

Education and Labour

Automation and Robotisation of Work



The National Research University Higher School of Economics Institute for Statistical Studies and Economics of Knowledge (HSE ISSEK) presents the results of a human capital trends study. The study methodology included big data mining using the HSE ISSEK-developed [iFORA system](#), expert sessions, and a Delphi survey of more than 400 leading international and Russian scientists specialising in human capital.

The project is being implemented by the World-Class Human Capital Multidisciplinary Research Centre and the UNESCO Futures Studies Chair (UNESCO Futures Literacy Chairs network). A complete list of trends is available in a unique open-access database at https://ncmu.hse.ru/chelpoten_trends.

The Trend's Structure

- **Changing role of people in production**

People's role in production processes is radically changing. According to the World Economic Forum (WEF), by 2025 work will be divided between people and machines approximately equally: the former will focus on control functions, while the latter will be responsible for most of the routine operations, including those related to data processing.

Robotics have significant growth potential: by 2030 the relevant global market is expected to reach 225.6 billion USD (88.2 billion USD in 2022). The growth will be driven by the demand for automation of production operations and personal tasks as well as the opportunity to increase performance and reduce costs.

Technological progress leads to the emergence of new professions and the creation of new jobs in innovative industries. The length of technologies' life cycle determines how long the demand for relevant skills will last. Further, some experts point out that new technologies do not so much eliminate old professions as change the nature of existing ones.

Over time, the range of responsibilities robots and algorithms can perform better than humans will expand. This will create demand for abilities AI does not yet have: cognitive adaptability and empathy, advanced design thinking, creativity, and emotional intelligence. The changing role of human workers in production creates a need for retraining not just because people are replaced by machines, but for skills required

- **Regulation of the human-machine interactions in the new division of labour**

to interact with these machines. According to a Mercer survey, 43% of company employees believe that acquiring relevant competencies is the key to professional success.

In the long term, digital technologies and automation can negatively affect people's employment and well-being (e.g., increased number of precarious workers). These risks vary across countries depending on the socio-economic and demographic situation. To secure broad public support for the processes taking place on the labour market due to technological progress, social protection policies must take into account the interests of those who do not directly benefit from innovation.

Many countries (including the US, UK, Japan, and Singapore) still lack comprehensive laws regulating AI. The relevant responsibilities are assigned to various government bodies. The widest set of rules applies in China. It includes a code of ethics integrated into the lifecycle of every intelligent system, which mandates labelling or tagging AI-generated content. A draft plan to manage generative AI was published, requiring companies to conduct a security assessment before launching relevant services. In 2023 the EU is expected to complete work on a regulatory framework that would provide a legal definition of AI and establish regulation procedures based on breaking products down into risk categories. AI systems whose risk level was assessed as unacceptable will be banned, with their marketing punishable by a fine of up to 30,000 euros, or 6% of annual turnover.

- **Increased impact of technological innovation on the social protection system**

Key Estimates

A total of **1.1 billion**

workers could be replaced by machines and algorithms by 2032

50%

of workers will have to retrain by 2025

The Trend's Characteristics



Impact on human capital¹

1

2

3



Weak signal²

Robots producing goods and providing services



Strongest manifestation period

2026–2030



Wild card³

Full automation and robotisation of work



Effect of COVID-19 pandemic

Strengthened the trend



Consequences of the wild card event actually taking place

Violation of labour rights, elimination of social guarantees



Presence in Russia

Comparable with the global level

¹ 1 – weak, 2 – medium, 3 – strong.

² Weak signals are insignificant (rarely mentioned or discussed) events which indicate the trend may radically change in the future.

³ Wild cards³ are difficult-to-predict events which, if they do happen, can significantly affect the trend.

Drivers and Barriers



Drivers

- Technological progress
- Lower costs of robotic solutions
- Increased share of ageing population
- Labour shortages
- Need to improve safety at work, especially in difficult working conditions
- Increased number of production areas and processes where robots are used



Barriers

- Lack of necessary technological basis
- High financial costs
- Insufficient qualifications of workers
- Educational and training programmes inconsistent with labour market demand
- Companies' unwillingness to invest in new technologies, long payback periods

Trend Effects



Opportunities

- Increased productivity
- Enhanced physical and cognitive abilities through the use of new technologies
- Development of the robotics-as-a-service business model
- Increased employment opportunities for people with disabilities
- Longer working life
- Reduced labour turnover in difficult or dangerous jobs



Threats

- Aggravation of information security issues
- Increased load on social protection systems
- Social discontent
- Mass replacement of mid-level professionals (performing technical and auxiliary functions) by machines