <https://doi.org/10.1080/23270012.2020.1852895>
- [8] International Economic Development Council. (2025). *Artificial intelligence impact on labor markets*. Available from: https://www.iedconline.org/clientuploads/EDRP%20Logos/AI_Impact_on_Labor_Markets.pdf
- [9] Vlăsceanu, L., & Zamfir, C. (1998). *Dicționar de sociologie* (p. 424). Available from: <https://vignette4.wikia.nocookie.net/nccmn/images/1/1c/Dictionar-de-Sociologie-Catalin-Zamfir-Lazar-Vlasceanu.pdf/revision/latest?cb=20150813042511&path-prefix=ro>
- [10] Strack, R. et al. (2014). *The global workforce crisis* (1(1), 1–8). The Boston Consulting Group. Available from: <https://www.bcg.com/publications/2014/people-organization-human-resources-global-workforce-crisis>
- [11] Chivu, L. et al. (2020). *Piața muncii din România sub presiune: Repere privind deficitul de forță de muncă* (March 2020, No. 1) [PDF]. Romanian Academy, National Institute for Economic Research. Available from: https://www.researchgate.net/publication/341642006_Piata_muncii_din_Romania_sub_presiune_Repere_privind_deficitul_de_fora_de_munca
- [12] Pereira, V. et al. (2021). A systematic literature review on the impact of artificial intelligence on workplace outcomes: A multi-process perspective. *Human Resource Management Review*, 31(4), 100857. <https://doi.org/10.1016/j.hrmr.2021.100857>
- [13] Iuga, M. (2021). *Towards a Romanian AI strategy: Understanding the status quo*. Cluj IT Cluster. Available from: <https://www.clujit.ro/wp-content/uploads/2021/12/Towards-a-Romanian-AI-Strategy.pdf?x83040>
- [14] Ciocodeică, D. et al. (2024). The Impact of Artificial Intelligence on the Labor Market in Romania. *Proceedings of the International Conference on Business Excellence*, 18(1), 198-208. <https://doi.org/10.2478/picbe-2024-0017>
- [15] Li, L. (2022). Reskilling and Upskilling the Future-ready Workforce for Industry 4.0 and Beyond. *Information Systems Frontiers* 26, 1697–1712 <https://doi.org/10.1007/s10796-022-10308-y>
- [16] Fotea, S. et al. (2019). Artificial intelligence in education – Romanian students’ attitudes toward artificial intelligence and its impact on their career development. In *Proceedings of the 12th International Conference of Education, Research and Innovation (ICERI 2019)* (pp. 9330–9338). IATED. <https://doi.org/10.21125/iceri.2019.2259>
- [17] Eurostat. (2023). *Digitalisation in Europe – 2023 edition* [Interactive publication]. Publications Office of the European Union. Available from: <https://ec.europa.eu/eurostat/web/interactive-publications/digitalisation-2023>
- [18] PwC. (2023). *PwC’s workforce: Hope and fears. Romania survey 2023*. PwC Romania. Available from: <https://www.pwc.ro/en/publications/Raport-Hopes-FearsRomania.pdf>
- [19] Romanian Government. (2024). *Strategia națională în domeniul inteligenței artificiale 2024–2027* [National Strategy on Artificial Intelligence 2024–2027; Decision No. 832/2024]. Official Gazette No. 730, July 25, 2024. Available from: <https://www.adr.gov.ro/wp-content/uploads/2024/03/Strategie-Inteligenta-Artificiala-22012024-1.pdf>