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HELPING ORGANIZATIONS PREPARE EMPLOYEES FOR AI

STUDY REGARDING THE AI IMPACT ON ENERGY AND TRADE SECTORS IN ROMANIA

June 2025

Project: Helping organizations prepare employees for AI in Romania and Hungary **(Hope 4 IA)**

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EXECUTIVE SUMMARY

Artificial Intelligence (AI/IA) represents a spectrum of technologies that exhibit intelligent behaviour by analysing context and making decisions — with some level of autonomy — to achieve specific goals (EUR-Lex, 2024). They are constantly evolving and will have a significant socio-economic impact by optimising operations, allocating resources, and personalising digital solutions available to individuals and organisations. At the same time, depending on the specific circumstances of the implementation, use and level of technological development, AI can generate risks and potentially harm public interests and fundamental rights.

The AI impact on labour force is crucial, with the potential to transform not only working patterns but also the structure of the labour market (OCDE, 2023). On the one hand, AI automates repetitive tasks, which will lead to the replacement of traditional jobs, particularly in manufacturing industries and areas such as professional services. On the other hand, it can increase productivity with a positive impact on income and create new job opportunities in emerging fields such as AI system development and management, data analysis, cybersecurity, or clean technology specialisations. Furthermore, integrating AI into work processes can support employees in focusing their efforts on creative and strategic tasks that require critical thinking and adaptability.

Thus, the labour force must adapt by acquiring new skills/abilities, and retraining and upskilling programmes become essential to cope with technological changes..

AI is not evenly distributed across the sectors of an economy, and as a general-purpose technology its potential has not yet been fully realised (OCDE, 2024). The use of AI is prevalent in the IT&C and professional services sectors, with adoption rates in the IT&C sector exceeding 20% in many OECD countries and even exceeding 40% in some, such as Denmark.

Artificial Intelligence is seen as a catalyst for adapting companies' business models, as 58% of them say it has contributed to increasing employee work efficiency over the past year. In addition, 43% of them predict that Generative Artificial Intelligence (GenAI) will lead to increased profitability in the next 12 months, according to PwC Global CEO Survey 2025.

The Romanian context reflects the challenges and opportunities of digital transformation at European level. Romania ranks last in Europe in terms of AI adoption in companies, with only 3.1% of Romanian companies using AI in 2024, well below the EU average of 13.5%. (Eurostat, 2025). Energy[1] and retail are among the sectors most exposed to rapid technological changes, from the transition to renewable sources and smart grids to the personalisation of customer experiences and automated supply chain management. These

[1] In this report, the energy sector refers to the distribution and supply of electricity and natural gas.

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fields provide an ideal framework for analysing how technology and AI are reshaping work, skills and processes, in a context where the labour force must adapt by acquiring new skills and retraining programmes are becoming essential to cope with technological changes.

The research methodology of this report was designed to provide a comprehensive overview of the impact of AI on the labour market in the sectors analysed. The research design integrated multiple stakeholder perspectives by developing tailored research tools: questionnaires for companies (identifying the current stage of AI adoption and mapping challenges) and for employees (perceptions of digital transformation). Data collection took place between April and May 2025, recording 725 respondents from the energy sector and 571 from retail. The research included 4 companies in the energy sector (approx. 12,000 employees) and 3 companies in the retail sector (approx. 30,000 employees), supplemented by 18 structured meetings with representatives of companies, public institutions and trade unions to validate the results and develop recommendations.

The main conclusions of the report highlight significant potential for transformation in both sectors. In the energy sector, the average degree of automation of business processes is estimated at over 60% as against 30% in the retail sector, while companies keep investing in Machine Learning, IoT, GenAI, AR&VR, RPA and Smart Grids. Both sectors are seeing concrete implementations of AI: from demand forecasting systems and self-service cashiers to predictive equipment maintenance, grid balancing and automation of operational decisions. Most jobs with a high risk of automation will benefit from complementing their existing role through partial retraining, with companies in the retail sector estimating that a maximum of 20% of employees will require complete retraining.

The economic impact of AI implementation is substantial for the Romanian economy. **Projections indicate that the implementation of technology in the energy sector will generate an 18% increase in wages and contribute RON 734 million to the state budget by 2030, while the trade sector will see a 12% increase in wages and contribute RON 4.8 billion to the state budget.** The optimistic scenario estimates annual wage increases in both sectors, based on improved skills through the adoption of AI and increased productivity. These benefits are evident at both the microeconomic level (increased employee income and company competitiveness) and the macroeconomic level (strengthening of the tax base and stimulation of domestic consumption), demonstrating that investment in AI generates a virtuous cycle of sustainable economic growth.

The report's recommendations aim to maximise the benefits of digital transformation through integrated measures. Priorities include implementing the national digital skills framework for employee reskilling, aligning national strategic documents (AI Strategy 2024-2027 and Digital Decade Plan) with labour market realities, and facilitating access to financing for digitization projects. It is essential to strengthen data infrastructure and interoperability, to adapt the regulatory framework to the digital age and to create public-private partnerships for innovation. The implementation of a system for continuous monitoring and evaluation of the effects of AI on the labour force, productivity and budget revenues will enable public policies to be adjusted in line with observed developments, ensuring that Romania can catch up with the European average and fully exploit the potential of digital transformation.

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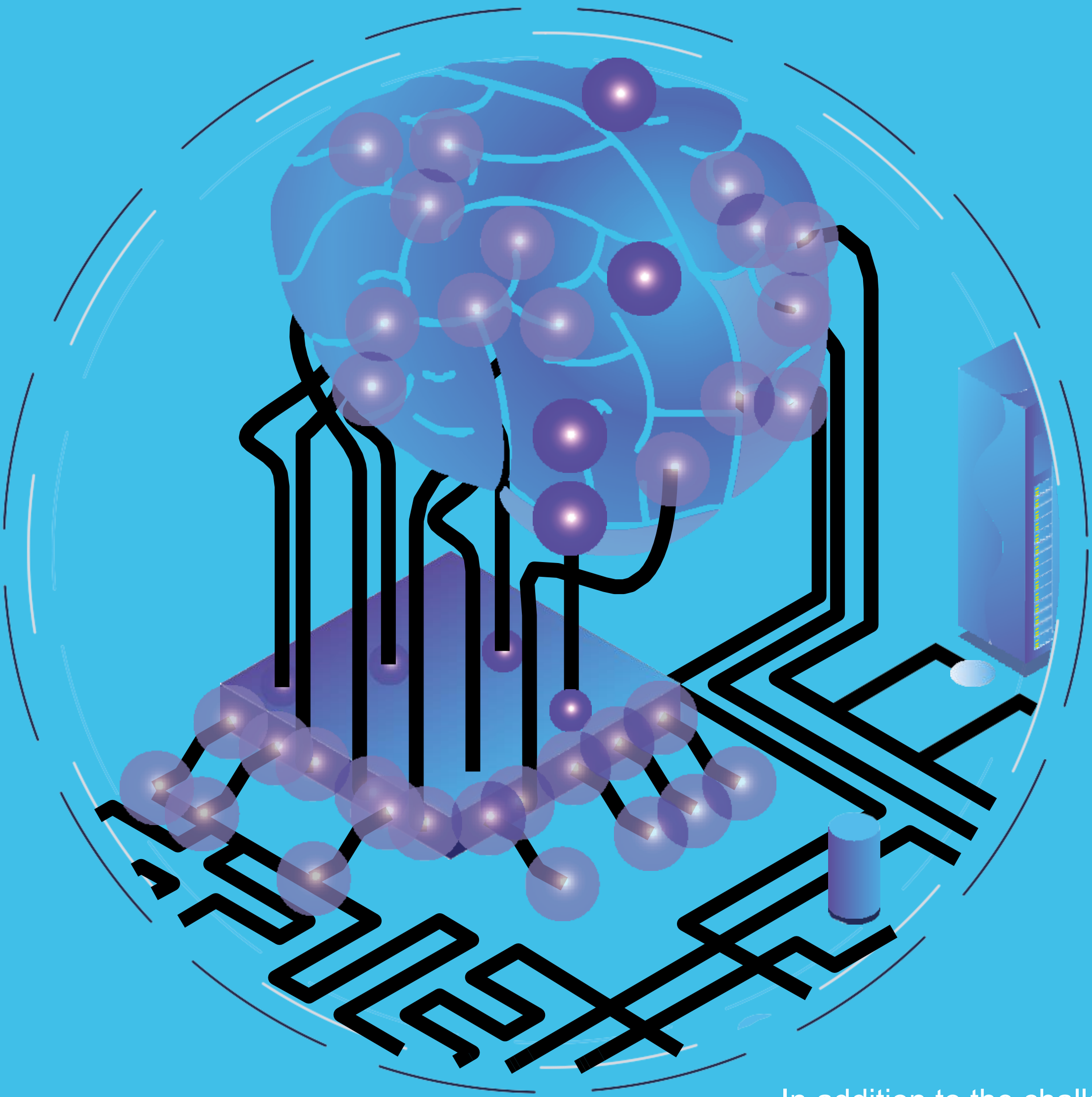
CONTEXT

AI will transform the global economy due to its impact on **40%** of the employed labour force according to IMF

EU AI Act: first European legislation dedicated to artificial intelligence. In 2024 Romania adopted its National Artificial Intelligence Strategy for 2024-2027.



In EU **13.5%** of companies were using AI technology in 2024. Denmark led the ranking (28%), while **Romania (3%) was in last place.** Romania shows mixed performance in European digital indicators.

In addition to the challenges posed by the new wave of technology and the highly competitive global and European context in this regard, Romania is facing a structural labour shortage, both in terms of quantity and quality.

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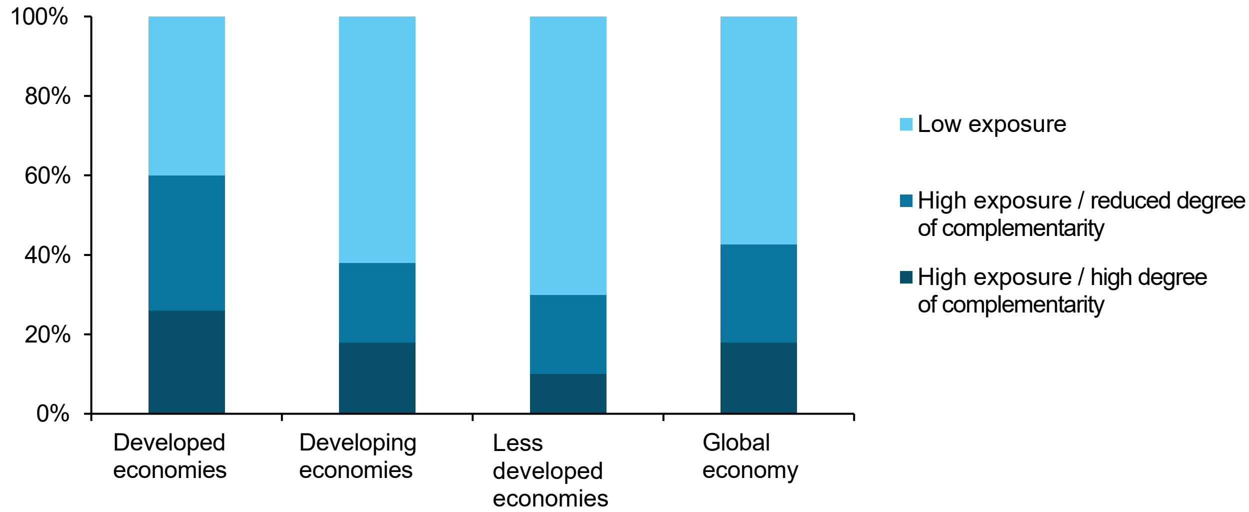
AI GLOBALLY

AI will transform the global economy by impacting 40% of the labour force, and it is perceived as a new industrial revolution (FMI, 2024)**.** Developed economies face a higher exposure rate of approximately 60% of the impact of AI on the labour force, given the high share of activities involving cognitive tasks. However, only half of these jobs may be negatively affected by AI, while the other half could benefit from increased productivity and a high degree of complementarity with AI. Developing economies have an overall exposure of 40%, while less developed countries face an exposure of 26%. (Figure 1). It should be noted that the lower impact of AI in developing and less developed countries stems from the fact that they are less prepared to capitalise on AI, which has an impact on accelerating the digitalization gap with developed countries.

Figure 1. The impact of AI on employment according to the development degree of economies



Source: processed based on the IMF Report, 2024 (FMI, 2024)

The impact of AI on productivity and incomes depends on the extent to which it will replace employees or complement their work. If AI becomes complementary to the labour force, employees can expect a more than proportional increase in their incomes amid accelerated productivity growth, leading to greater inequality between those who use AI and other employees (FMI, 2024).

The level of education and age of employees are factors that contribute significantly to the impact of AI on jobs. Employees with tertiary education are better prepared to shift from jobs at high risk of replacement due to AI to those where AI complements their work. Older employees are generally more vulnerable to the AI-driven transformation, as their level of digital skills is lower

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and their reluctance to change is greater.

At the macroeconomic level, the exploitation of AI potential depends on the degree of development of countries. Developed economies will focus on AI innovation and its regulatory framework, while developing or less developed economies should prioritise fundamental infrastructure and labour force training in digital skills. Furthermore, reskilling programmes for employees susceptible to the impact of AI are essential in all economies to ensure its inclusion.

According to the World Economic Forum (WEF, 2025), the main macroeconomic trends affecting jobs until 2030 concern:

- **Technological advances, such as automation and artificial intelligence, which are transforming traditional job roles,** and it is estimated to have a net positive impact of 1.8 million jobs by 2030.
- **Economic uncertainty, driven by global market volatility and inflation, along with geo-economic fragmentation,** is affecting job security, reshaping global supply chains, and influencing labour mobility.
- **Demographic changes, such as population aging and changing migration patterns, are driving increased demand for healthcare, nursing and related services.**
- **The energy transition creates new opportunities** with a net positive impact of approximately 1 million jobs in energy production, storage and distribution.

Table 1. Macroeconomic trends and impact on jobs, 2025–2030, net effect globally

Macroeconomic trends	Net effect on jobs 2025–2030 (millions)
Increasing access to digitization	9.9
Increase in the age of the working population	9.1
Government support and industrial policies	2.8
Impact of AI and technological processes	1.8
Energy production, storage and distribution	1.0
Impact of geopolitical conflicts	0.9
Increase in the cost of living/prices	0.8
Slowdown in economic growth	-1.6

Source: World Economic Forum, 2025: Future of Jobs

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Jobs requiring technology-related skills will see the fastest growth by 2030, according to the World Economic Forum (WEF, 2025), **the demand for specialists in Big Data, Fintech engineers, specialists in AI and machine learning, as well as software and application developers will increase by over 50%.**

While technology-related trends contribute in part to security roles, such as security management specialists, which are among the fastest-growing occupations, the impact of geopolitical conflicts contributes significantly to the labour demand for this position.

In contrast, the impact of digitization and AI is expected to be clearly negative on positions such as cashiers, alongside administrative assistants and executive secretaries, printing workers, accountants and auditors. Furthermore, the aging and decline of the economically active population and slower economic growth are contributing to the decline of administrative functions.

Table 2. The fastest growing and declining positions by 2030

	The fastest growing positions		*The fastest declining positions*
1	Big Data Specialists	1	Postal Service Clerks
2	FinTech Engineers	2	Bank Tellers and Related Clerks
3	AI and Machine Learning Specialists	3	Data Entry Clerks
4	Software and Applications Developers	4	Cashiers and Ticket Clerks
5	Security Management Specialists	5	Administrative Assistants and Executive Secretaries
6	Data Warehousing Specialists	6	Printing and Related Trades Workers
7	Autonomous and Electric Vehicle Specialists	7	Accounting, Bookkeeping and Payroll Clerks
8	UI and UX Designers	8	Material-Recording and Stock-Keeping Clerks
9	Light Truck or Delivery Services Drivers	9	Transportation Attendants and Conductors
10	Internet of Things Specialists	10	Door-To-Door Sales Workers
11	Data Analysts and Scientists	11	Graphic Designers
12	Environmental Engineers	12	Claims Adjusters, Examiners, and Investigators
13	Information Security Analysts	13	Legal officials
14	Devops Engineer	14	Telemarketers
15	Renewable Energy Engineers	15	Accountants and Auditors

Source: World Economic Forum, 2025: Future of Jobs

Labour productivity will increase up to threefold in the sectors most exposed to the impact of AI, according to PwC's Job Barometer (PwC IA Barometer, 2025), which analysed approximately 1 billion job postings globally to find out how generative AI and other technology iterations are transforming the labour market.

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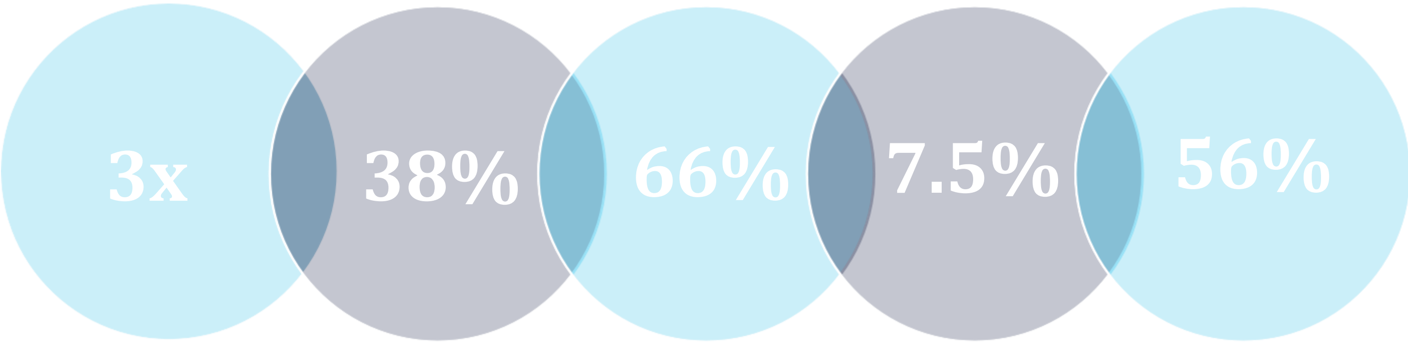
Figure 2. The impact of AI on the global labour market according to PwC IA Barometer, 2025



Increasing labour productivity in sectors most exposed to the impact of AI

Reducing demand for positions that are most exposed to the impact of AI

Much faster net change in the skills required in positions exposed to the impact of AI

Positions requiring AI skills continue to grow faster than all others

Premium (additional) salary for jobs requiring special skills in AI

Source: PwC AI Barometer, 2025

Also, according to the European Parliament, labour productivity is estimated to increase by between 11% and 37% by 2035 at EU level as a result of the introduction of AI technology (Guvernul României, 2024).

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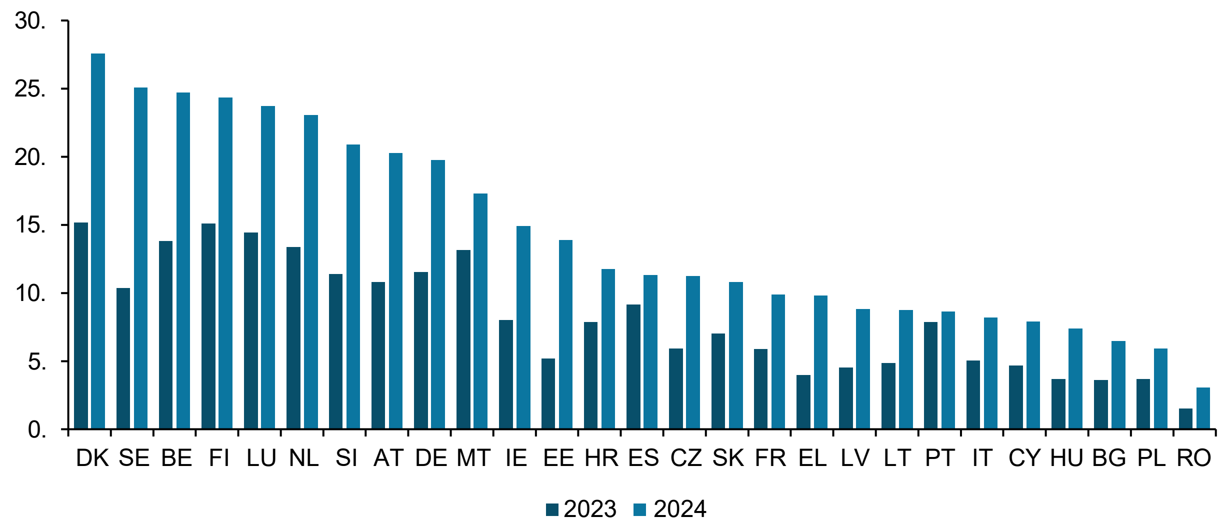
AI AT THE EUROPEAN LEVEL

In the European Union (EU), 13.5% of companies were using AI technology in 2024, with this rate being more than three times higher among large companies with over 250 employees, at 41.2% (EC, 2025), primarily for workflow automation, machine learning and code analysis. Although AI usage has increased by 6 percentage points among companies from 7% in 2020 to 13.5% in 2024 (Figure 3), the Draghi Competitiveness Report (CE, 2024) shows that the EU lags significantly behind the US and should accelerate this process of AI integration. **Denmark leads the EU member states in AI adoption at the company level (28%), followed by Sweden (25%), Belgium (25%) and Finland (24%).**

The countries with the lowest rates of AI adoption among EU companies are Romania (3.0%), Poland (6%) and Bulgaria (6.5%).

Figure 3. Usage of AI at the company level (% of companies), 2023 and 2024



Source: Eurostat (code: isoc_eb_ai)

The European legislative framework on artificial intelligence - EU AI Act

In April 2021, the European Commission proposed the first European legislation dedicated to artificial intelligence, introducing a regulatory framework that classifies AI systems according to the degree of risk they pose. This classification assesses AI systems in various fields of use and divides them into risk categories to protect users and society.

Systems that pose unacceptable risks, such as those used for cognitive manipulation or social scoring, are prohibited. High-risk AI systems that affect safety or fundamental rights are

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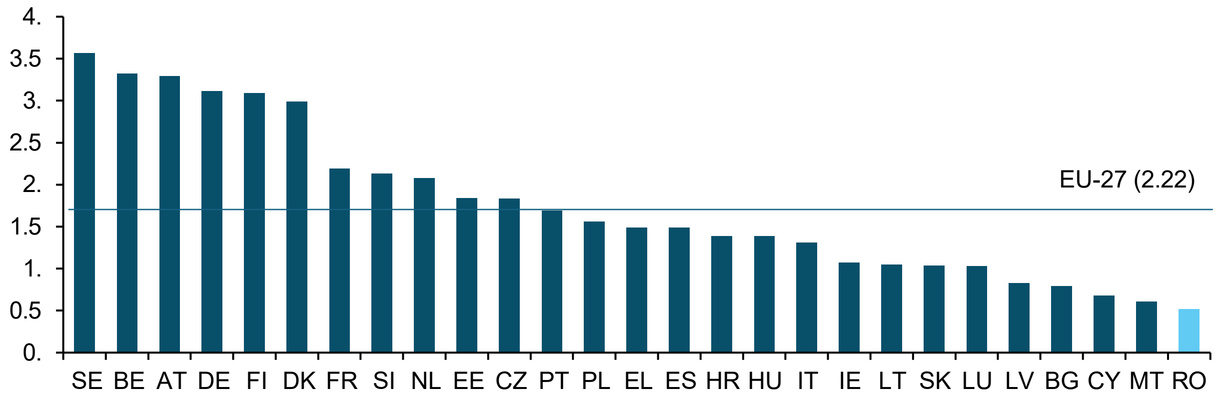
subject to rigorous assessment and registration in an EU database. Generative AI models, such as ChatGPT, are subject to transparency requirements, which mandate disclosure of AI-generated content and compliance with copyright laws.

The EU IA Act also aims at promoting innovation in the field of AI and at supporting European start-ups by creating testing environments for AI technologies. These "regulatory incubators" allow companies to develop and test AI models before public release. The European Parliament and the European Commission actively monitor the implementation and enforcement of the EU AI Act. The Law's compliance timeline includes immediate bans on AI systems with unacceptable risk, followed by the gradual implementation of transparency requirements for general-purpose AI and broader regulations for high-risk systems over the next three years.

AI AT THE LEVEL OF ROMANIA

In 2023, EU spending on research and development rose slightly to 2.22% of GDP, totalling €381 billion according to Eurostat. Romania recorded the lowest expenses in the EU in this area, with only 0.52% of GDP. In absolute terms, Romania allocated EUR 1.65 billion (RON 8,288.5 million), significantly below the European average, highlighting chronic underfunding of research.

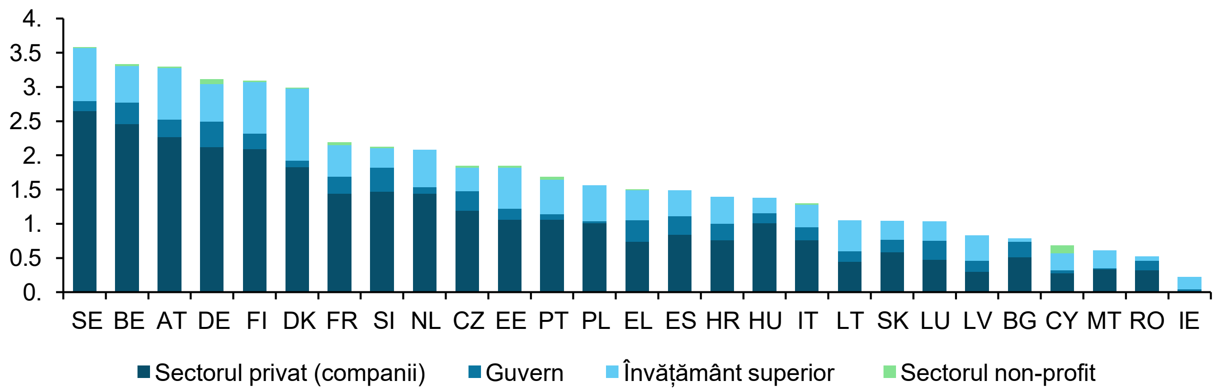
Figure 4. Expenses for research and development (% GDP), 2023



Source: Eurostat (code: tsc00001)

In 2023, the main sources of funding for research and development expenses were companies, accounting for 54.2%, followed by public funds (including general university funds), which accounted for 28.4% of total expenses.

Figure 5. Research and development expenses at sector level (% GDP), 2023



Source: Eurostat, INS (code: tsc00001)

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Over 72% of Romania's population (aged 15–74) lacks basic digital skills. According to the Digital Economy and Society Index 2024 (DESI), Romania ranks last in the EU in terms of basic digital skills (27.8% vs. 55.5%).

Figure 6. Share of population with basic digital skills (%), DESI 2024 (data for 2023)

Source: Eurostat (DESI, 2024)

Romania shows mixed performance in European digital indicators. It is significantly below the EU average in terms of both advanced digital skills (8.9% compared to the European average of 27.3%) and the proportion of IT specialists in the total workforce (2.6% compared to 4.8% at European level). In contrast, with 6.8% of its graduates in IT, Romania ranks among the top countries in the European Union.

Romania ranks last in Europe in terms of AI use in companies. In 2024, only 3.1% of the Romanian companies had implemented AI solutions, which is way below the EU average of 13.5% (Eurostat, 2025). Although the annual growth was above the EU average and the figures exceeded Romania's forecast for 2024, the overall progress remains modest.

The National Strategy on Artificial Intelligence 2024-2027 (Guvernul României, 2024) adopted in July 2024 (Government Resolution no. 832/2024) was developed to support the integration of digital technologies in Romania, emphasising respect for human rights and promoting trust in AI. Funded by the Administrative Capacity Operational Programme, the strategy focuses on six main pillars: developing education and skills in AI, modernising infrastructure and databases, strengthening the research and innovation ecosystem, facilitating the adoption of AI in various sectors, and implementing a robust governance framework for AI.

Through this strategy, Romania aims to prepare society for digital transformation, to stimulate sustainable economic growth and to align itself with European reference standards and practices. However, although the document lists ambitious objectives, including specific quantitative targets, the concrete instruments and operational measures needed to improve performance indicators (such as DESI) remain insufficiently detailed in the current version.

The National Action Plan on the Digital Decade for Romania (Guvernul României, 2024) aims at consolidating and coordinating digital transformation efforts at all administrative levels in order to align with the European Union's strategic objectives for the digital sector. This public policy instrument directs national investments towards accelerating progress in meeting the targets set by the European Digital Decade 2030 Programme.

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The plan is structured around four fundamental strategic axes: (i) digitization of public services, (ii) development of the population's digital skills, (iii) modernisation of digital infrastructure, and (iv) support for the digital transformation of the business environment. The progress in implementing these directions can be monitored using DESI indicators, as shown in Table 2.

With most relevant indicators, Romania performs at approximately 50% of the EU average. **In the field of artificial intelligence, the gap is considerably more pronounced, with the EU level being approximately five times higher than that of Romania**.

The National Strategy for Quantum Technologies 2024-2029 (Romanian Government, 2024) aims at promoting the development and application of quantum technologies and at creating a national framework for the development of such technologies. The strategy also aims at stimulating the domestic business environment and attracting foreign expertise and funds, thereby contributing to Romania's technological and economic advancement in this field. The four quantum technology areas addressed are: (i) quantum computing: the core area for the development of new algorithms, which will see exponential growth; (ii) quantum communications: the use of quantum physics in communications; (iii) quantum detection and metrology: the strategy for developing quantum sensors; (iv) quantum-safe/post-quantum cryptography.

In Romania, quantum technologies were included as a strategic research programme in the National Research, Development and Innovation Plan 2022–2027, and a co-financing instrument was created for projects awarded under the Digital Europe programme.

The National Strategy for Research, Innovation and Smart Specialisation 2022-2027 (Romanian Government, 2022) aims at transforming the Romanian research and innovation system by 2030 by supporting excellence, performance and public-private cooperation.

Here are the main targets:

- development of the research, development and innovation system
- supporting innovation ecosystems
- mobilisation towards innovation
- increased European and international cooperation

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Publicly funded training/retraining programmes in the field of advanced technologies

In Romania, the government supports the digital transformation of small and medium-sized enterprises through training and retraining programmes for their employees. One example is the "Advanced Technology Skills for SMEs" project, initiated by the Romanian Digitalization Authority. This project aims at supporting at least 2,000 SMEs, contributing to the development of their employees' digital skills and the specialisation of the labour force in advanced technological fields, such as Artificial Intelligence, Big Data and Blockchain. Each SME receives financial aid of up to €17,000 to train its employees in these key areas.

Digital career counselling platform for Romanians. The project "Development of the national career counselling management system," initiated by the Ministry of Labour, Family, Youth and Social Solidarity, aims at supporting more than 20,000 Romanians through a digital career counselling platform. The project includes assessing individual skills, providing personalised career advice and free counselling for career change. It also aims at training 1,000 counselling specialists using methods and tools that comply with European standards (MIPE, 2025).

The RCOE (CRED) project for improving teachers' digital skills. The project "Relevant Curriculum, Open Education for All" (RCOE / CRED) focuses on improving teachers' digital skills. By April 2023, 56,615 primary and secondary school teachers (almost 50% of the total) had participated in the digital training modules offered by this programme. The project also includes a large-scale continuing education programme, providing digital educational resources that contribute to improving the educational process.

Mentoring and continuing education for teachers. As part of the PROF project, significant interventions were developed for teacher career mentoring, with a focus on digital education. By the end of 2023, 28,211 teachers in pre-university education were targeted for continuing professional development. The use of the e-Prof platform supports the development of digital skills among teachers and school managers. These initiatives contributed to improving the quality of education and to integrating advanced technologies into the Romanian education system.

The digital competence framework for education professionals: DigCompEdu describes the digital competences that teachers and other educators need in order to use technology effectively in the teaching-learning-assessment process. The 17 projects currently underway aim at developing fundamental and advanced digital skills as well as digital pedagogy, for 100,000 teachers by the end of March 2026.

The Ministry of Education and Research, through two initiatives, promotes flexibility and diversity in education, offering students opportunities to develop their skills in a personalised way:

- **"Curriculum as decided by the school "** allows schools to tailor their educational offerings to the needs and interests of pupils, of the community and of the local labour market by introducing new subjects such as "Introduction to Machine Learning" (for high school education).

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- **"Curriculum as decided by the pupil"** gives pupils the opportunity to choose subjects such as "Art and New Media," "Digital Education and Media Skills," or "Web Page Creation" starting in the 2025-2026 school year, thus contributing to the development of their digital skills.

AI for Youth is a European project for high school pupils and teachers that aims at training future specialists in artificial intelligence and other advanced technologies. Participating high school pupils combine knowledge of AI, programming, entrepreneurship and project management to develop innovative solutions in the agri-food sector, focused on resource efficiency, food safety and supply chain digitization.

In 2024 the **Building Digital Bridges to Student Well-being** project brought together pupils and teachers from different countries to promote pupil well-being and to develop strong digital connections through interactive activities, using technology & programming themes.

The **3DUTECH programme** activated 62 3D printing and robotics hubs in high schools in all Romania’s counties and developed a network of teachers specialising in robotics and 3D printing, who in turn trained over 1,000 young people. In 2025, 20 high schools in Romania will become artificial intelligence hubs for 50 high school teachers and over 400 high school pupils.

The **Saro** project will introduce an **AI assistant in Romanian schools and universities** in 2025 to combat challenges such as school dropouts, excessive bureaucracy and declining motivation. Saro is based on more than 20 artificial intelligence models, allows for personalised learning and aims at increasing class attendance and academic performance of 1,200 pupils and students in its first pilot year.

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CHALLENGES OF THE LABOUR MARKET IN ROMANIA

In addition to the challenges posed by the new wave of technology and the highly competitive global and European context in this regard, Romania is facing a structural labour shortage, in terms of both quantity and quality. Furthermore, after a long period of economic growth sustained by investments, Romania is going through a volatile period from a macroeconomic point of view, with modest increases in Gross Domestic Product (GDP), the largest budget deficit in the EU and regional geopolitical instability, thus highlighting the need for urgent and sustainable labour force measures to ensure at least Romania's return to the short-term investor map, but especially its long-term competitiveness, by attracting, developing and retaining critical skills for the future in the country.

The growth rate of the number of employees in Romania is slightly slowing down due to the economic slowdown, but it is supported by non-EU workers. The average number of employees increased by more than 16% in less than 10 years (National Commission for Strategy and Prognosis autumn prognosis, December, 2024). This growth rate, in line with forecasts, is below the nominal GDP growth rate, which has exceeded expectations over the last decade, being one of the highest in the EU. This means an increase in labour productivity due to technological developments and increased automation in all industries, with acceleration caused by the COVID-19 pandemic (Appendix, Figure 23).

On the other hand, looking at the exponential growth in the number of non-EU workers, especially after 2020 (in fact, since 2017 it has increased more than tenfold), we can note that a large part of the additional number of employees was supported by this category (Appendix – Figure 24).

At the sector level, manufacturing industry followed by retail (trade), as well as health and education, have the highest shares in the average number of employees in Romania. The real estate, mining and energy sectors are at the opposite end of the spectrum. In recent years, there have been different trends in the number of employees by sector, reflecting changes in the structure of the economy, as well as a faster growth in productivity in certain areas, mainly due to digitalization. Thus, between 2017 and 2023, the sectors with the highest growth are: IT (+43%), healthcare (+20%), and HoReCa (+19%), while declines were recorded in the mining sector (-15%) and manufacturing industry (-5%).

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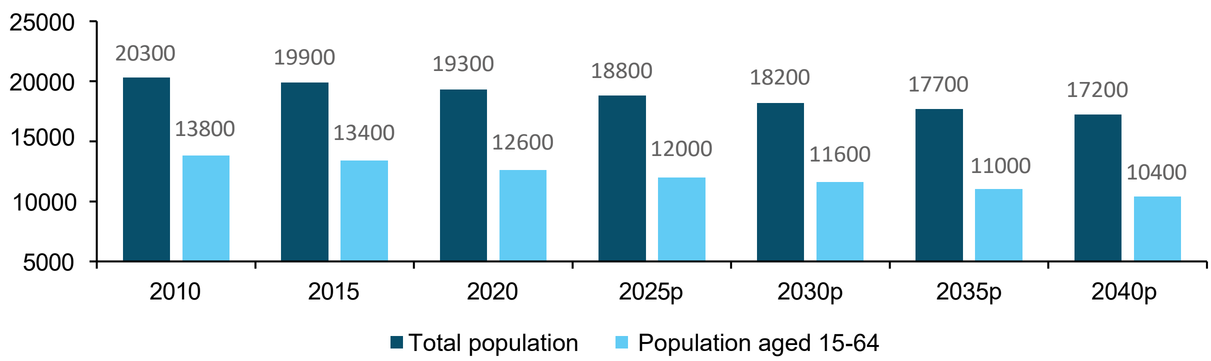
Table 3. Evolution of the average number of employees at sector level (thousands of persons, 2017 - 2023)

Sector	2017	2023	Variation (2023 vs 2017)
D. Production and supply of electricity and heat, gas, hot water, and air conditioning	53	51	-4%
G. Wholesale and retail trade; repair of motor vehicles and motorcycles	834	915	10%
TOTAL ECONOMY	4,946	5,365	8%

Source: processing based on the National Institute of Statistics data, (INSSE, 2024), PwC analysis

Demographic decline represents a major structural challenge for the Romanian labour market in the long term. Although population decline affects the entire EU, demographic trends vary significantly between Member States. The European average for the 2020-2030 decade indicates a 6% increase, while Romania is experiencing a continuous decline of approximately 1% per decade. The impact on the working population is even more pronounced due to the phenomenon of demographic aging. These trends place Romania among the countries with the most severe negative demographic trends in the EU, alongside Bulgaria, Greece, Latvia and Croatia.

Figure 7. Population trends in Romania (thousands of persons, 2010 - 2040)



Source: Eurostat, European Commission, PwC analysis

The impact of the decline in the working-age population is amplified by low labour market participation rates. Romania ranks among the top countries in the EU in terms of inactive population, behind Italy and ahead of Greece, with 33.2% of the population not integrated into the labour market in 2023, up from 31.4% in 2019. The employment rate remains below the EU-27 average for all age groups, but the gap is particularly worrying for young people aged 15-24, where the difference from the European average exceeds 12 percentage points.

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Alongside demographic aging, migration is an additional factor exacerbating population decline. According to World Bank estimates (World Bank, 2017, 2018)**, between 2.5 and 4 million Romanian citizens reside in other countries, representing almost 25% of the total population.** Recently, there has been an improvement in this trend, with the net migration rate falling to -1.5 (compared to -5.6 in 2010), as a result of a slowdown in emigration and an increase in the number of immigrants from non-EU countries.

Although the average unemployment rate of around 5% remains below the European average, youth unemployment (15-24 years) has risen significantly, particularly since the Covid-19 pandemic. The level of youth unemployment is a major concern, with negative social and economic implications and with the potential to exacerbate the skills shortage in the labour market in the coming years.

The average unemployment rate (BIM) declined steadily between 2015 and 2019, following the European trend of post-crisis economic recovery. Except for the pandemic context in 2020, the unemployment rate stabilised at around 5-5.5%, which is about one percentage point below the EU-27 average. However, regional disparities are substantial, particularly between large developed urban centres (Bucharest-Ilfov, Cluj, Timișoara, Iași) and the rest of the country. This territorial segmentation generates extreme variations in unemployment, ranging from less than 2% in high-performing metropolitan areas to over 9% in counties with the lowest level of economic development.

Romania ranks first in Europe in terms of the NEET youth population (not in employment, education, or vocational training) with a rate of 19.4% in 2024 (15-29 years old) compared to the EU average of 11%. The social and economic risks generated by this situation are amplified by the prospect of an increase in the number of NEETs in the context of accelerating technological progress. Automation processes are increasingly replacing entry-level activities, which traditionally were the entry point into the labour market for people at the beginning of their professional careers.

The labour market is suffering the consequences of a deteriorating education system. Romania ranks among the EU countries with the highest school dropout rates, an indicator that has been on the rise in recent years despite economic progress and improvements in overall living standards. This paradoxical development reflects the growing polarisation of the population in terms of access to educational and professional opportunities.

The PISA results also highlight a considerable quality gap compared to developed OECD countries. Combined with the tertiary education graduation rate, where Romania ranks among the lowest in Europe alongside Italy and the Czech Republic (below 25% compared to the EU average of over 40%), as well as with the aforementioned deficient digital skills indicators, this worrying picture of the Romanian education system does not create the conditions for improving the labour market situation in the medium and long term. On the contrary, the downward trend in these indicators increases the risk of an acute crisis in the skills relevant to the economy of the future.

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From a competitiveness perspective, Romania retains its advantage of low labour costs, even in the context of the fastest wage growth in the region. The estimated hourly labour cost for 2024 stood at EUR 12.5 compared to the European average of EUR 33.5, placing Romania in second place in the ascending ranking, after Bulgaria and close to Hungary, Croatia and the Baltic countries. Accelerated wage dynamics characterise all these economies, being determined mainly by the acute structural labour shortage and the pressure exerted by minimum wage increases, with Romania recording the fastest growth rate, surpassing even Hungary. However, this advantage is threatened by the pace of productivity growth in Romania, which is below that of wage growth.

At sectoral level, in 2024 the highest salaries were concentrated in the IT&C, financial services and energy sectors. In terms of wage dynamics, the most pronounced increases were recorded in sectors with a high proportion of employees earning the minimum wage or close to it, such as HoReCa, construction and retail. The healthcare sector also saw substantial wage increases.

In conclusion, Romania's labour market faces multiple structural challenges, ranging from poor education and digital skills to sharp demographic decline. The long-term competitiveness of the national economy will depend critically on the availability of a skilled labour force capable not only of assimilating emerging technologies but also of distinguishing itself through its capacity for innovation. This transformation can only be achieved through a strategic approach and sustained long-term investment in developing the skills relevant to the economy of the future.

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METHODOLOGY

The research methodology was designed in direct line with the project objectives, pursuing a comprehensive approach to assessing the impact of AI on the labour market in the energy and retail sectors in Romania. The research design integrated multiple stakeholder perspectives to ensure a comprehensive understanding of the challenges and opportunities generated by digital transformation.

1. Development and application of research tools

Two separate questionnaires were developed, tailored to the specific characteristics of each category of respondents:

- **The questionnaire for companies** aimed at identifying the current stage of AI adoption, at mapping the challenges in the implementation process and assessing the prospects for sectoral development. The tool was validated during a round table discussion with representatives of the participating companies.
- **The questionnaire for employees** was designed to capture the labour force's direct perceptions of digital transformation. It was distributed by participating companies and, in the retail sector, additionally through trade unions. The tool was validated through consultations with company representatives.

Data collection took place between April 25 and May 31, 2025, with 725 respondents from the energy sector and 571 from retail.

2. Development of the job impact matrix

A comprehensive matrix was developed to identify job families likely to be affected by AI implementation, along with mapping the skills needed to adapt to emerging technological requirements.

3. Economic impact assessment

The economic impact of AI was estimated by analysing the increase in the number of employees and wages as a result of improved productivity. The projections were extended to 2030, quantifying tax contributions based on wage growth and tax conditions in the first half of 2025.

4. Organisation of consultations and validation of results

18 structured meetings were organised during the project:

- **February 2025**: Sectoral workshops to present objectives, methodology and next steps, with the participation of PwC, Concordia and contributing companies.

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- **March 2025**: Individual interviews with participating companies on strategic directions and projects.
- **April 2025**: Interviews with representatives of the Ministry of Education, the Ministry of Labour, the Romanian Digitalization Authority, ANOFM, and the CNS Cartel Alfa, FS Comerț and FS Gaz Romania trade unions.
- **May 2025**: Sector-specific co-creation workshops to present and validate initial findings, to identify solutions for professional transition and to change management, and individual discussions with participating companies.
- **June 2025**: Final round table to present the results of the analysis and economic impact, with the participation of all stakeholders.

Participants

The research included four companies from the energy sector (approximately 12,000 employees) and three companies from the retail sector (approximately 30,000 employees), used as representative proxies for the respective sectors.

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SECTOR ANALYSIS: RETAIL SECTOR

Companies are already implementing AI technologies to analyse consumer behaviour, personalise loyalty programmes and optimise product ranges.

The average degree of automation of business processes is over

30%

75%

of participating retailers use AI chatbots to provide customer support and in recruitment processes.

The companies estimate that by 2030, a maximum of

20%

of cashiers will be replaced, while the rest will undergo a transformation of their existing role.

Groups of positions with high and medium exposure are in Operations (stores), Customer Support, Marketing and Logistics.

In Romania, the potential reduction in staff caused by the impact of automation and AI will be balanced out by the current shortage of employees.

From the employees' perspective:

- **66% of them learned to use new tools/technologies**
- **for 70%, daily responsibilities changed as the workload increased**
- **attitude toward change is positive, with 85% being enthusiastic about opportunities for learning and growth**
- **38% of retail employees have never used AI, mainly because they do not consider it relevant to their current role**
- **34% of employees are concerned that AI will provide incorrect information**
- **22% believe that technology will change the nature of their work in a negative way**

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Trends

Globally, the retail sector is undergoing rapid transformation, characterised by intensive digitization, the expansion of e-commerce based on new technologies and the evolution of consumer behaviour towards sustainability concerns and personalised experiences.

In a global retail market worth $22.6 trillion, online sales in 2023 will exceed three times the 2014 level (Global Retail E-Commerce Forecast) reaching $4.4 trillion and illustrating a fundamental change in consumer preferences that has prompted companies to reconfigure their business models and development strategies. According to forecasts, the global retail market will see a cumulative growth of 127% by 2028 compared to 2023, reaching $28.7 trillion.

The strategic importance of the retail sector in the national economy is reflected in the substantial increase in its share of total gross value added (GVA), from 14.1% in 2013 to approximately 20% in 2023, as well as **by representing 17% of the average number of employees**, or approximately 900,000 people out of a total of 5.4 million employees in the same year.

The Romanian retail sector is showing robust growth despite the moderate economic context, with the national economy recording growth of only 0.9% in 2024 compared to 2023. Modern retail continues to expand, supported by the growing consumption and the entry of new international players into the market, with non-food sales advancing by 14% in 2024.

The Romanian retail market has been particularly buoyant over the past year, marked by both major consolidations and strategic new entries. Consolidation measures include Carrefour's acquisition of Cora's local operations and the takeover of Profi by Ahold Delhaize (Mega Image). At the same time, major international players have entered the Romanian market, such as Trendyol (Turkey's first decacorn), the Polish chain Zabka with its Froo brand, and the Dutch retailer Action (Economedia). Aldi, one of the largest global food retailers, is also preparing to enter the Romanian market by moving some accounting functions by spring 2026 (Profit.ro). Expansion strategies are ambitious – German discounter Lidl plans to open 200 new stores in Romania by 2030 (ZiarulFinanciar).

The eCommerce segment also continues to grow. According to forecasts, the Romanian e-retail market will exceed €8 billion in 2025, marking an 8% increase over the previous year, despite the difficult geopolitical and socio-economic context (eCommerce Insights 2025). In 2024, the number of online shoppers increased significantly: 72.9% of internet users in Romania made online purchases in 2024, 4.8 percentage points more than in 2023, according to the data published by the National Institute of Statistics. All interviewed retail companies have concrete plans to expand on the Romanian market.

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The evolution, profile and perception of the analysis-participating companies

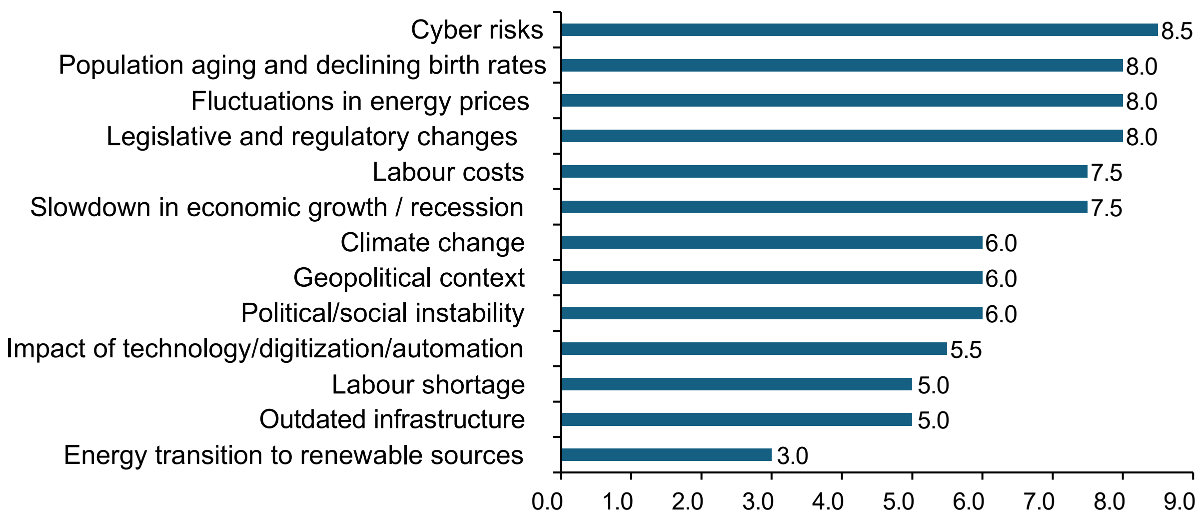
The analysed retail companies recorded a significant average annual turnover growth of approximately 16% between 2019 and 2024. Continuous growth is expected over the next two years, but at a more moderate pace – companies estimate an annual turnover growth of **4.3%** in 2025 and **2.3%** in 2026.

In 2024, the impact of digitization (technology) was the main growth-driving factor in the sector, according to the analysed companies, while the main negative effects on the business were generated by: (i) the macroeconomic and geopolitical context, (ii) the legislative and regulatory changes, and (iii) the changes in customer preferences.

The analysis highlights companies' major concern about cyber risks, perceived as the main threat to business due to their potential impact on operations, sensitive data and reputation.

Alongside cyber risks, companies face challenges generated by the current socio-economic context: an aging population with implications for the labour force, volatile energy prices affecting production costs and profitability and unpredicted legislative changes that create uncertainty. These three issues are considered almost as important as cyber risks.

Figure 8. Key risks for the retail sector companies



Source: PwC analysis based on the data collected from participating companies

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In terms of average number of employees, the analysis-participating companies estimate an **average increase of 5% per year**, both in 2025 and 2026, proportional to business expansion. Furthermore, according to PwC's analysis, eight out of ten retail companies believe that the number of employees will remain constant or increase in 2025 (PwC HR Barometer Report, First Quarter, 2025).

Business expansion and transformation of processes/business models are the main drivers of staff growth, while the global economic slowdown and the implementation of new technologies may lead to slight declines. For half of companies, legislative unpredictability and the geopolitical context can negatively influence team size.

The retail sector has a staff turnover rate significantly higher than the national average: while nationally 16.3% of employees left their jobs in 2024 (PwC HR Barometer Report, First Quarter, 2025)**, in retail the average turnover rate for the period 2019-2024 was 33%** and remains at this level**. This almost double fluctuation puts the sector in first place in the national ranking, generating a negative impact on the economic activity of companies by slowing down the operational pace as a result of constant staff turnover.**

All participating companies supplement their staff with outsourced labour for core roles (commercial and production workers), and 50% of them use contractors for support functions (training, legal). These additional labour resources represent approximately 2.3% of the total labour force at the analysed companies.

Companies are already implementing AI technologies to analyse consumer behaviour, to personalise loyalty programmes and to optimise product ranges. They are testing new applications to anticipate customer needs and adapt operations in real time, as well as to robotise logistics processes in the long term. Current trend: local omnichannel retailer with integrated experience – physical stores, mobile applications, online platforms, own delivery or through partners (Bringo, Glovo, Tazz, Wolt, Bolt) and Click & Collect services.

The average degree of automation of business processes is estimated at over 30%. Companies continue to invest in Gen AI, IoT, AR&VR, Machine Learning, RPA and the expansion of self-checkout cashiers. All participating companies are committed to continuing the integration of technologies and AI in order to increase operational efficiency, to improve customer experience and to redefine the business model in the context of rapid global transformations.

Automation and AI implementation remain priorities on companies' agendas. The pace of AI adoption over the next 3-5 years will remain relatively constant, with the prospect of being partially tempered by the economic and geopolitical context.

Conclusions on AI integration and automation:

- In Romania, the retail sector is following European trends, but the pace of transformation is shaped by structural challenges and by the need for substantial investment in infrastructure modernisation and digital skills development.

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- **Major retailers in Romania use AI-integrated systems to optimise inventory management and to demand forecasting,** according to responses provided in the analysis. These systems analyse sales data and consumer behaviour in order to adjust inventories and minimise losses. These technologies also include inventory automation through IoT sensors, RFID tracking technologies and predictive analytics using AI (in all companies), automated picking systems (in 50% of companies) and transportation automation systems (in all respondent companies).
- **Self-service cash registers are implemented in all study-participating companies.**
- **75% of the analysis-participating retailers use chatbots with integrated AI to provide real-time support to both customers and recruitment processes.** These virtual assistants can answer frequently asked questions, provide product information, assist customers with the purchasing process and guide candidates through the selection stages.
- Among the notable technological innovations in retail, it is worth mentioning that in 2024, **the first two fully autonomous stores in Romania** were opened: PENNY, equipped with over 5,000 sensors and image processing units, where items are automatically scanned using a system of 500 smart cameras strategically placed throughout the stores (ZiarulFinanciar), and Auchan GO, where over **70 cameras and 3,000 sensors** automatically detect the products chosen by customers, allowing them to enter, shop and pay without cash registers, shopping carts or cash (Auchan).

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Transforming retail jobs through the impact of AI

Emerging technologies — automation, AI, augmented reality (AR/VR) and advanced management systems — are exposing certain job categories to a greater extent and are reshaping the skill requirements for traditional roles such as cashier, merchandiser or warehouse worker. At the same time, there is an accelerating demand for digital, analytical and socio-cognitive skills.

According to the theoretical framework developed by MIT Media Lab on skill polarisation, this transformation amplifies the division between jobs with complex cognitive requirements and those based on physical or repetitive activities, with the potential to restrict the professional mobility of the employees in the latter category (MIT- Automation and Polarization, 2022).

Activities with high automation potential in the retail sector: (i) product scanning, (ii) payment processing and issuing receipts, (iii) returns management, (iv) personalised product recommendations and product presentation, (v) answering frequently asked questions from suppliers' customers, (vi) processing online orders and tracking customer orders, (vii) inventory planning, (viii) price monitoring, (ix) promotion management and marketing campaign automation, (x) receiving and storing goods, sorting and packaging products, and (xi) transporting goods and preparing orders for delivery. These are summarised in Table 5.

Certain categories of jobs are more vulnerable to automation and are more exposed to the impact of technology and AI, in the context of the growing demand for digital, analytical and socio-cognitive skills. The research, based on consultations with company representatives and on the detailed analysis of responsibilities and positions, recognised that groups of positions with high and medium exposure are concentrated in **Operations** (stores), **Customer Support**, **Marketing** and **Logistics**. The high potential for automation is determined by:

- Predominance of repetitive and predictable activities combined with high volumes and labour-intensive processes: In Operations, standardised and repetitive activities such as inventorying, arranging products on shelves and processing payments are being automated. In Customer Support, chatbots handle frequently asked questions, while in Logistics warehouse automation and route optimisation are being implemented.
- Accessibility of structured data: Digital marketing generates substantial volumes of data that can be used to personalise campaigns and to automate targeting processes through AI. The analysis of sales and inventory information allows for supply chain optimisation in Logistics.

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Table 4. Estimating the level of exposure to the impact of automation/AI on job families in the retail sector

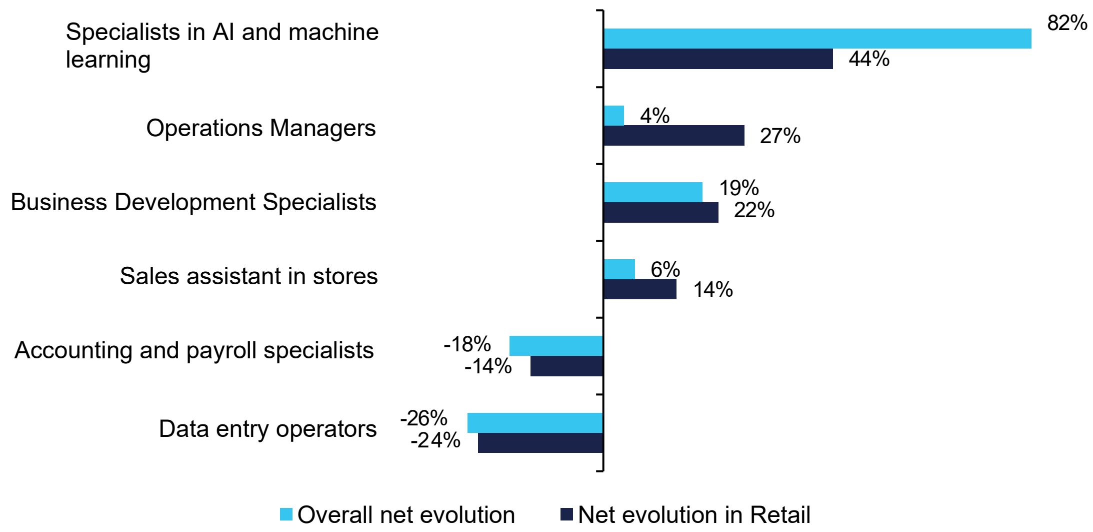
Potential for automation	Job family (positions	Impact on the number of employees
Low	Expansion	Stagnation
	Achiziții	Stagnation
	Logistics: Transport and distribution	Growth lower than the rate of expansion
	Operations: Production	Growth proportional to expansion
	Operations: Sales Assistant	Growth proportional to expansion
Medium	Non-IT (HR, Financial, Accounting, Audit)	Decrease
	IT	Stagnation
	Marketing and E-commerce: product management	Stagnation
	Sales & merchandising	Growth proportional to expansion
	Logistics: Warehouse	Growth lower than the rate of expansion
High	Communication	Decrease
	Supply chain management	Growth proportional to expansion
	Marketing & E-commerce: market analysis, pricing and promotions	Stagnation
	Customer Support	Growth proportional to expansion
	Operations: Cashier	Growth lower than the rate of expansion

Source: PwC estimate based on questionnaire sent to companies and discussions during workshops

From the perspective of the companies participating in this report, the impact on the labour force is already noticeable, and the transformation of roles from operational to multifunctional profiles is underway. **In Romania, however, the potential reduction in staff numbers caused by the impact of automation and AI will be offset by the current shortage of employees in the context of economic expansion.**

Global trends in the retail industry, according to the World Economic Forum 2025, indicate significant net increases in the number of employees in operations and AI specialists, while the roles of data entry operators and accounting and payroll specialists will see declines due to the impact of technology and automation.

Figure 9. Evolution of the number of employees by job type globally (total and in the retail sector)



Source: WEF Future of Jobs Report 2025

Over the next five years, digital skills, alongside resilience and the ability to adapt through continuous learning, will be fundamental to the professional development of the retail sector employees, according to the same World Economic Forum report (2025).

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Figure 10. Digital skills on the rise by 2030

Source: WEF Future of Jobs Report 2025

Mapping and transferability of skills in professional transition in the retail sector as a result of the impact of automation and AI

Developing bridging skills and facilitating professional mobility in the retail sector requires a structured approach in three strategic directions: (i) mapping transferable skills, (ii) retraining programmes based on complementarity, and (iii) data-driven occupational transitions. Most jobs with a high or medium risk of automation will benefit from the expansion of the existing role responsibilities and partial reskilling

- companies estimate that a maximum of 20% of cashiers will be completely replaced in the medium term (by 2030), with the rest undergoing a transformation of their existing role.

Occupational transition pathways demonstrate that employees in traditional roles can effectively migrate to emerging positions: a cargo handler can become an automated equipment operator by developing technical skills and using HMI interfaces, or a logistics specialist by strengthening basic organisational and digital skills. Similarly, a merchandiser can evolve into a graphic designer by expanding their visual skills and using creative software with integrated AI, or into a procurement specialist by developing inventory management and supplier relationship skills. More details can be found in Table 12 in the Appendices.

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Table 5. Retraining options in the retail sector

Cargo handler

Option 1: Automated Equipment Operator

- Expanding the existing role: transition from manual handling to interacting with automated systems (e.g., sorting robots, smart conveyor belts)
- Development of basic technical skills:
  - Understanding the operating principles of equipment
  - Operation of HMI interfaces (Human-Machine Interface)
  - Diagnosing simple errors and communicating effectively with maintenance teams

Expected outcome: an employee capable of working with technology, ensuring continuity of operations and contributing to the efficiency of automated processes. Increasing its productivity will also lead to wage increases.

Option 2: Logistics Specialist

- Leveraging existing skills: transitioning from manual organisational activities to digital inventory and logistics process management (e.g., WMS systems, ERP applications). Skills such as: Organisation and planning, digital literacy (basic knowledge)
- Developing complementary skills:
  - Management of medium-level stocks and logistics processes (using WMS – Warehouse Management Systems)
  - Average digital skills (navigating ERP applications, using spreadsheets)

Expected outcome: ability to manage logistics operations and cooperate effectively with procurement and distribution teams.

Merchandiser

Option 1: Graphic Designer

- Leveraging existing skills: transitioning from visual planning in-store to creating digital promotional materials
- Developing creative and technical skills:
  - Use of design software (Adobe Illustrator, Photoshop, Canva) and software with integrated GenAI
  - Principles of branding and visual identity

Expected outcome: ability to contribute to integrated visual campaigns, to create digital promotional materials and to cooperate with marketing and e-commerce teams.

Option 2: Procurement Specialist

- Leveraging existing skills: the transition from product and consumer behaviour knowledge to procurement strategies and promotional planning
- Developing complementary skills:
  - Inventory management (using WMS systems)
  - Average digital skills: operating specific software systems (ERP, SRM, Business Intelligence, CRM AI)
  - Supplier relations (negotiation, inter-organisational communication, contract management)

Expected outcome: ability to contribute to the procurement strategy, cost optimisation and supplier selection based on market dynamics.

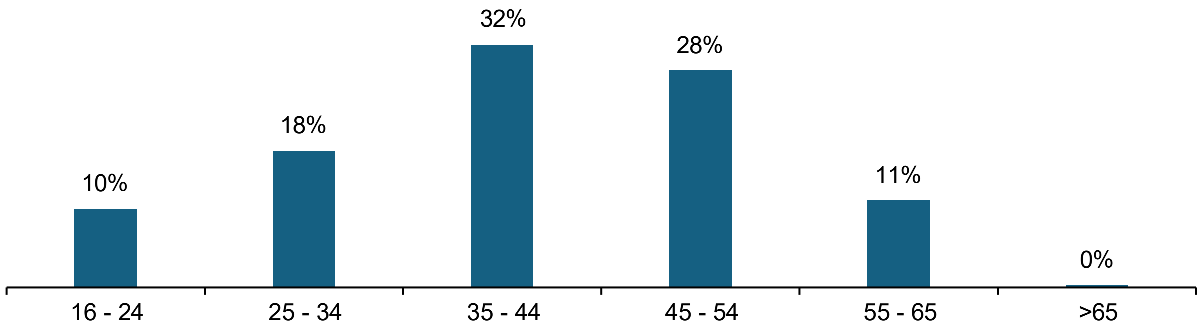
Source: PwC based on the PayWell catalogue and discussions with company and trade union representatives during workshops

The implementation of these transitions requires identifying transferable skills, developing micro-certifications in relevant technologies, creating feasible career paths and integrating personalised career counselling. Success depends on integrating basic digital skills, socio-cognitive abilities and analytical thinking into retraining programmes, thereby facilitating adaptation to the demands of the changing labour market.

Employees' perception of the impact of AI on their work

The profile of an employee in the Romanian retail sector reflects a 41-year-old person with over 6 years of seniority in the company, 66% of whom are female.

Figure 11. Distribution by age group of the employees in the retail sector (%)



Source: PwC analysis based on data collected from participating companies

Recent transformations have already had a major impact on retail employees, with changes in responsibilities and technologies used. From the employees' perspective, the changes in the workplace over the last 12 months have been significant: **66% of them learned to use new tools/technologies, and for 70% daily responsibilities changed as the workload increased.**

66%
learned to use new tools/technologies

50%
Their activities have been enhanced by technology

76%
The workload has increased

70%
Daily responsibilities have changed

51%
Their working relationships changed

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Openness to change demonstrates a predominantly optimistic attitude among the labour force. **The attitude towards change is positive, with 85% enthusiastic about learning and growth opportunities, and 88% feeling prepared to adapt to new working methods, despite concerns about the future of their job for 66% of them. However, 38% of retail employees have never used AI, mainly because they do not consider it relevant to their current role.**

Perceptions of AI reflect optimism rather than fears about its impact, but it should be noted that the effects of new technologies (including AI) on the workplace are perceived as positive by retail employees: **58% believe that AI will provide them with opportunities to acquire new skills, 53% believe that it will help them be more efficient and improve the quality of their work, and for 46% AI is a tool that will help them increase their value in the labour market.**

Reservations and limitations in AI adoption highlight practical and perceptual barriers. Currently, **34% of employees are concerned that AI will provide incorrect information and 22% believe that technology will negatively change the nature of their work.**

The focus on professional development indicates a proactive workforce that is open to learning. **Most respondents in the sector are willing to invest in professional development, both through personal resources (70%) and through courses offered by the company (63%),** demonstrating a preference for proactive career development rather than relying solely on workplace experience.

Employees' attitude toward change is positive, despite concerns about the future of their jobs:

85%
are enthusiastic about opportunities to learn and grow

78%
are confident in the future of the company

88%
feel ready to adapt to new ways of working

66%
are concerned about the future of their jobs

48%
think there are too many changes happening at once

28%
do not understand why change is necessary

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SECTOR ANALYSIS: ENERGY SECTOR

AI plays an important role in transforming the energy sector, contributing to process optimisation and increased efficiency.

The average degree of process automation is over

60%

The impact of automation and AI will be much slower among the employees with roles in electricity and natural gas distribution, while in supply activities it will be more accelerated.

From the employees' perspective:

- **67% of them learned to use new tools/technologies**
- **57% of daily responsibilities changed with the increase in workload**
- **Attitude toward change is positive, with 90% enthusiastic about opportunities for learning and growth**
- **25% of the employees in the energy sector have never used AI, mainly because they do not consider it relevant to their current role**
- **28% of employees are concerned that AI will provide incorrect information**
- **13% believe that technology will change the nature of their work in a negative way**

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Trends

Globally, the energy sector is undergoing a profound transformation, marked by the transition to renewable energy sources (RES) and digitalization driven by the need to reduce greenhouse gas emissions. According to the International Energy Agency (IEA, 2025), in 2024 the global electricity consumption reached a record high, with an increase of nearly 1,100 TWh, driven by the electrification of transport, digitalization, expansion of data centres and growing sales of electric vehicles. RES and nuclear energy generated 80% of this increase, marking a historic moment: for the first time, they covered 40% of global electricity production. CO2 emissions rose by only 0.8%, while the global economy grew by more than 3%, suggesting a decoupling between economic growth and CO2 emissions.

The global energy transition has also had a major impact on the labour market, generating nearly 2.5 million new jobs in 2023 and bringing the total number of employees in the energy sector to over 67 million. According to the International Energy Employment (IEA, 2024), the growth was mainly driven by record investments in renewable energy and clean technologies, which created 1.5 million jobs, but also by a recovery in the fossil fuel sector. Sectors such as solar energy and electric vehicle manufacturing led the expansion, while the wind and nuclear industries faced challenges related to costs and shortage of skilled labour. While the transition offers significant opportunities, it also highlights challenges such as regional inequality (with investments and jobs concentrated in China and the developed economies), skills shortages and the risk of job losses in fossil fuel industries, particularly coal. In addition, wages are rising in the sector, especially in renewable energy sector, but they have not yet matched levels in oil and natural gas.

The European Union adopted an ambitious package of measures to reduce greenhouse gas (GHG) emissions by 55% by 2030 with the goal of achieving climate neutrality by 2050. The European Green Deal (CE, 2019), the *Fit for 55* package (CE, 2022), the revision of the *Renewable Energy Directive* (RED III, 2023) represent some of the most relevant strategies and legislative documents on the profound restructuring of the energy mix, reducing the dependence on fossil fuels and increasing the share of RES in final consumption.

With regard to grids, the *EU Action Plan for Grids* (EU Action Plan for Grids, 2023), estimates that investments of €584 billion are needed by 2030 to modernise European electricity grids (transport and distribution).

In Romania, the energy sector follows European guidelines (NECP, 2024), **but the pace of change is influenced by structural challenges and the need for substantial investments in infrastructure modernisation.** For Romania, the investment needed in electricity grids to meet the targets set out in the National Energy and Climate Plan (NECP, 2024) is estimated at between €9 and €11 billion by 2030 (EPG, 2024), compared to an average of around €400 million per year in recent years.

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Romania's Energy Strategy for the 2025-2035 period sets out the six key strategic objectives for the sustainable development of the national energy sector: energy security, low-carbon energy, energy efficiency, universal access and economic competitiveness, efficient energy markets and digitalization, smart grid development and cybersecurity.

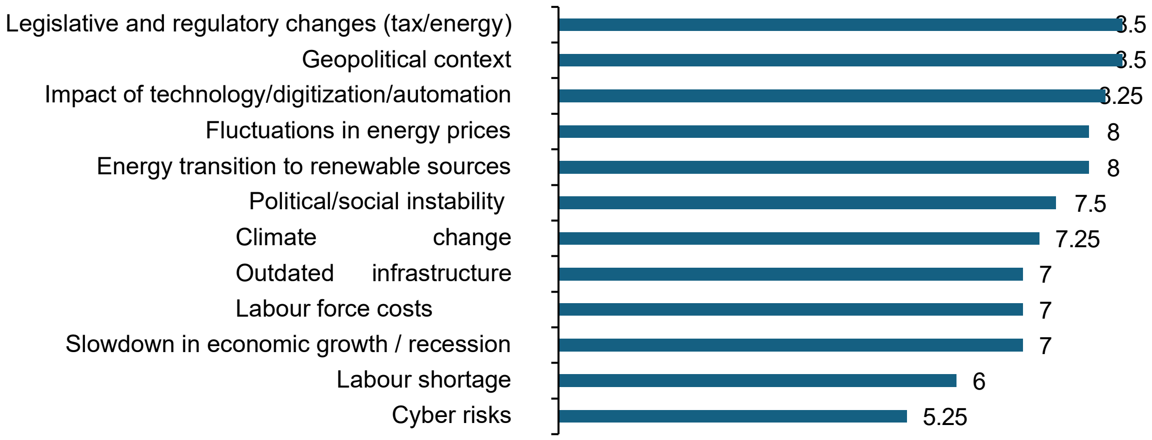
AI is playing an increasingly important role in transforming the energy sector, helping to optimise processes and increase efficiency. Using advanced algorithms, AI can anticipate energy demand, can manage grid flows in real time and can detect anomalies or faults before they become critical. AI is also used in predictive equipment maintenance, reducing shutdown times and extending the life of infrastructure.

As grids become more complex and decentralised, AI is becoming essential for integrating SREs, which have intermittent output. AI facilitates grid balancing, automation of operating decisions and efficient energy storage management. In addition, by analysing consumption data, AI enables the personalisation of offers for customers, encouraging more responsible and sustainable consumption. Thus, AI not only supports the energy transition, but also redefines how energy is produced, distributed and used.

Evolution, profile and perception of the analysis-participating companies

Here are the main factors that influenced the activity in Romania's energy sector in 2024: (i) legislative and regulatory changes, (ii) geopolitical context, and (iii) the impact of technology, digitization and automation, according to the responses of the analysed companies, as shown in Figure 12.

Figure 12. Key risks for companies in the energy sector



Source: PwC analysis based on data collected from participating companies

All energy companies analysed in this report integrated comprehensive automation processes for billing operations and the activities in the areas of human resources, IT and data collection.

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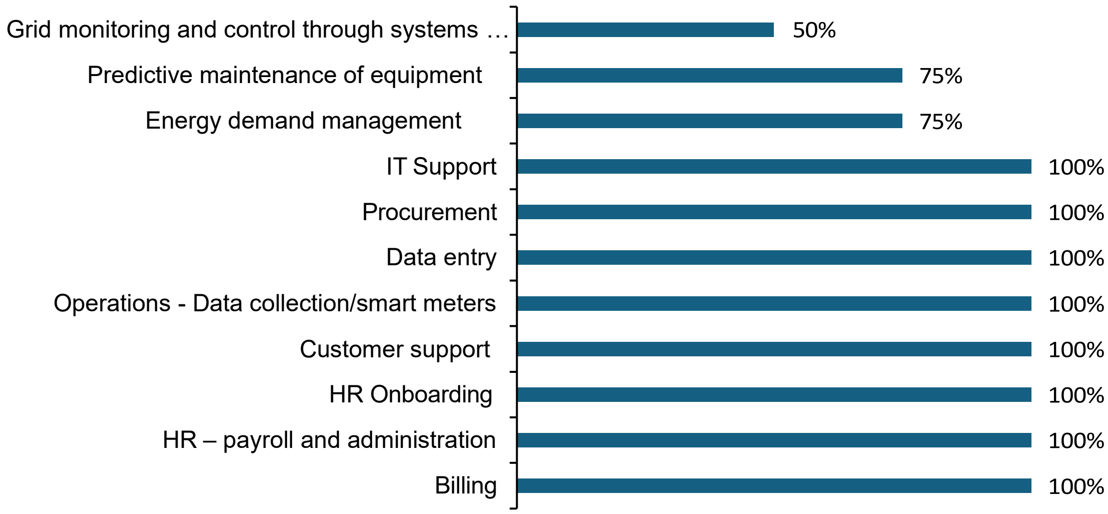
In the electricity and natural gas distribution segment, automation varies between 50% for grid management and control and 75% for predictive equipment maintenance, as shown in Figure 13.

Figure 13. Automated processes in the energy sector



Source: PwC analysis based on data collected from participating companies

The main objectives for automation and AI integration at sector level are: (i) stimulating innovation, (ii) reducing costs, and (iii) improving data security and compliance. In contrast, the main barriers to implementing these processes are: (i) uncertainty about return on investment caused by the regulatory framework for distribution companies, (ii) concerns about cybersecurity and difficulties of integration with existing systems, and (iii) employee resistance to change.

The average degree of automation estimated by the analysis-participating companies is over 60%. They continue to invest in new technologies such as Machine Learning, IoT, GenAI, AR&VR, Smart Grids and energy storage solutions. The analysis confirms the companies' commitment to further integrating technologies and AI to optimise and redefine their business model in the context of rapid global transformations in the sector.

Regarding the pace of adoption over the next 3-5 years, opinions differ: some companies anticipate an acceleration, while others predict that the current pace will continue, tempered by the economic and geopolitical context. The conclusion remains clear: automation and AI implementation continue to advance.

The average number of employees in the analysed companies has grown steadily, reaching approximately 12,000 people in 2024. This trend contrasts with data from the National Institute of Statistics, which indicates a decrease in the number of employees in *Class D – Production and supply of electricity and heat, gas, hot water and air conditioning* to approximately 50,600. **The average annual staff turnover rate was approximately 7% between 2019 and 2024,** demonstrating considerably greater stability compared to the retail sector.

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Transforming jobs in the energy sector through the impact of AI

Table 6. Estimating the level of exposure to the impact of automation/AI on job families in the energy sector

Potential for automation	Job family (positions)	Impact on the number of employees
Low	Regulatory and Legal	Stagnation
Low	Strategy, Management	Stagnation
Low	Grids: expansion, constructions	Growth proportional to expansion
Medium	Non IT: Financial, Audit	Stagnation
Medium	Non IT: HR, Admin	Stagnation
Medium	IT	Growth lower than expansion rate
Medium	Communication/Marketing	Stagnation
Medium	Debt recovery	Growth lower than expansion rate
Medium	Network management	Growth lower than expansion rate
Medium	Sales	Growth proportional to expansion
Medium	Energy efficiency and renewable energy	Growth proportional to expansion
Medium	Grids: technical support (operations other than the above)	Growth proportional to expansion
Medium	Grids: grid connection, maintenance, interventions, and malfunctions	Growth proportional to expansion
High	Customer support	Growth lower than expansion rate
High	Market analysis / efficiency / forecasts / procurement	Stagnation

Source PwC estimate based on questionnaire sent to companies and discussions during workshops

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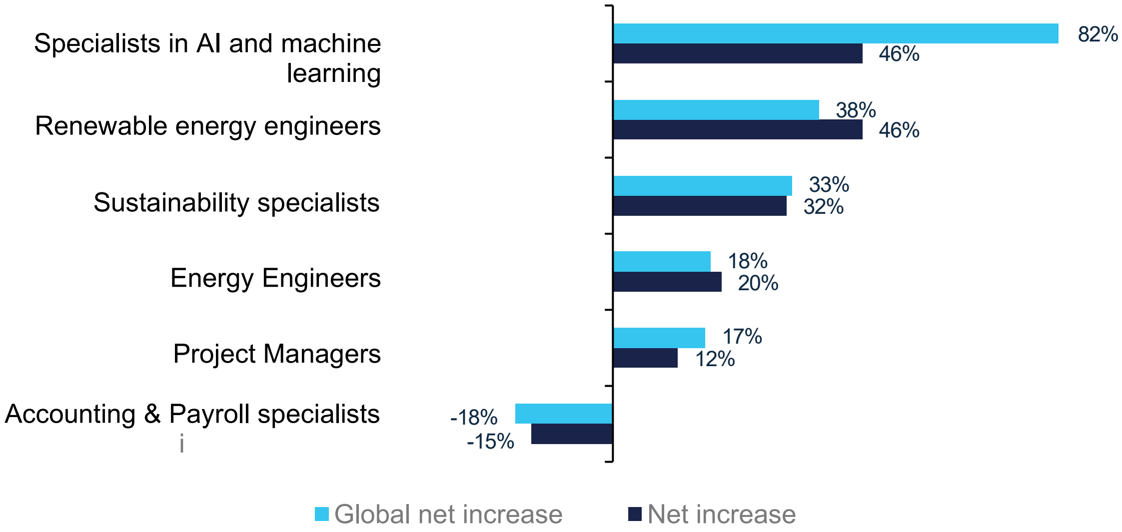
Global trends in the energy sector, according to the World Economic Forum 2025, point to significant net increases in the number of employees in operations and AI specialists, renewable energy engineers, electrical engineers and sustainability specialists, while accounting and payroll specialist roles will see declines due to the impact of technology and automation.

Figure 14. Evolution of the number of employees by job type globally (total and in the energy sector)



Source: WEF Future of Jobs Report 2025

Over the next five years, AI and big data, grids and cybersecurity will be fundamental to the professional development of employees in the energy sector, according to the same World Economic Forum report (2025).

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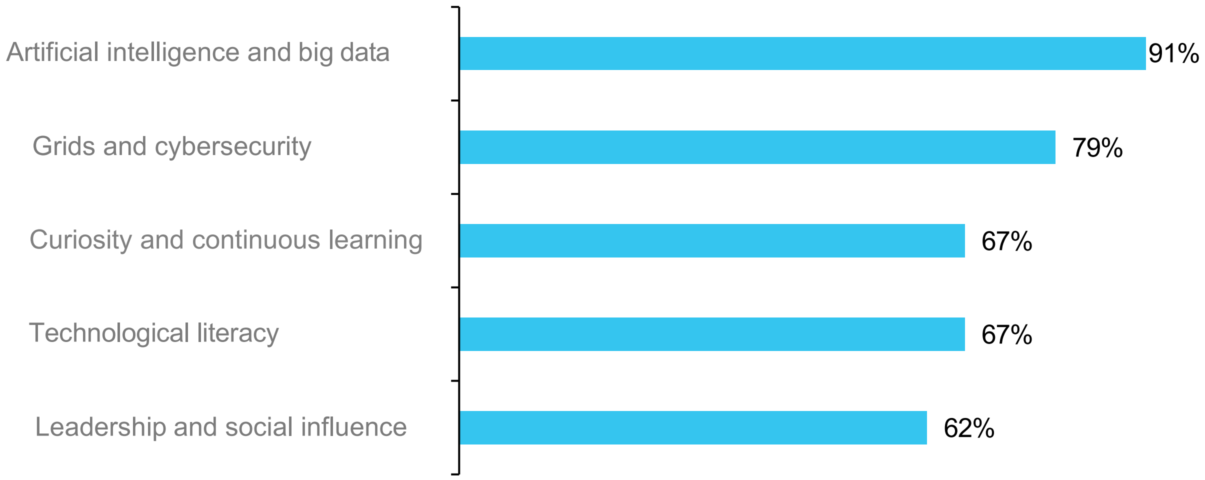
Figure 15. Digital skills on the rise by 2030



Source: WEF Future of Jobs Report 2025

The impact of automation and AI will be much slower among employees with roles in electricity and natural gas distribution, according to discussions in the workshops, while it will be more accelerated in supply activities.

Thus, occupational transition paths prove that the employees in this sector can effectively migrate to emerging positions: a market analysis specialist can become a data analyst for renewable energy solutions by developing skills in machine learning and using predictive modelling platforms, or an energy solutions consultant by consolidating technical knowledge and expertise in renewable energy solutions.

Similarly, a customer support representative can evolve into a chatbot trainer or support process automation specialist, as shown in Table 8. More transition options can be found in Table 13 in the Appendices.

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Table 7. Retraining options within the energy sector

Electricity trading analyst

Option 1: B2C Energy Solutions Consultant

- Capitalising on existing skills: transitioning from advanced knowledge of energy markets and regulations to personalised advisory strategies and understanding of energy products
- Developing complementary skills:
  - In-depth knowledge of B2C energy solutions (photovoltaic systems, heat pumps, energy efficiency solutions)
  - Expertise in renewable energy production and storage

Expected outcome: ability to advise customers on choosing and implementing customised energy solutions

Option 2: Data analyst for renewable energy solutions

- Capitalising on existing skills: transitioning from advanced knowledge of energy markets to predictive analysis and the ability to interpret market data and energy trends
- Developing complementary skills:
  - Advanced analytical and modelling skills (Python, R, SQL, Power BI)
  - Predictive modelling and optimization for renewable energy production and consumption

Expected outcome: ability to develop forecasting models, optimise energy flows and contribute to strategies for integrating renewable sources into energy systems

Customer support agent

Option 1: Trainer Chatbot / Prompt Engineer

- Capitalising on existing skills: transition from advanced knowledge of energy products and services to an emerging role
- Developing complementary skills:
  - Knowledge of conversational AI solutions
  - Advanced prompting: formulating clear instructions for different solutions with AI models
  - Testing and training chatbots specific to the energy sector

Expected outcome: ability to contribute to the development of chatbots for an improved experience

Option 2: Support Process Automation Specialist (No Code solutions)

- Capitalising on existing skills: transition from customer support processes and workflows to operational optimisation
- Developing complementary skills:
  - Use of No Code / Low Code platforms
  - Process modelling: identifying repetitive tasks and automating them

Expected outcome: optimising support processes through efficient automation, reducing response times and improving the customer experience.

Source: PwC estimate based on the PayWell catalogue and discussions with company and union representatives during workshops

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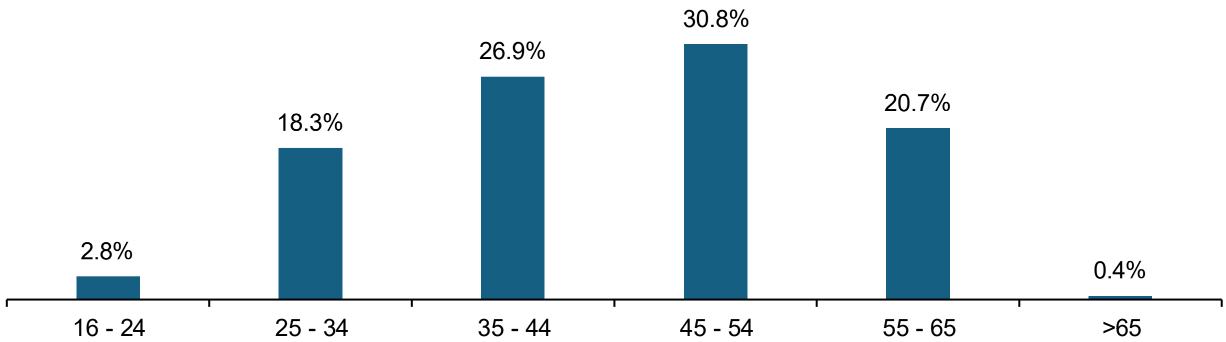
Employees' perception of the impact of AI on their work

The profile of employees in Romania's energy sector reflects an average age of 45-50, with over 12 years of service in the company.

Figure 16. Distribution by age group of employees in the energy sector (%)



Recent transformations have already had a major impact on energy employees, with changes in responsibilities and technologies used. From the employees' perspective, the changes in the workplace over the last 12 months have been significant: **67% of them learned to use new tools/technologies, and for 57%, daily responsibilities changed as the workload increased.**

67%
learned to use new tools / technologies

65%
Their activities were enhanced by technology

66%
The workload increased

57%
Daily responsibilities changed

87%
Their working relationships changed

Openness to change demonstrates a predominantly optimistic attitude among the labour force. **The attitude towards change is positive, with 90% enthusiastic about learning and growth opportunities, and 95% feeling prepared to adapt to new ways of working, despite**

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concerns about the future of their jobs for 70% of them. However, 25% of the employees in the energy sector have never used AI, mainly because they do not consider it relevant to their current role.

90%
Are enthusiastic about opportunities to learn and grow

85%
Are confident in the future of the company

95%
Feel ready to adapt to new ways of working

70%
Are concerned about the future of their jobs

39%
Consider there are too many changes happening at once

12%
Do not understand why change is necessary

Perceptions of AI reflect optimism rather than fears about its impact, but it should be noted that the effects of new technologies (including AI) on the workplace are perceived as positive by energy employees: **73% believe that AI will provide them with opportunities to acquire new skills, 70% believe that it will help them be more efficient and improve the quality of their work, and for 58% AI is a tool that will help them increase their value in the labour market.**

Reservations and limitations in AI adoption highlight practical and perceptual barriers. Currently, **28% of employees are concerned that AI will provide incorrect information and 13% believe that technology will negatively change the nature of their work.**

The focus on professional development indicates a proactive workforce that is open to learning. **Most respondents in the sector are willing to invest in professional development, both through personal resources (77%) and through courses offered by the company (58%),** demonstrating a preference for proactive career development rather than relying solely on workplace.

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Perspectives and challenges in the adoption of new technologies and AI in Romania

To obtain a comprehensive perspective, we analysed the potential barriers under four distinct aspects: (i) companies' vision, (ii) employees' perception, as well as (iii) the perspectives of authorities and (iv) social partners. The methodology included data provided by the companies participating in this study, DESI 2024 indicators, information published by the European Commission, the World Bank and other relevant PwC studies, supplemented by responses collected from representatives of authorities, social partners and employees who responded to the survey.

Aspects related to the activity of companies

- **High implementation costs**: Investments in infrastructure, software, development of customised AI solutions and hiring specialists are significant, representing one of the major barriers according to the representatives of the companies in the retail and energy sectors participating in the study.
- **Cybersecurity risks alongside integration with existing systems**
- **Lack of specialists in technology & AI**: The Romanian labour market is facing a shortage of IT specialists according to DESI 2024, which impedes the development and implementation of automation and AI projects. At the same time, the capacity to retain human capital with technological skills is low, Romania being one of the largest sources of migration with 4 million Romanians leaving the country according to World Bank estimates. Thus, the difficulty of hiring qualified personnel is a problem for 63% of companies, along with the lack of skills and competencies of employees for 32% of them (European Commission).
- **Limited access to data**: The development of AI algorithms requires large volumes of data, and in Romania the access to relevant data is limited due to the low level of digitization of processes and limited access to data silos.
- **Lack of financial incentives:** The provision of grants, subsidies and tax incentives to the companies investing in this technology and in labour force skills training is very limited, and the authorities have confirmed that they are only able to reach a small number of companies.

Aspects of the legislative and regulatory framework of AI

- **Insufficient legislative framework**: Romanian legislation on AI is still developing and does not cover all ethical, security and liability issues related to the use of this technology.
- **The lack of a centralised infrastructure** for data collection and the irregular, non-standardised and non-interoperable publication of open data is a problem identified

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in the discussions with the Ministry of Education, the Romanian Digitalization Authority, the Ministry of Labour and ANOFM.

Aspects highlighted by the social partners

- **Insufficient and ineffective social dialogue**: The constructive dialogue between trade unions, employers and authorities to manage the impact of AI on the labour market and to ensure a fair transition to a digital economy is currently only a goal, as social dialogue groups at sectoral level are not functional at national level, according to CNS Cartel Alfa and FS Gaz Romania. Trade unions also feel that there is a lack of communication regarding employers' intentions about which jobs will be affected by technology and related development plans, signalling an exclusive focus on increasing efficiency and reducing costs.
- **Collective bargaining not adapted to the new realities**: The lack of concrete discussions on national collective labour agreements (with the exception of those in the banking and insurance-reinsurance sectors) does not allow, from the trade unions' perspective, for adaptation to the new realities of the labour market influenced by AI by setting a concrete basis for projects. Thus, according to CNS Cartel Alfa, there is a lack of joint measures between employers and trade unions in the private sector with regard to retraining, protection and job security for the employees affected by the negative effects of new technologies. The FS Gaz trade union also sees the risk of systemic discrimination against employees who do not have AI skills.
- **Lack of national-level debates between trade union confederations**: As national discussions have not yet taken place, without a common understanding and a unified strategy on the impact of AI, trade unions risk being unable to effectively represent the interests of the employees affected by automation or other technological changes.

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ESTIMATED ECONOMIC IMPACT

The implementation of AI in the energy and retail sectors generates a significant economic impact, reflected both in labour force trends and in wage dynamics.

The implementation of automation and AI in the energy sector will generate an increase of **18%** of wages and will contribute by **734** million RON to the state budget by 2030

The implementation of automation and AI in the retail sector will generate an increase of **12%** of wages and will contribute by **4.8** billion RON to the state budget by 2030

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The implementation of AI in the energy and retail sectors generates a significant economic impact, reflected both in the evolution of the labour force and in wage dynamics. For the energy sector, a gradual increase in the average number of employees by 200 people per year has been estimated, supported by the acceleration of electrification processes and the increased need for investment in energy grids. This trend was validated during consultations with the companies in the sector, which confirm a low fluctuation rate of between 1% and 3% in the short term, indicating relative stability in the labour force in the context of technological transformation.

From a wage growth perspective, the two sectors show different dynamics, with two main projection scenarios. In the energy sector, the baseline scenario estimates an average annual wage growth of 6%, in line with the National Commission for Strategy and Prognosis' forecast for the average gross wage in the economy until 2028. For the retail sector, the baseline scenario forecasts an accelerated growth of 7% annually, above the national average, driven by the specific dynamics of this sector and the impact of the minimum wage increase.

The optimistic scenario reflects the transformative potential of AI implementation on productivity and labour force skills. In both sectors, this scenario projects a 9% annual wage increase, based on improving employee skills through AI adoption and increasing productivity resulting from work process optimisation. This difference of 3 percentage points compared to the baseline scenario in the energy sector and of 2 percentage points in the retail sector illustrates the concrete economic benefits of investing in AI.

The fiscal impact of these developments is substantial, contributing to the consolidation of budget revenues through multiple channels. For social contributions and income tax, calculations are based on an effective tax rate of 37%, according to Eurostat data for 2024, applied to gross wages in the two sectors. In addition, the consumption generated by the increase in wage income fuels VAT revenues, calculated based on an effective rate of 14.7% for 2024, applied to 70% of net wages, representing the estimated consumption rate adjusted for a conservative outlook.

These estimates, made under the assumption that the current tax regime will remain in place (*ceteris paribus*, May 2025), provide an overview of the economic benefits of implementing AI by 2030. The positive impact is evident both at the microeconomic level, through increased employee income and increased company competitiveness, and at the macroeconomic level, through the consolidation of the tax base and the stimulation of consumption.

By implementing automation and AI in the energy sector, salaries will increase by 18% and additional revenues of RON 734 million will be generated for the state budget by 2030, compared to the scenario in which these technologies would not be adopted, as shown in the Figures below.

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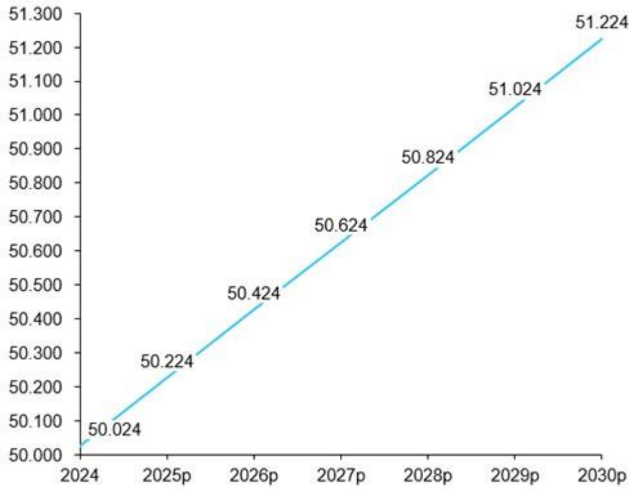
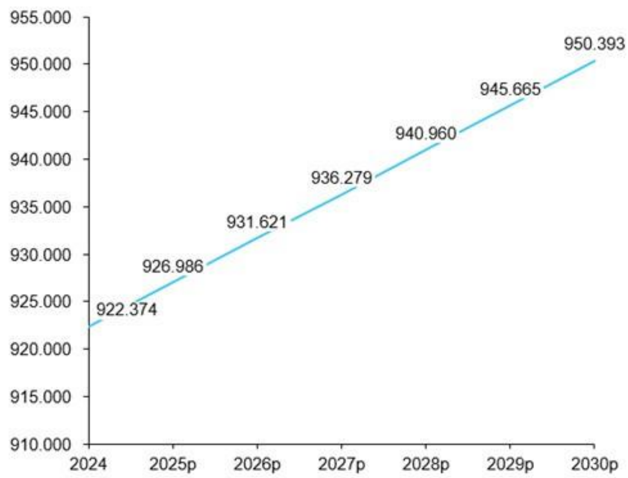
Figure 17. Forecast of the average number of employees in the energy sector



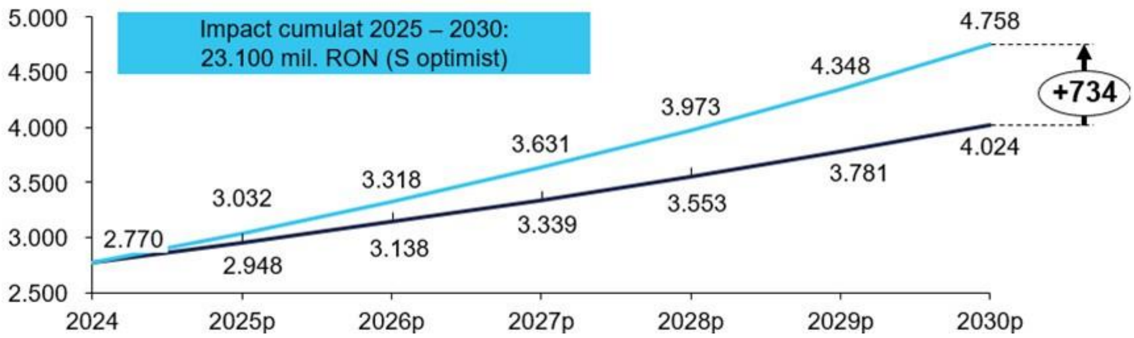
Source: PwC Estimate

Figure 18. Forecast of the average number of employees in the retail sector



Source: PwC Estimate

Figure 19. Estimated state budget revenues from social contributions, income tax and VAT due to wage increases in the energy sector (RON million)



Source: PwC Estimate

The implementation of automation and AI in the retail sector will generate a 12% increase in wages and contribute an additional RON 4.8 billion to the state budget by 2030, compared to a scenario where these technologies would not be adopted.

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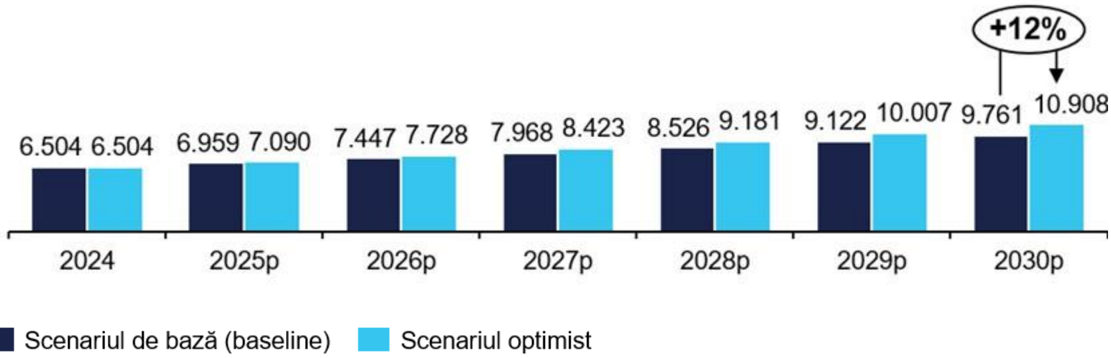
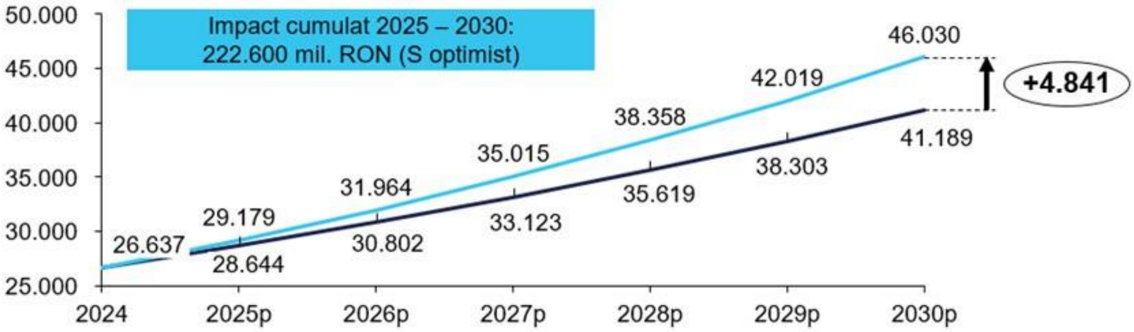
Figure 20. Forecast of average gross salary in the retail sector (RON)



Source: PwC Estimate

Figure 21. Estimated state budget revenues from social contributions, income tax and VAT due to wage increases (RON million)



Source: PwC Estimate

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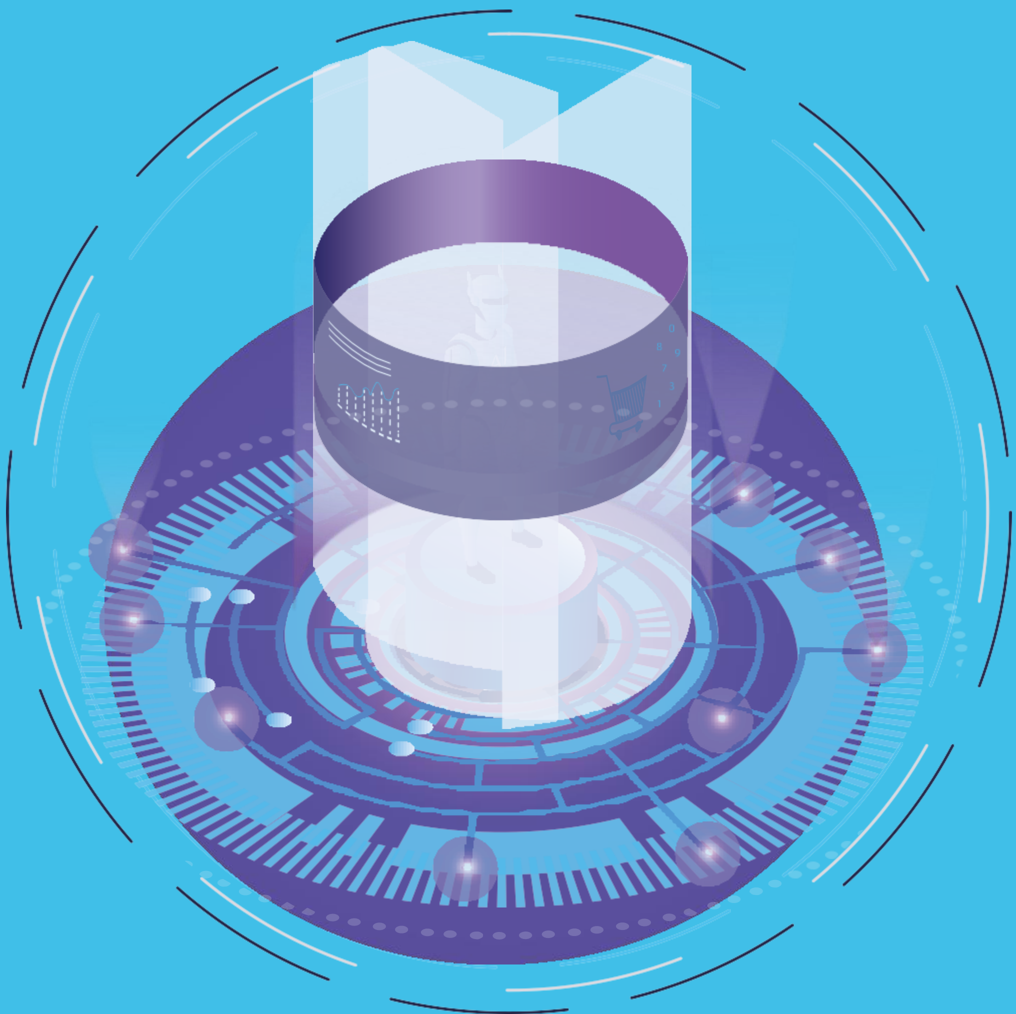
CONCLUSIONS AND ADVICE

Implementation of structured national programmes for the development of digital and AI skills in the energy and retail sectors based on the DigCompRo national framework.

Aligning national strategic documents with labour market realities

Facilitating access to financing for digitization projects

Monitoring the social and economic impact of digital transformation



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Romania ranks last in the EU in terms of AI adoption in the business environment, with only 3.1% of companies using AI technologies in 2024, compared to the EU average of 13.5% according to Eurostat.

However, estimates of the impact of automation and AI in Romania's retail and energy sectors reveal significant potential for economic transformation. The implementation of AI technologies could generate wage increases of up to 18% in the energy sector and 12% in retail, contributing over RON 5.5 billion to the state budget by 2030 (cumulative value). Although most jobs at high risk of automation will benefit from the expansion of existing role skills through partial reskilling, the analysed sectors present concrete opportunities for occupational transition for employees, from traditional roles to emerging positions with higher added value.

Recommendations for maximising the benefits of digital transformation:

- **The national digital competence framework for Romanian citizens, a strategic tool for developing digital competences at national level**. The implementation of structured national programmes for developing digital and AI competences in the energy and retail sectors based on the DigCompRo national framework, with a focus on retraining employees in positions at high risk of automation for emerging roles with higher added value.
- **Aligning national strategic documents with labour market realities**. Updating the AI National Strategy 2024-2027 and the National Action Plan for the Digital Decade by including specific measures for protection and professional retraining for the energy and retail sectors, in line with the results of the study on the impact on the labour force.
- **Facilitating access to financing for digitization projects**. Creating dedicated financial instruments to support investments in AI and automation technologies, including guarantee and co-financing schemes for small and medium-sized companies in the analysed sectors, to accelerate technology adoption.
- **Strengthening data infrastructure and interoperability.** Developing a national energy and commercial data platform to facilitate the integration of AI systems, complying with cybersecurity and data protection standards, to optimise operational efficiency at sector level.
- **Adapting the regulatory framework for the digital age**. Modernising legislation and regulations in the energy and retail sectors to remove the barriers to the adoption of AI and automation, clarifying issues related to responsibility, transparency and the return on investment in new technologies.
- **Creating public-private partnerships for innovation**. Establishing innovation ecosystems through strategic cooperation between the public sector, universities and private companies to develop and test AI solutions tailored to the specific Romanian energy and trade sectors.

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- **Monitoring the social and economic impact of digital transformation**. Implementing a system for continuous monitoring and evaluation of the effects of AI implementation on the labour force, productivity and budget revenues, in order to adjust public policies according to observed developments.

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APPENDICES

Table 8. Description of technologies

#	Typology
1	**An application programming interface (API)** is a way to programmatically (usually externally) access models, datasets or other software components.
2	**Artificial intelligence (AI)** is the ability of software to perform tasks that traditionally require human intelligence.
3	**Artificial neural networks (ANNs)** are made up of interconnected layers of software-based computers, known as "neurons." These networks can absorb vast amounts of input data and can process such data through multiple layers that extract and learn the characteristics of the data.
4	**Deep learning** is a branch of machine learning that uses deep neural networks, i.e., layers of connected "neurons" whose connections have parameters or weights that can be trained. It is particularly effective in learning from unstructured data such as images, text and sound.
5	**Foundation models** are deep learning models trained on significant amounts of unstructured and unlabelled data, which can be used for a wide range of tasks from the outset or adapted to specific tasks through fine-tuning. Examples: GPT-4, PaLM, DALL·E 2, Stable Diffusion.
6	**Generative artificial intelligence (generative AI)** is a type of AI typically built on fundamental models, and which has capabilities that previous AI did not have, such as the ability to generate content. Fundamental models can also be used for non-generative purposes (e.g., classifying user sentiment based on call transcripts), while offering significant improvements over previous models.
7	**Graphics processing units (GPUs)** are computer chips originally developed for rendering graphics (e.g., for video games) and they are also useful for deep learning applications. In contrast, traditional machine learning and other analyses typically run on central processing units (CPUs), commonly referred to as a computer's "processor".
8	**Large language models (LLMs)** are a class of fundamental models that can process massive amounts of unstructured text and can learn relationships between words or parts of words, known as tokens. This allows LLMs to generate natural language text, performing tasks such as summarisation or knowledge extraction. Examples: GPT-4 (which powers ChatGPT).

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9	**Machine learning (ML)** is a subfield of AI in which a model acquires capabilities after being trained with many examples of data. ML algorithms detect patterns and learn to make predictions and recommendations by processing data and experiences, without receiving explicit programming instructions. Algorithms can adapt and become more efficient as they receive new data
10	**Self-attention**, sometimes referred to as internal attention, is a mechanism that attempts to mimic cognitive attention by linking different positions in a sequence to calculate a representation of the sequence.
11	**Structured data** are tabular data (e.g., organised in tables, databases or spreadsheets) that can be used effectively to train machine learning models.
12	**Transformers** are a relatively new neural network architecture that relies on self-attention mechanisms in order to transform a sequence of inputs into a sequence of outputs, focusing its attention on the important parts of the context surrounding the inputs. They do not rely on convolutional or recurrent networks.

Table 9. DESI indicator targets by 2030

	Romania			**EU**		**Digital Decade target by 2030**	
2030 Digital Decade: KPI 2024	**DESI 2023**	**DESI 2024**	**Annual progress**	**DESI 2024**	**Annual progress**	**RO**	**EU**
Fixed Very High-Capacity Network (VHCN) coverage	95.60%	95.00%	-0.60%	78.80%	7.40%	99%	100 %
Fibre to the Premises (FTTP) coverage	95.60%	95.00%	-0.60%	64.00%	13.50%	99%	-
Overall 5G coverage	26.80%	32.80%	22.40%	89.30%	9.80%	62%	100 %
SMEs with at least a basic level of digital intensity	22.20%	26.80%	9.90%	57.70%	2.60%	75%	90%

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Cloud	11.30%	15.50%	17.10%	38.90%	7.00%	40%	75%
Artificial Intelligence	1.40%	1.50%	3.50%	8.00%	2.60%	10%	75%
Data analytics	NA	21.90%	NA	33.20%	NA	15%	75%
IA or Cloud or Data analytics	NA	28.70%	NA	54.60%	NA		75%
At least basic digital skills	27.80%	27.70%	-0.20%	55.60%	1.50%	50%	80%
ICT specialists	2.80%	2.60%	-7.10%	4.80%	4.30%	4%	~10 %
Digital public services for citizens	47.6	52.2	9.70%	79.4	3.10%	100	100
Digital public services for businesses	44.6	50	12.10%	85.4	2.00%	100	100
Access to e-Health records	57.1	58.6	2.70%	79.1	10.60%	x	100

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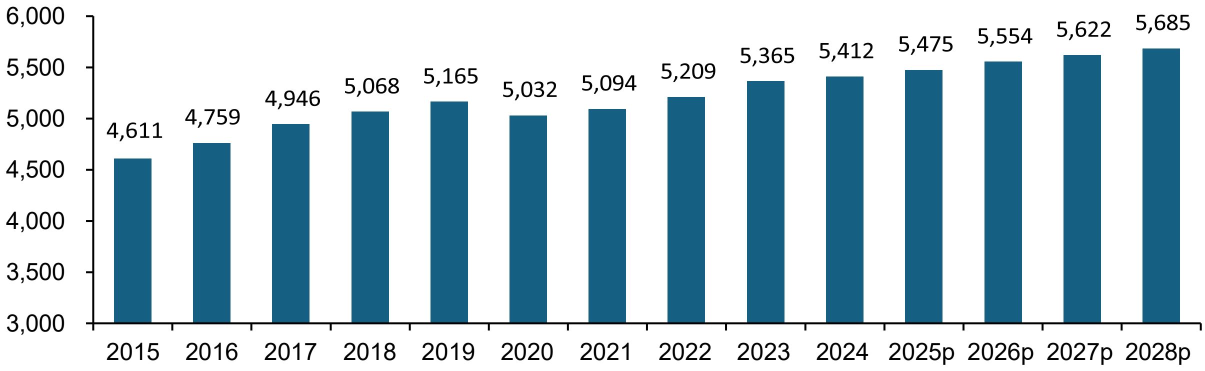
Tabel 10. Evolution of the average number of employees at sector level (thousands of persons, 2017 - 2023)

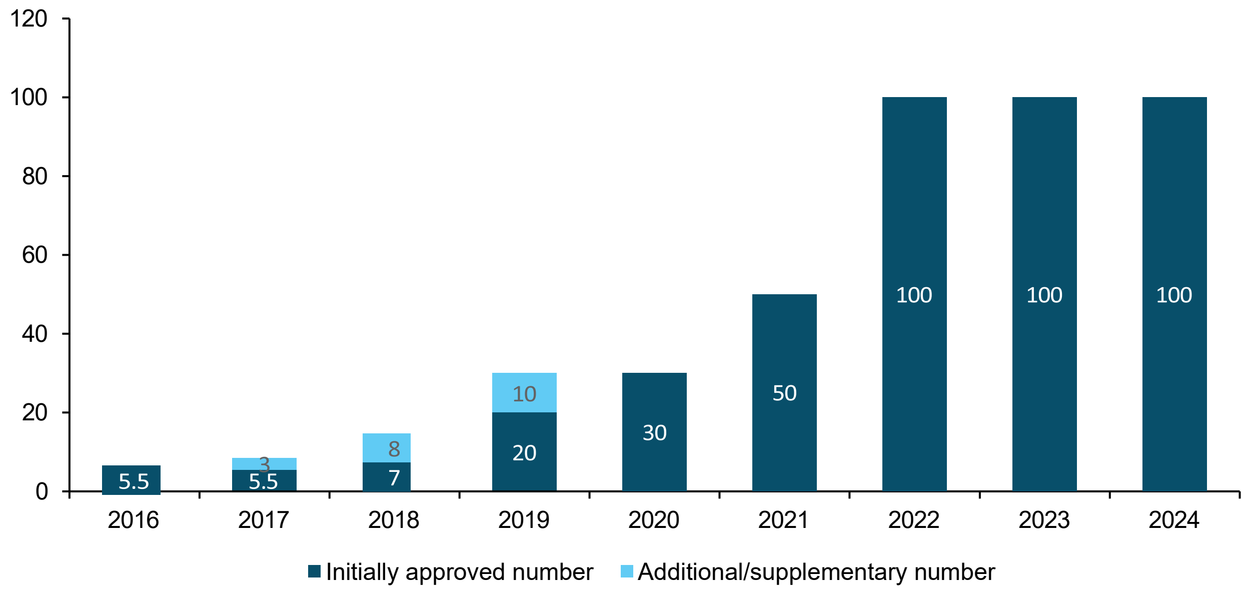
Sector	2017	2023	Variation (2023 vs 2017)
A AGRICULTURE, FORESTRY AND FISHERIES	122	131	8%
B MINING INDUSTRY	51	44	-15%
C MANUFACTURING INDUSTRY	1195	1134	-5%
D PRODUCTION AND SUPPLY OF ELECTRICITY AND HEAT, GAS, HOT WATER AND AIR CONDITIONING	53	51	-4%
E WATER DISTRIBUTION; SANITATION, WASTE MANAGEMENT, DECONTAMINATION ACTIVITIES	102	106	4%
F CONSTRUCTIONS	370	463	25%
G WHOLESALE AND RETAIL TRADE; REPAIR OF MOTOR VEHICLES AND MOTORCYCLES	834	915	10%
H TRANSPORT AND STORAGE	277	296	7%
I HOTELS AND RESTAURANTS	170	202	19%
J INFORMATION AND COMMUNICATIONS	170	243	43%
K FINANCIAL INTERMEDIATION AND INSURANCE	89	89	0%
L REAL ESTATE TRANSACTIONS	28	31	13%
M PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES	158	201	27%
N ADMINISTRATIVE SERVICES AND SUPPORT SERVICES	290	323	12%
O PUBLIC ADMINISTRATION AND DEFENCE; SOCIAL SECURITY IN THE PUBLIC SYSTEM	200	206	3%
P EDUCATION	352	356	1%
Q HEALTH AND SOCIAL CARE	367	440	20%
R PERFORMANCE, CULTURAL AND RECREATIONAL ACTIVITIES	68	77	13%
S OTHER SERVICE ACTIVITIES	49	57	15%
TOTAL	4946	5365	8%

Figure 22. Evolution of the average number of employees in Romania and forecasts (thousands of persons, 2015 - 2028)



Source: National Strategy and Prognosis Commission (autumn prognosis, December 2024)

Figure 23. Quota of non-EU workers (thousands of people, 2016 – 2024)



Source: Ministry of Labour, Family, Youth and Social Solidarity, PwC analysis, Explanatory Note to Government Resolution No. 968/2019 and Government Resolution No. 1448/2022, General Inspectorate for Immigration.

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Table 11. Prospects for transforming the roles with high or medium potential for automation through technology and AI in Retail:

Current role	Transferable skills	Potential new roles	Skills needed in transition
Cashier	Cash register/POS operation (basic)	**Customer Service Representative/Customer Experience**	Average interpersonal communication and written communication (email, chat) Basic knowledge of new technologies (AI, AR/VR)
	Cash/card management	**Operation/Technical Support for automated systems - first level**	Average skills in specific automated systems
	Interpersonal communication (basic)	**Food Production (Butcher, Baker, Assistant Cook)**	Knowledge of specific technological processes and food safety
Merchandiser	Sales analysis	**Graphic Designer**	Basic graphic design
	Visual Merchandising	**Digital content developer**	Storytelling digital, editing video
	Supplier relations Promotional planning	**Customer Experience Specialist**	Effective digital communication (email, chat, social media) Knowledge of new technologies (IA, AR/VR, chatbots)
	Inventory management	**Procurement Specialist**	Operating advanced systems/specific software (Business Intelligence, CRM AI, Supply Chain, SEO, logistics systems)
Cargo handler	Equipment operation	**Automated equipment operator**	Basic technical skills for operating automated equipment
	Organisation and inventory management skills - basic level	**Logistics Specialist**	Average knowledge of inventory management software (ERP, WMS) and logistics processes
	Basic knowledge of workplace safety	**Safety & Equipment Instructor (specialising in robotics/automation)**	Advanced knowledge of OHS legislation Basic knowledge of mechanics, electrical engineering, robotics
Sales Assistant	Interpersonal communication (intermediate)	**Omnichannel Customer Service Representative**	Operation of advanced systems/specific software (CRM, customer support platforms)
	Focus on the customer	**Customer Experience Specialist**	Use of eCommerce platforms and digital marketing tools
	Inventory management and product placement on shelves	**Online Sales Specialist**	Consultative and customised sales skills in multiple environments (cross-selling, up-selling)
	Basic use of software applications (e.g.POS, CRM)	**Visual Merchandiser**	Knowledge of visual merchandising/store layout
	Sales techniques (basic)	**Specialised Sales Consultant**	Advanced interpersonal communication (complex problem solving, complaint handling, relationship building) Knowledge of new technologies (IA, AR/VR, chatbots) Effective digital communication (email, chat, social media)

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Current role	Transferable skills	Potential new roles	Skills needed in transition
Procurement Manager	Negotiation and leadership	**Data Analyst**	Advanced data analysis and reporting
	Data analysis and reporting	**Project Manager**	Advanced software knowledge of Business Intelligence, ERP, BPM, AI
	Knowledge of products and markets	**Supply Chain Specialist**	Project management and team coordination skills
	Supplier relationship management	**Supplier Relations Manager**	Inventory planning
	Procurement planning		Basic knowledge of project management
	Cost optimisation		Predictive analytics skills
			Financial and accounting knowledge
Logistics Specialist	Flow & Stock Planning	**Data Analyst**	Advanced data analysis and reporting
	Basic data analysis and reporting	**Automation Solutions Implementation Specialist**	Knowledge of automation, IoT, systems integration, robotics
	Use of specific mid-level logistics software	**Logistics Process Analyst**	Predictive analytics skills
	Knowledge of transport and customs regulations	**Inventory Optimisation Specialist**	Advanced software knowledge of WMS, Business Intelligence, AI and Machine Learning
	Supply chain and distribution management		Process design, process mapping
	Managing relationships with suppliers and carriers		
Digital marketing specialist	Data analysis & reporting	**Marketing Automation Specialist**	Advanced skills in using BI, CRM, RPA, and AI software for automation, segmentation and personalisation
	Cross-channel digital campaign management		Algorithms, advanced SEO, predictive models for consumer behaviour - foresight & trend hunting
	Content strategy and SEO	**Social Media Specialist**	Influencer marketing, use of GenAI for multimedia content generation
	PPC and SEM campaign optimisation	**Product Marketing Manager**	Knowledge of product management, digital funnel analysis
	Digital communication and social media	**Media Buyer**	Advanced skills in media buying, budget optimisation, media strategy and the use of AI technologies for programmatic advertising
	Advanced knowledge of specific digital platforms	**Community Manager**	Online community management, AI-assisted engagement
	Content creation (text, video, graphics)	**Predictive Analytics Specialist**	Predictive models for consumer behaviour - foresight & trend hunting

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Current role	Transferable skills	Potential new roles	Skills needed in transition
Business analyst	Requirements management and documentation	**Product Manager for Digital Solutions / e-commerce**	Product strategy; UX & Customer Centricity; digital marketing skills
	Problem analysis and resolution	**Project Manager**	Project management skills
	Project management	**Process automation specialist (RPA)**	Process modelling and automation; use of RPA platforms
	Complex information communication and presentation	**Risk Analyst**	Predictive analytics; risk modelling with AI
	Understanding complex processes	**GenAI solutions configuration specialist (e.g. Copilot)**	Advanced GenAI solutions skills
HR Specialist	HR legislative knowledge	**Specialist Employee Experience**	Advanced organisational change techniques, employee experience design
	Recruitment and selection	**People Analytics Specialist**	HR data analysis, statistics, BI tools
	Performance management	**Mediator**	Advanced knowledge of mediation, non-violent communication, conflict resolution
	Change management	**HR Transformations Project Manager**	Process analysis skills, digital optimisation, project management, AI integration into HR processes
	Communication and negotiation skills	**Change Management Specialist**	Development of engagement programmes, organisational storytelling
	Management of administrative processes	**Coach**	Coaching, design thinking
	Conflict resolution	**Harassment specialist**	Legal, psychological, ethical and compliance skills.
	Managing relationships with employees and candidates	**People & Culture Specialist**	Organisational culture, wellbeing programmes, inclusion, equity, employee experience design
	Project organisation and management skills	**L&D Specialist**	Digital content creation, LMS, microlearning, AI for learning personalisation
Accountant	Financial data analysis and interpretation	**ERP Consultant**	Advanced ERP systems skills, data analysis, IT skills, training
	Financial reporting	**Specialist in accessing European Funds**	Researching funding opportunities, writing EU projects
	Cost control	**Internal auditor (including financial algorithms)**	Regulatory knowledge, auditing, financial algorithms, risk assessment
	Budgeting and forecasting	**Tax consultant**	Medium-level project planning and management
	Financial legislative knowledge	**Non-financial reporting specialist (ESG)**	ESG knowledge, sustainability data collection, reporting standards
		Compensation & Benefits Specialist	Skills in salary data modelling, labour legislation, compensation programme development

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Table 12. Prospects for transforming roles with high or medium automation potential through technology and AI in energy:

Current role	Transferable skills	Potential new roles	Skills needed in transition
Electricity trading analyst	Analytical and modelling skills	**Renewable energy data analyst**	Big data skills
	Advanced knowledge of energy markets and regulatory environments	**Energy risk management consultant**	Advanced risk management knowledge
	Risk management and evaluation of trading opportunities	**B2C Energy Solutions Consultant**	Advanced knowledge in renewable energy production and storage
	Advanced knowledge of trading platforms and analytical tools		
Custoer support agent	Advanced knowledge of products and services	**Trainer Chatbot / AI - Prompt engineer**	Advanced prompting skills (AI)
	Customer focus; strong communication and organisational skills	**B2C Energy Solutions Consultant**	In-depth knowledge of energy solutions
	Documentation skills	**Support Process Automation Specialist with No Code Solutions**	No Code Platform Skills
Debt collection specialist	Knowledge of debt collection legislation	**Specialist in automated debt collection**	Use of automated collection platforms
	Effective communication with debtors	**Risk Analyst**	Advanced data analysis and risk identification & assessment skills
	Advanced negotiation and persuasion skills	**Financial advisor for clients with payment difficulties**	Financial knowledge
	Problem solving and conflict management	**Mediator in dispute resolution**	Advanced mediation and negotiation skills
Energy and Services Sales Advisor	Customer focus; strong communication skills Sales techniques (intermediate)	**B2C Energy Solutions Consultant**	In-depth knowledge of energy efficiency, renewable energy, energy storage, energy solutions Advanced consultative selling skills
	Knowledge of the energy market and specific products/services	**Customer Relations Manager**	Advanced interpersonal communication Basic knowledge of new technologies (IA, chatbots)
	Negotiation skills	**Customer Experience Specialist**	Knowledge of design thinking, customer journey mapping and other methodologies for improving customer experience Effective digital communication (including social media)

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Current role	Transferable skills	Potential new roles	Skills needed in transition
Electrician mentenanță	Advanced technical knowledge of electricity and electronics	**Operator of drones for electrical inspections**	Skills in operating drones, regulations
	Skills in diagnosing, troubleshooting and repairing electrical installations and equipment	**Predictive maintenance technician**	Advanced software monitoring, diagnosis and predictive maintenance skills
	Safety knowledge and regulations in the electrical field	**Systems automation technician**	Use of energy-specific technologies; advanced knowledge of automation
Electrician construcții energetice	Construction and modernisation of aerial and underground distribution power lines	**Solar photovoltaic system installer**	Drone operation (including legislation) and image interpretation skills
	Construction and modernisation of transformer stations	**Operator of drones for electrical inspections**	Monitoring and control of smart grids
	Construction and modernisation of consumer connections	**SCADA monitoring technician**	Average knowledge of SCADA, HMI, PLC systems
	Advanced technical knowledge of electricity and electronics	**Renewable energy source operator**	Data analysis and anomaly identification
	Equipment troubleshooting and diagnosis skills	**Specialist in integrating renewable energy systems into distribution networks**	Knowledge of renewable energy and grid integration
			Operation and monitoring of renewable energy production facilities
Specialist marketing digital	Data analysis & reporting	**Marketing Automation Specialist**	Advanced skills in using BI, CRM, RPA, and AI software for automation, segmentation and personalisation
	Cross-channel digital campaign management		Algorithms, advanced SEO
	Content strategy and SEO	**Social Media Specialist**	Influencer marketing, use of GenAI for multimedia content generation
	PPC and SEM campaign optimisation	**Product Marketing Manager**	Knowledge of product management, digital funnel analysis
	Digital communication and social media	**Media Buyer**	Advanced skills in media buying, budget optimisation, media strategy and the use of AI technologies for programmatic advertising
	Advanced knowledge of specific digital platforms	**Community Manager**	Online community management, AI-assisted engagement
	Content creation (text, video, graphics)	**Predictive Analytics Specialist**	Predictive models for consumer behaviour - foresight & trend hunting
Analist de business	Requirements management and documentation	**Product Manager for Digital Solutions / e-commerce**	Product strategy; UX & Customer Centricity; digital marketing skills
	Problem analysis and resolution	**Project Manager**	Project management skills
	Project management	**Process Automation Specialist (RPA)**	Process modelling and automation; use of RPA platforms
	Communication and presentation of complex information	**Risk Analyst**	Predictive analytics; risk modelling with AI
	Understanding complex processes	**GenAI solutions configuration specialist (e.g. Copilot)**	Advanced GenAI solutions skills

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Current role	Transferable skills	Potential new roles	Skills needed in transition
Specialist HR	HR legislative knowledge	**Employee Experience Specialist**	Advanced organisational change techniques, employee experience design
	Recruitment and selection	**People Analytics Specialist**	HR data analysis, statistics, BI tools
	Performance management	**Mediator**	Advanced knowledge of mediation, non-violent communication, conflict resolution
	Change management	**HR Transformations Project Manager**	Process analysis skills, digital optimisation, project management, AI integration into HR processes
	Communication and negotiation skills	**Change Management Specialist**	Developing engagement programmes, organisational storytelling
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	Managing relationships with employees and candidates	**People & Culture Specialist**	Organisational culture, wellbeing programmes, inclusion, equity, employee experience design
	Project organisation and management skills	**L&D Specialist**	Digital content creation, LMS, microlearning, AI for learning customisation
Contabil	Analysis and interpretation of financial data	**ERP Consultant**	Advanced ERP systems, data analysis, IT skills, training
	Financial reporting	**Specialist in accessing European Funds**	Researching funding opportunities, writing EU projects
	Cost control	**Internal auditor (including financial algorithms)**	Regulatory knowledge, auditing, financial algorithms, risk assessment
	Budgeting and forecasting	**Tax Consultant**	Medium-level project planning and management
	Financial legislative knowledge	**Non-financial reporting specialist (ESG)**	ESG knowledge, sustainability data collection, reporting standards
		Compensation & Benefits Specialist	Skills in salary data modelling, labour legislation, compensation programme development

Figure 24. The attitude of Romanian employees in the retail sector towards the effects of technology & AI on the workplace

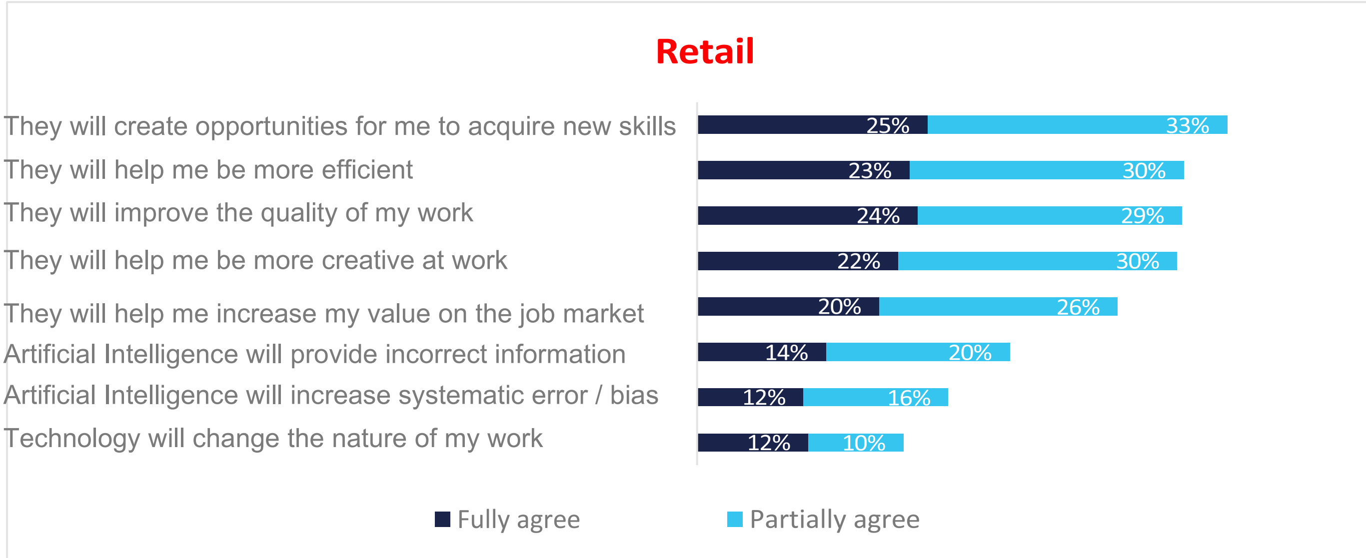

Figure 25. Frequency of AI use by Romanian employees in the retail sector

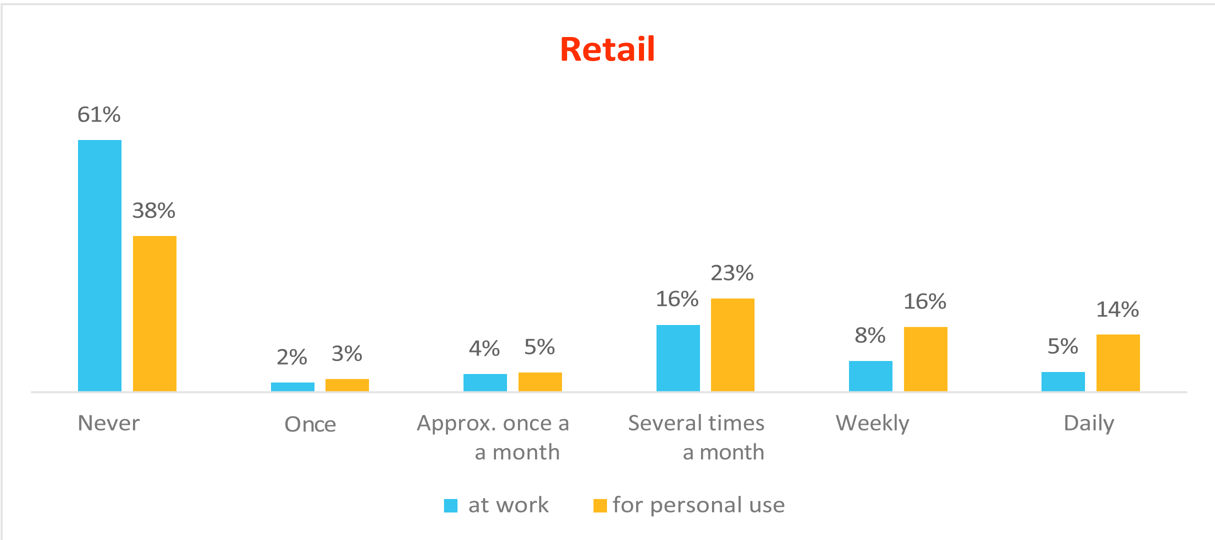

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Figure 26. Preferences of Romanian employees in the retail sector regarding career development options

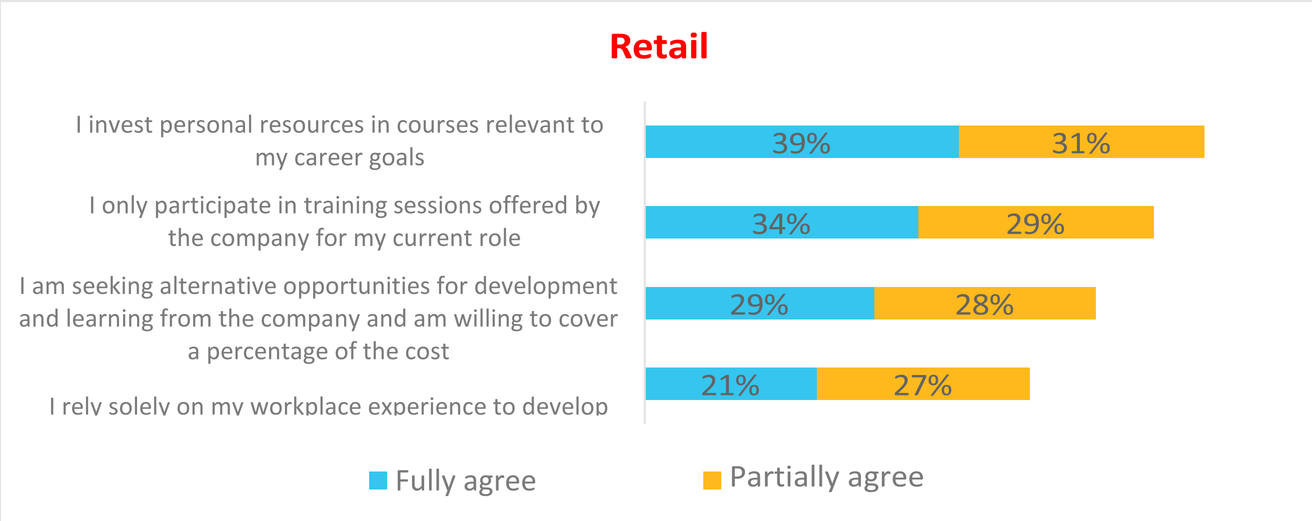

Figure 27. Perception of Romanian employees in the retail sector regarding the responsibility for their own learning and development

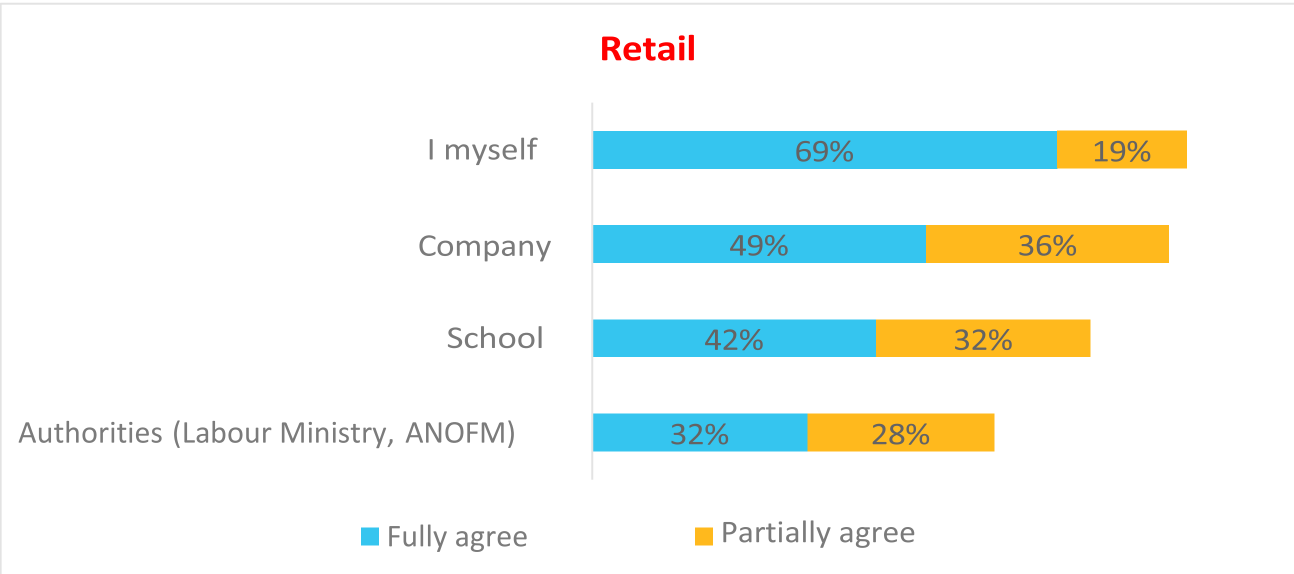

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Figure 28. The attitude of Romanian employees in the energy sector towards the effects of technology & AI on the workplace

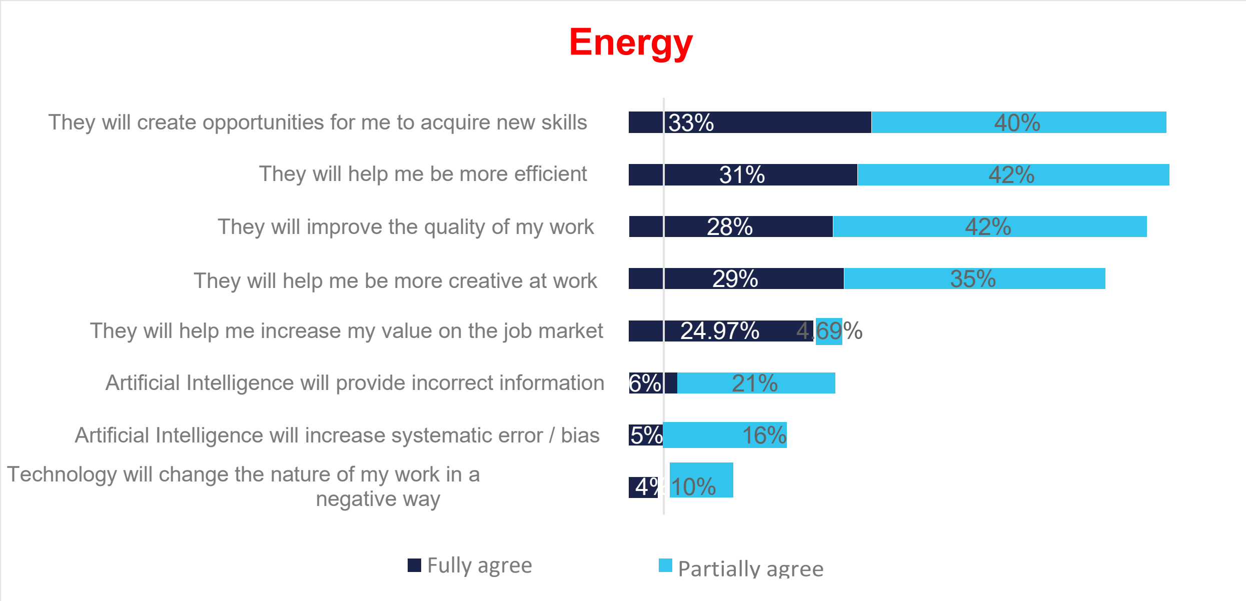

Figure 29. Frequency of AI use by Romanian employees in the energy sector

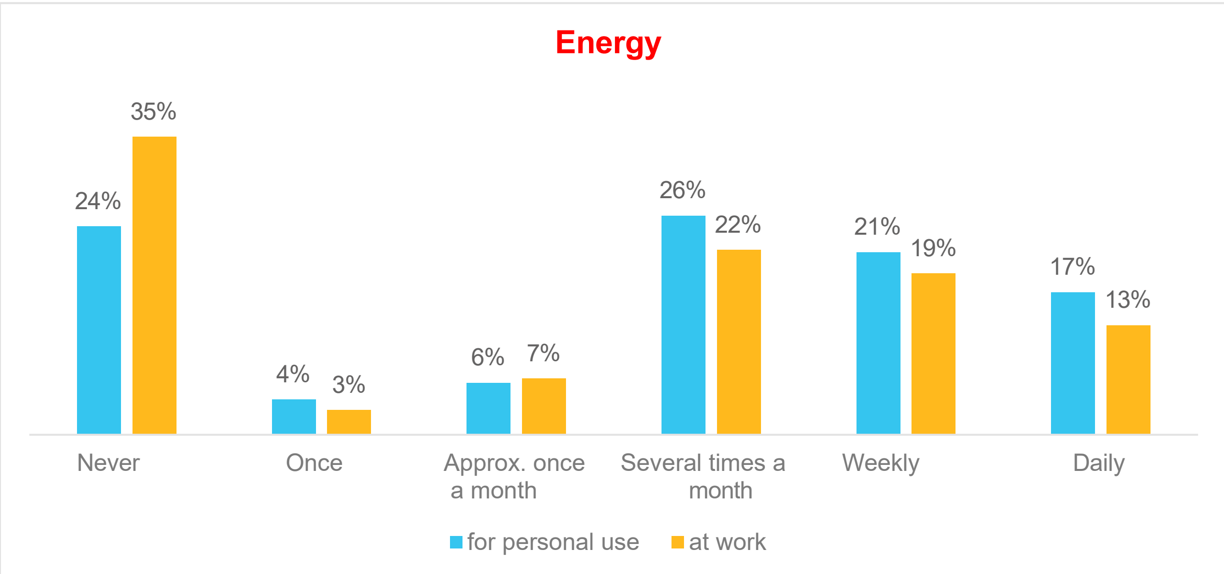

Figure 30. Preferences of Romanian employees in the energy sector regarding career development options

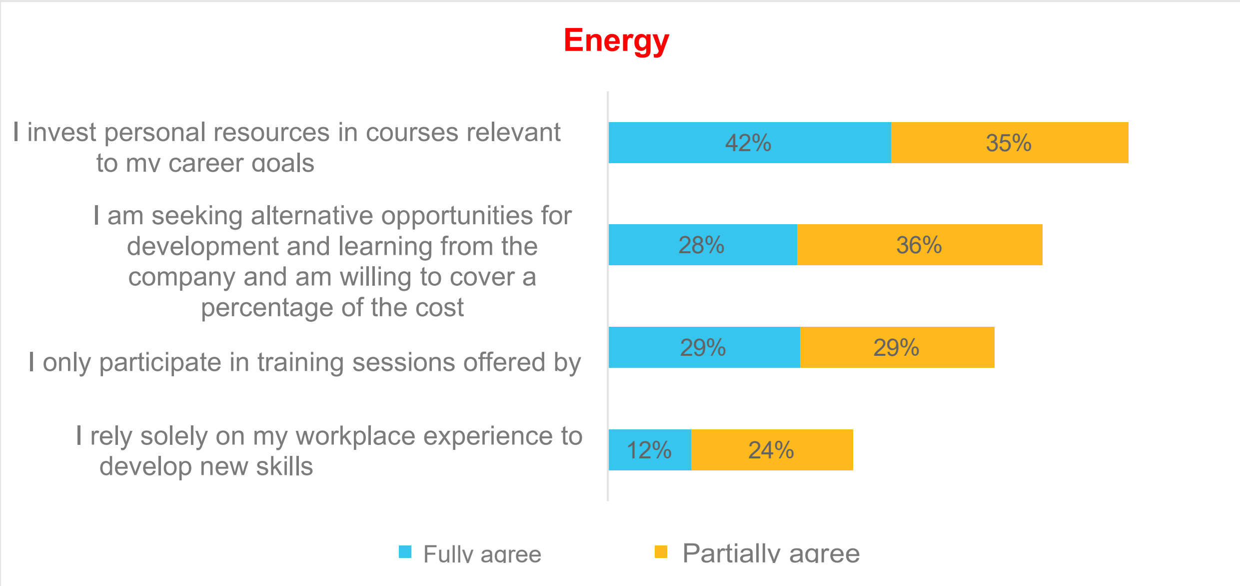

Figure 31. Perception of Romanian employees in the energy sector regarding the responsibility for their own learning and development