

# Impact of Digital Technologies on the Labour Market

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**Abstract.** Such innovations as blockchain, artificial intelligence, and the Internet of Things exhibit an increasing impact on different sectors of the economy. These changes are creating new jobs while simultaneously changing the nature of work, demanding new skills, and reducing the demand for traditional jobs. The aim of the research is to identify the impact of digital technologies on the labour market. The results show that the implications of digital technologies for the labour market and employment of workers are analysed from different perspectives. The rapid development of digital technologies promotes innovation, leading to faster job creation in the labour market. On the other hand, technological processes lead to fewer jobs, which will increase unemployment. There are also those who believe that society will not notice major changes in the labour market because technological progress will create as many jobs as it will eliminate.

**Keywords:** digital technologies, labour market, employment, trends.

## Introduction

### *Relevance of the article*

In recent decades, digital technology has become an integral part of our daily lives. Rapid globalisation and demographic challenges are increasing the society's need for change and improvement, which consequently leads to more rapid developments in digital technologies. The use of these technologies in the business environment provides a competitive advantage, increases productivity and helps ensure smoother task performance. Innovations such as block-chain, the next generation internet, quantum computing, artificial intelligence, and the Internet of Things exhibit an increasing impact on different sectors of the economy and the way they organise their activities. These changes are creating new jobs while simultaneously changing the nature of work, demanding new skills, and reducing the demand for traditional jobs. However, there are diverging forecasts for the future in terms of employment trends and work itself. Some believe that digital technologies will perform a significant part of employee tasks, which will result in a decrease in employment and a change in the nature of work itself in the market. Others believe that new jobs will be created with the help of digital technologies, so employment trends in the market will not have significant changes. Therefore, it is important to analyse the changes in the labour market caused by digital technologies.

### *Problem investigation level*

The literature highlights the power of digital technologies to create competitive advantages, improve services and products, and develop markets (Digital Economy and Society Index, 2022). Åström, Reim, & Parida (2022) emphasise that these technologies play a key role in creating and amplifying disruptions occurring at societal and industry levels. Pascucci, Savelli, & Gistri (2023) note that digital technologies are essential for markets and society, and digital transformation is becoming a key area of business innovation. Meanwhile, Orishev, & Achilov (2023) argue that “digital” encompasses the active use of information technologies in all areas, emphasising data as a key resource. Davronovich, & Mansurjonovich (2023) outline the transition from digitised e-learning resources to the mass use of digital technologies in various areas of the economy and society that enhance or replace traditional products and services. The digital transformation of society is significantly changing industrial and economic structures and introducing new elements in civil, entrepreneurial, governmental, and international circuits. Mohsen (2023) argues that the emergence of digital technologies has profoundly affected business activities, consumer habits, and the relationships between different parts of the economy. As a result, the mobile internet has contributed to an always-online mentality and hyperconnectivity between people, businesses, and machines in the global digital

economy. Finally, Light, Panicker, Abrams, & Huh-Yoo (2024) stress that such technologies are critical not only for work tasks, but also for relationships and communication with others, professionally and personally. The impact of technology on employees' employment is examined from different perspectives in academic literature. Some scholars believe that the rapid development of technology contributes to process and product innovation in firms, resulting in faster job creation in the market. Still, others believe that it can have a negative impact, with technological processes destroying jobs and increasing unemployment (Karaliūtė, 2017). However, there are also those who believe that technological progress will create as many jobs as it eliminates so that society will not see significant changes in the labour market (Peters, Jandric, & Means, 2018).

#### ***Scientific problem***

How digital technologies affect the labour market?

***Object of the article*** – impact of digital technologies on the labour market.

***Aim of the article*** – to identify the impact of digital technologies on the labour market.

#### ***Objectives of the article:***

1. To investigate the positive and negative impacts of digital technologies on the labour market.
2. To assess the importance of digitalisation for employment trends and the demand for new skills.

***Methods of the article:*** a comparative analysis of the scientific literature is used to analyse the concept of digital technologies as defined by different authors, as well as their views on the links between digital technologies and labour market. A synthesis approach is used to combine the components identified by several authors. Statistical data analysis is used to examine trends in digital technologies, their significance for employment and the demand for new skills.

### **1. Theoretical framework for the digital technologies impact on the labour market**

The first digital technologies appeared in the mid-20<sup>th</sup> century. Some of the first digital devices were electronic computers, designed to perform large-scale computations, an essential process for military and scientific purposes (Weik, 1961). Later, the Intel company developed the first computer microprocessor using integrated circuits. This innovation led to the development of computer technology for businesses and home users (Moore, 1996). These and other similar technologies became the foundational basis for the development of further digital technologies.

As globalisation spreads, companies have started to deploy various systems to improve their data management, business operations, and infrastructure. One of the first statistical analysis software was SPSS (*Statistical Package for the Social Sciences*), which enabled fast and efficient statistical analysis, thus simplifying data analysis in the social sciences, medicine, and other sectors (Subramani, & Rajiv, 2016). *Microsoft Word* and *Excel* are among the programs that have become mandatory in every office and have revolutionised administrative work and calculations. *Microsoft Word* has made the word processing process more intuitive, while *Excel* has made it possible to quickly perform financial calculations and analyse data (Rosenberg, 2024). Later, other systems emerged that required specific skills to install and operate, contributing to the growth in demand for and supply of skilled labour.

Digital technologies include the Internet of Things (IoT), digital currencies, big data, artificial intelligence, 3D printing and other similar technologies. The basic operating principle of these technologies is the storage or transmission of information in a digital format, i.e., the conversion of information into numbers, such as “zeros and ones” (Pullen, 2009). Various definitions of digital technologies can be found in the literature (Table 1).

Table 1

**Definitions of digital technologies**

Year	Author/organisation	Definition
2022	Åström, Reim, & Parida (2022)	Digital technologies play a central role in the creation and the reinforcement of disruptions that take place in society and the levels of industry.
2022	Digital Economy and Society Index	Digital technologies enable businesses to gain competitive advantage, improve their services and products, and expand their markets.
2023	Pascucci, Savelli, & Gistri (2023)	Digital technologies are now imperative for markets and society, and digital transformation is becoming a key area of business innovation.
2023	Orishev, & Achilov (2023)	Digital technologies are information and communication services in educational and production facilities. The term “digital” refers to the active use of information technologies in all of these areas. If material goods are considered the main resource in the economy, in digital technologies, this means information data that can be processed and transmitted.
2023	Davronovich, & Mansurjonovich (2023)	It defines the transition from digitised e-learning resources to the mass use of digital technologies in various sectors of the economy and society that improve or replace traditional products and services. The digital transformation of society not only significantly changes industrial and economic structures, but also introduces new elements in civil, entrepreneurial, state and interstate circulations.
2023	Mohsen (2023)	It is undeniable that the advent of digital technology has profoundly affected the workings of businesses, the habits of consumers, and the relationships between different parts of the economy. Consequently, the mobile Internet has contributed to the always-online mentality and the hyperconnectivity of people, businesses, and machines in the global digital economy.
2024	Light, Panicker, Abrams, & Huh-Yoo	These technologies are now critical not only to work tasks, but also in connecting and communicating with others, professionally as well as personally, including providers of medical and psychological services.

Source: created by the authors.

As presented in Table 1, digital technologies are defined in many ways, but they all highlight their fundamental importance for transforming society, business, and the economy. In summary, digital technologies are described as a key driver of modern societal and economic transformation. They foster innovation, reshape traditional models, provide businesses with a competitive advantage, and expand markets. Moreover, these technologies are becoming indispensable in various fields, where data and information serve as the primary resource, while digital transformation impacts not only industrial and economic structures but also everyday life.

The development of digital technologies is driven by factors at the individual, organisational, and macroeconomic levels. Human aspects such as leadership and workforce skills play a critical role in facilitating or hindering digital transformation in enterprises. At the organisational level, strategic alignment between digital initiatives and business objectives is crucial. In addition, the macro-level environment, including regulatory frameworks, market dynamics, and technological infrastructure, significantly impacts the pace and scale of digital development. The continuing trend towards globalisation has also lowered the barriers to entry for new entrants, encouraging greater competition and innovation in digital solutions (Feliciano-Cestero et al., 2022).

Digital technologies are significantly impacting the labour market, creating both new opportunities and serious challenges. On the one hand, technology drives economic growth, increases productivity, and creates new jobs that require innovative solutions and high skills. Automation and artificial intelligence allow routine work to be done more efficiently, focusing on more creative tasks while simultaneously lowering production costs. On the other hand, these changes can lead to job losses in less skilled sectors, increase income inequality, and make it harder for older or less skilled workers to adapt. Therefore, these technological transformations pose economic and social dilemmas that need to be addressed to ensure labour market stability and equality (Eurofound, 2021).

Technology has a moderate positive effect on employment, and technological advances tend to create new job opportunities rather than mass unemployment (Dağlı, 2021). This change is evident as automation and digital tools increase productivity, reduce production costs, and lead to the emergence of new industries that require different skills from the traditional workforce. However,

this transition is not without its drawbacks. The author's study shows that many workers may have difficulty finding new job opportunities after losing their jobs to automation.

A study by Li et al. (2023) highlights that the introduction of IoT into healthcare has changed clinical workflows by automating routine data collection while at the same time increasing the need for professionals capable of interpreting complex datasets and managing cloud computing infrastructures. However, the study also highlights challenges such as ensuring data security. While advanced solutions highlight the role of IoT in moving towards proactive, patient-centered models of care, they also require healthcare professionals to adapt to hybrid clinical-technological roles. IoT automates routine tasks such as manual patient monitoring and data collection, which may reduce the importance of the roles of nurses and technicians performing these functions. However, there is still a growing need for professionals capable of managing IoT ecosystems, including biomedical data analysts, IoT system administrators, and cybersecurity experts, to ensure the protection of sensitive health data. Thus, integrating the Internet of Things (IoT) into healthcare has a twofold impact on employment: it disrupts traditional roles and increases the need for new skills.

Haleem et al. (2021) contradict the authors and argue that blockchain technology is transforming healthcare by increasing data security, transparency, and streamlining processes. The application of blockchain creates demand for skilled professionals, such as blockchain developers, data analysts, and cybersecurity experts, thus leading to new job opportunities. However, the authors note that this may reduce jobs that rely on traditional systems or manual processes, as automation and decentralised systems reduce the need for middlemen. Integrating the blockchain into healthcare is changing the workforce dynamics, as it requires retraining and adaptation to new technologies. This innovation, therefore, also significantly impacts employment and unemployment in the industry.

IoT has the potential to increase productivity and create new work opportunities by automating routine work, allowing workers to focus on more complex and creative aspects of their work. This change can lead to higher salaries for those working in high-skilled occupations, as the IoT is mainly designed for tasks that require education and more knowledge. In addition, the IoT can help to reduce wage inequalities among less skilled workers by replacing high-wage jobs, which could lead to a more equitable distribution of income in different sectors of the economy (European Commission, 2024).

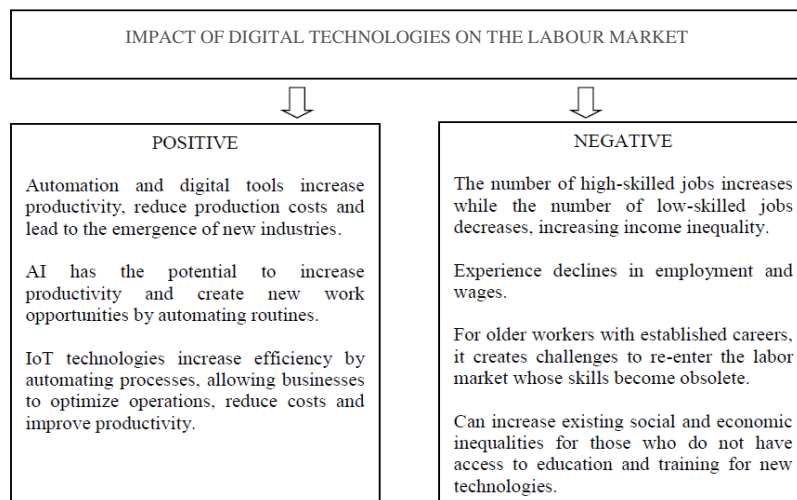
However, historical evidence shows that occupations exposed to automation technologies, such as the IoT, often experience a decline in employment and wages. For example, while the IoT can replace high-skilled jobs in the medical and engineering fields, it can exacerbate job losses in less-skilled sectors, leading to higher unemployment rates in vulnerable populations. In addition, the substitution effect may disproportionately affect older workers with established careers, making it challenging to re-enter the labour market for those whose skills have become obsolete. Overall, while the IoT has the potential to positively reshape the labour market by stimulating innovation and efficiency, it also poses risks of job losses and rising inequalities, which need to be carefully managed through policy interventions and workforce development strategies (Webb, 2019).

The impact of IoT technology on the labour market is also multifaceted. IoT technologies increase efficiency by automating processes, allowing businesses to optimise operations, reduce costs and improve productivity. This can create new jobs related to data management and analysis, thus stimulating innovation and economic growth. In addition, efficiency gains can increase the demand for goods and services, opening up additional employment opportunities in various areas. However, the negative impacts are also significant. The automation driven by IoT may destroy traditional jobs, especially in sectors that rely on manual operations. Workers in these areas may face the risk of unemployment due to technological change. In addition, the shift towards a more technology-intensive labour market is creating a need for advanced skills knowledge, which may increase socio-economic inequalities for those who do not have access to education and training in new technologies. Thus, while IoT has the potential to positively transform business practices, challenges need to be addressed in order to mitigate negative labour market developments (STRATA, 2023).

Artificial Intelligence (AI) has a dual impact on employment, disrupting traditional labour markets and creating new opportunities. While specific sectors may experience job losses due to automation, AI is driving the growth of new areas such as educational technology development,

data analysis, and maintenance of AI systems. In education, IoT-based learning systems and innovative learning platforms automate administrative tasks and personalise training, which can reduce the demand for roles involving routine tasks but increase training efficiency (Ahmad et al., 2021). However, as highlighted in the studies of the researchers discussed above, this change requires a retraining of the workforce. According to Ahmad et al. (2021), the introduction of the IoT highlights the importance of digital literacy and adaptability. Maria et al. (2025) add that the IoT simultaneously promotes both job destruction and the creation of new opportunities, as well as changing the workforce structure. Based on the analysis of trends in different industries and qualitative interviews, the dual impact of the IoT highlights both challenges and opportunities that require a coordinated societal response.

Summarising the scientific literature, Fig 1 shows digital technologies' positive and negative effects on the labour market.



Source: created by the authors, based on STRATA (2023), Webb (2019), Dağlı (2021).

**Fig. 1. Impact of digital technologies on the labour market**

Thus, digital technologies are a key factor in transforming modern society and economies. It drives innovation, changes traditional business models, gives businesses a competitive edge, and expands markets. They are also becoming indispensable in a wide range of areas where data and information are becoming key resources, and digital transformation is changing not only industrial and economic structures but also everyday life. Digital technologies have both negative and positive impacts on employment and work. The creation of new jobs, new forms of business organisation and the promotion of self-employment thanks to digital technologies are boosting employment. However, digital technologies have negative effects, such as unemployment, the disappearance of certain occupations, and a reduction in the demand for low-skilled workers in the labour market.

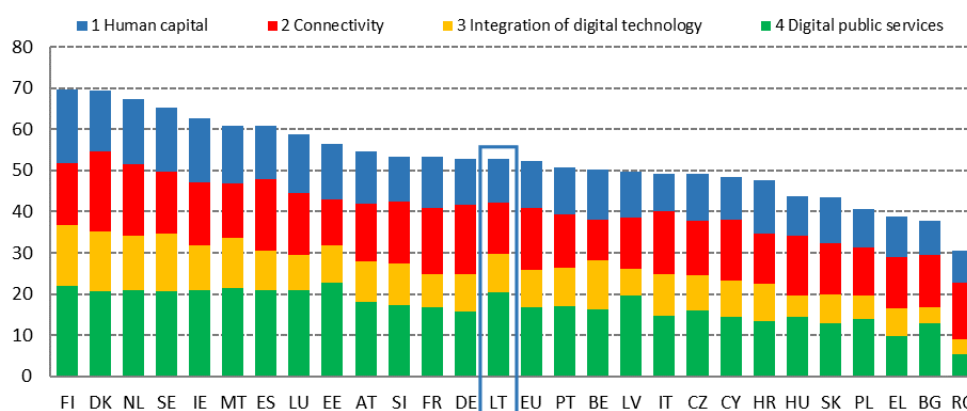
## 2. The digital progress and labour market

The Digital Economy and Society Index (DESI) has been the main tool used to measure the digital progress of EU Member States since 2014. Developed by the European Commission, DESI provides annual reports summarising digital performance indicators and tracking progress across Europe's digital sector. The index looks at areas such as connectivity, digital skills, technology integration in business, and the delivery of digital public services. In particular, it notes that Member States made progress in digitisation during the COVID-19 pandemic, although challenges remain in terms of digital skills gaps and the digital transformation of micro, small, and medium-sized enterprises (MSMEs) (European Commission, 2022).

The integration of digital technologies and infrastructure has significantly impacted the labour market, reshaping work roles, increasing productivity, and creating new employment opportunities.

The business sector's growing need for advanced technologies, such as artificial intelligence, cloud computing, and big data, has increased the demand for skilled workers who can use these tools. This change requires a workforce with strong digital skills, which increases the importance of continuous learning and professional development. In addition, developing digital infrastructure, including high-speed internet and mobile communications, facilitates teleworking and flexible working arrangements, expanding access to employment in different geographical locations. However, this change also poses some challenges, such as the risk of job losses for workers whose roles are automated or made redundant. The ultimate success of the integration of digital technologies in the labour market depends on addressing these challenges and creating an inclusive environment that supports skills development and the adaptation to new digital realities (Eurofound, 2021).

The 2022 Digital Economy and Society Index report highlights Lithuania's progress in digital transformation and specific challenges. Fig. 2 shows the DESI index values in 2022.

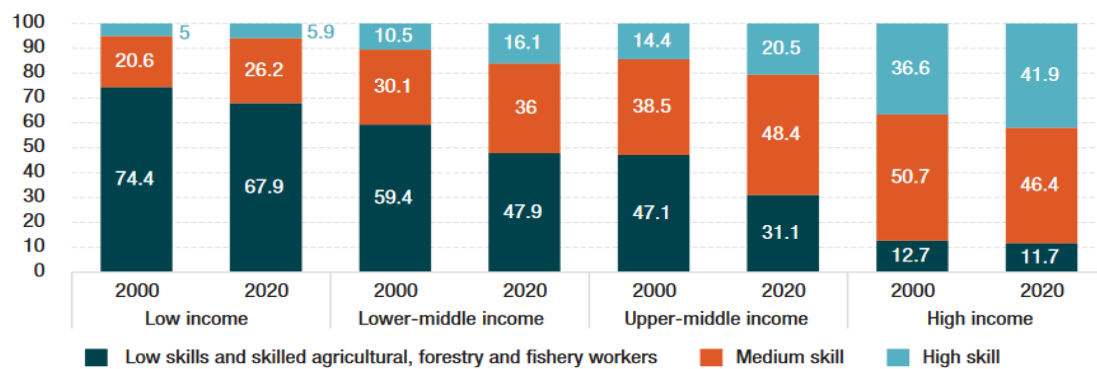


Source: European Commission (2022). Digital Economy and Society Index (DESI) 2022, Lithuania, p. 3.

**Fig. 2. The Digital Economy and Society Index values in 2022**

Lithuania ranks 14<sup>th</sup> among the 27 EU Member States, with its strengths in digital public services, where it performs well above the EU average (Fig. 2). The use of e-government services has reached 70% of internet users, and the progress is demonstrated by the quality of service indicators. Lithuania also demonstrates an excellent performance in open data. However, there are still challenges to overcome. Lithuania faces a lack of human capital, investment in ICT training remains low. In terms of digital technology integration, Lithuania ranks 13<sup>th</sup> in the EU. While its SMEs outperform the EU average in online commerce, the integration of advanced technologies such as artificial intelligence (used by only 4% of businesses) and cloud computing (28%) still lags. In summary, Lithuania is making steady progress in its digital transformation, especially in public services, but more attention is needed to strengthen digital skills, develop connectivity, and integrate advanced technologies. To fully exploit the potential of the digital economy, Lithuania needs to combine strategic reforms with targeted investments and strengthen support for SMEs and the education sector.

Digital technologies have an impact on employment levels. Fig. 3 presents changes in the employment structure in 2000 and 2020, grouping countries by income.



Source: United Nations (2021). *Technology and Innovation report 2021*, p. 42.

**Fig. 3. Employment by skill level (percentage of total civil employment)**

A comparison of the employment structure in 2000 and 2020 shows that, in all groups of countries, there is a decline in the number of low-skilled and skilled workers in agriculture, forestry, and fisheries (see Fig. 3). These changes are likely related to the rapid development of digital technologies worldwide. As new technologies make simple and less skilled jobs easier and faster to perform, some workers retrain for higher-skilled jobs. Looking at the group of workers with intermediate qualifications, it can be observed that this share has also increased in all country groups, except in high-income countries. In this group of countries, the share has fallen in the same way as for the low-skilled workers, which could be due to the intense economic situation in this group of countries (United Nations, 2021). As a result, countries can adopt digital technologies more easily and rapidly, and with the rapid growth of the IT sector the demand for highly skilled workers is increasing. Meanwhile, the share of high-skilled workers has increased in all groups of countries, confirming that the rapid development of digital technologies is reducing the demand for low- and medium-skilled workers. This means that workers need to improve their skills to be able to compete for high-skilled jobs, which are becoming more and more scarce in 2020, as compared to 2000.

In the context of technology adoption, the challenges of workforce adaptability are addressed. There is an 84% skills gap among workers, which is caused by three main factors (Maria et al., 2025): (1) inadequate DI literacy programs for mid-career professionals; (2) mismatch between academic curricula and IoT requirements in industry; and (3) limited access to retraining initiatives in developing economies.

The study by Maria et al. (2025) reveals marked differences in the impact of the IoT across industries, depending on whether IoT mainly replaces routine tasks (e.g., manufacturing and retail) or complements sophisticated human skills (e.g., medical diagnostics, personalised training). Firstly, the manufacturing sector experiences a 45% job loss due to automated production lines and quality control systems, while only 25% of new jobs are created. Secondly, healthcare is an IoT-enhanced sector, as diagnostic tools and robotic surgery systems have led to a 50% job growth in IoT-enabled medical positions. Thirdly, education is the largest job creator (60%), driven by the need for developers of IoT-driven learning systems and adaptive learning platforms.

The data analysis in the context of digital technologies and employment reveals that the rapid development of digital technologies is a global phenomenon, but each country may face the challenges of digitalisation differently, depending on its economic situation. Digital technologies are associated with structural changes in employment, showing that, over time and with the rapid development of technology, the demand for low-skilled workers in the world's labour market is decreasing, whereas the demand for high-skilled workers is increasing.



## Conclusions

1. Digital technologies have become a key factor in shaping the modern labour market. Their impact is multifaceted, with both positive and negative consequences. From artificial intelligence and the Internet of Things to blockchain and the next-generation Internet, these technologies are changing the nature of work and require new skills, adaptability, and innovation. The positive aspects include boosting economic growth, increasing productivity, and creating new jobs. However, these benefits are accompanied by challenges, such as the decline of traditional jobs, the increase of income inequality, and the continuous need to update skills. Workers, especially those less skilled or older, may struggle to adapt to changing demands.
2. Due to the advancement of digital technologies, the nature of work will continuously change. The impact of digital technologies on employment is more optimistic, for equality is maintained in the labour market, which is characterised by neither positive nor negative effects in the context of employment. Statistical data analysis has shown that with the help of new technologies, employees can perform simple and less skilled jobs more easily and quickly. Consequently, some employees undergo retraining to take on roles that require higher skills.
3. Technologies such as blockchain, the Internet of Things, and artificial intelligence are simultaneously driving both job destruction and creation, as well as changing the structure of workforce. Their dual effects highlight both challenges and opportunities. The impact of IoT on the labour market is not only a technological evolution, but also a fundamental socio-economic change. While the manufacturing sector faces major disruptions, healthcare and education show how IoT can complement rather than replace human skills.

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