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Dialectical Analysis of Problems Created by Technological Developments in the Labour Market

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Abstract The struggle between capital and labour has been ongoing for centuries. Technical and mechanical innovations, which began to develop with the industrial revolution, have gradually replaced manual labour. In recent years, with the development of automation systems, robots, and artificial intelligence, technology has replaced not only manual labour but also human intelligence. This situation has increased the risk of unemployment more than ever before and has become a threat to the workforce and society in terms of cybersecurity and occupational health and safety. Today, technology and unemployment, productivity, and workforce safety create a paradox. International and interdisciplinary solutions to this paradox must be found within an ethical and legal framework. This article aims to identify the problems and solutions caused by technological developments in the areas of unemployment, cybersecurity, and occupational safety in work and socioeconomic life using a dialectical approach, literature review, and document analysis methods. The research findings reveal that the workforce is facing rapidly increasing unemployment, that risks such as cybersecurity and occupational safety are increasing in parallel with technological developments, and that there is a paradox between technology and society. To eliminate this paradox, it is recommended that technology be disciplined by scientific ethical and legal rules.

Keywords Technological Advances · Artificial Intelligence · Unemployment · Cyber Security · Labour Security

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Dialectical Analysis of Problems Created by Technological Developments in the Labour Market

Social and economic life is now deeply integrated with robots, artificial intelligence, and automation phenomena (Verma, 2024). As the speed at which this technological revolution is integrated into the industry increases, it is thought that with the support of quantum technology, satellite communication, productive AI, which is the new form of AI, cloud technology, and big data, it will open the door to a hybrid and completely human-independent Industry 6.0 era with a super AI that can provide innovative development by self-renewing, programming / coding, and maximising sustainability (Chourasia, et al., 2022).

With the use of AI, productivity and profits increase, presentations and communication are enriched in jobs such as marketing and sales, customer experiences are fast tracked, jobs are automated, and production and service costs are reduced, which make a difference in competition. Artificial intelligence has become a strategic necessity rather than a need for today's businesses. Artificial intelligence and connected automation systems, which are the highest level of technology, are being adopted in various societies and sectors around the world due to the many benefits they offer. (Türkiye Artificial Intelligence Initiative [TRAI], 2024).

It is necessary to discuss the benefits as well as the harms of all developments, including artificial intelligence at the advanced technological and digital levels. When the history of humanity is considered in terms of technical advances from the past to the present, it is faced with a technological and industrial development process that is progressing very rapidly in the current era compared to past scientific advances. As a result of the rapid reflection of this process on life, the problems that arise / may arise in the short, medium, and long term cannot be analysed in a healthy way. Due to the ambition created by this rapid age, there is a chaos in which scientific ethics are not followed in scientific processes, universal values are ignored, societies are not made aware of the damages caused by technology, and the approval of the society is not obtained. The necessary sensitivity is not shown on the issue of what kind of legal responsibility and criminal sanctions will be faced due to the damages that may occur due to this disorder and chaos (Ponce del Castillo, 2017).

It is obvious that the joint work of science financed by capital within the framework of efficiency and profitability produces very beneficial results for capital. However, it does not seem possible to say that the same positive results have occurred at the same level in terms of labour force and societies. Despite this significant technological progress, living standards have not improved at the required level (Fan, 2025). Geographical inequalities and relative poverty are likely to worsen. Looking at global poverty rates, it is seen that those in extreme poverty (those earning less than $2.15 per day), that is, those below the hunger line, increase by approximately 1 million people in 2023. Even if they are not considered extremely poor, there is still an increase of 8.5 million people in the number of those who have an income of 3.65 USD per day, which is below the hunger limit (International Labour Organisation [ILO], 2024). Since the Industrial Revolution, the gap between relative poverty and income inequality has deepened.

We cannot deny the contributions of technology and automation to humanity. However, in terms of working life, it is seen that it increases social inequalities, pushes labour to the margins of working life, and makes the poor poorer. Especially when we examine the last 40 years, we see that the labour force has become unemployed and socioeconomic inequalities have become deeper and deeper, thanks to the integration of AI and similar digitalisation technologies into the automation of working life and the autonomous performance of jobs. As claimed, no new jobs have been created for the workforce who have been left

unemployed because their jobs have been taken over by artificial intelligence, robots, and automation systems. If no reasonable limit is imposed on technology, a frightening fate cannot be avoided (Acemoğlu, 2024). In order to solve this paradox of technology and unemployment, international regulations should be made to limit technology.

While there is a history of historical transformation shaped by capital's struggle with labour, it is necessary to be aware of the negative effects that this technological industrialisation process, in which capital instrumentalises all disciplines of science, presses all the buttons at once, and disregards scientific ethics, will create on behalf of labour (Verma, 2024). It is seen that technological developments continue to disable the labour force. Thanks to technological developments, some robotic automation systems with artificial intelligence can now perform the work done by thousands of people in the past. Even the white-collar and highly skilled labour force involved in the development of artificial intelligence and automation systems based on intellectual power, which usually requires IT expertise, is at risk of losing their jobs to artificial intelligence systems, especially with productive general artificial intelligence (Fan, 2025). If the form of "General/Super AI" is reached, it is understood that technology will be more overwhelmingly involved not only in jobs but also in all areas of life.

Although artificial intelligence provides benefits in all areas of life, such as health, production, and education, it should not be forgotten that it harbours some risks and dangers. The main danger that concerns the society about the future of AI is the general/super artificial intelligence that can fulfil different tasks very well and is likely to emerge in the near future. Artificial intelligence is an unpredictable system. Humans are largely not in control of how they process the data and conclude. It is an open-ended and unpredictable structure that progresses similarly to the evolution of the world. It is highly probable that the general/super artificial intelligence, which develops, learns, and thinks like a human being and even reaches a level that exceeds the level of human intelligence, becomes the dominant form of intelligence in the world and the computers or robots under its control take control of the planet. At this stage, super artificial intelligence, which can write its own codes, may become more intelligent and logical than human beings in about 5 years and may get out of control. Most importantly, humanity will face a major survival problem when autonomous combat robots get out of control (Russel, 2021; Hinton, 2023).

Predicting how technologies and societies will interact and influence each other is akin to solving a very complex problem. To understand how technologies such as robotics, automation, and artificial intelligence will affect societies and to determine exactly how these technological developments should be included in regulatory legal systems, it is necessary to discuss all aspects of the social, economic, legal, ethical, and political aspects of technological advances that permanently affect life. It should not be too late for the necessary academic, diplomatic, and bureaucratic efforts to determine the ethical and legal standards against the problems arising from artificial intelligence and a life dependent on it.

Ultimately, technological developments are rapidly replacing professions, increasing the risk of unemployment and creating significant problems in terms of occupational health and safety for the workforce that has managed to remain employed. Furthermore, cyber security risks, another problem created by developing technology, have reached a very dangerous level for all individuals in both working and social life. On the one hand, technological advances, which are thought to facilitate work and social life, are also seen to push work and social life towards a chronic set of problems, leading to a very historic paradox for humanity. The reason for this paradox appears to be that, in recent years, dominated by the selfish approach of the neoliberal paradigm, scientific ethics have been violated in the face of global economic and technological competition, with a focus solely on efficiency and profitability targets, disregarding the benefits and harms to humanity. It has become apparent that the benefits and harms of technology must be analysed and

that scientific ethical principles must be internationally updated to prevent harm. The article concludes that, considering ethical frameworks, national and international laws must also be regulated in favour of humanity to mitigate the harmful aspects of technology.

Methodology

This study comprehensively discusses the three main risks that advanced technologies pose to the labour market (unemployment, cybersecurity, and occupational safety and health). This article aims to contribute to the establishment of criteria to be considered in determining where ethical limitations begin and end by presenting the positive aspects of technological developments alongside the negative consequences they create using a dialectical approach. Technological developments are the result of humanity's intellectual progress and, although they serve the profit objectives of capital, they also provide significant benefits for humanity. The fact that these benefits reach a level that causes problems for humanity at a certain point creates a paradox between technology and humanity that should not be ignored. The article addresses the phenomenon of technology in a two-sided manner and adopts a dialectical approach to ensure scientific objectivity. In line with the goal of objective research, the aim is to use data obtained from reports of institutions and organisations, rather than relying solely on literature reviews, so that the dialectical approach can atomise the subject across a broader spectrum and then reassemble it.

The aim of the research was to conduct a dialectical critique of AI, automation, and robots, examining both their benefits and the risks they pose in terms of unemployment, occupational health and safety, and cybersecurity. To this end, search engines such as Google, Google Scholar, and Research Gates were used. No artificial intelligence was used at any stage of the study. The following keywords were used during the search: Industry 4.0, Industry 5.0, industrial development, industrial developments and law, industrial developments and ethics, AI, automation, robots, AI and law, AI and ethics, automation and law, automation and ethics, robots and law, robots and ethics, AI and unemployment, robots and unemployment, automation and unemployment, the harms of technological developments, the harms of AI, the harms of robots, technological developments and law, technological developments and ethics, technological developments and labour market, AI and labour market, AI and labour market, AI and socioeconomic effects, robots and socioeconomic effects, AI and occupational safety and health, Robots and occupational safety and health, AI and cyber security, etc. Searches were conducted in English. In addition to the word groups searched for in the research, new related sources not found in search engines were accessed by proceeding within the framework of the snowball method. As it includes quantitative and qualitative data obtained through research, literature review, and document analysis, it can also be considered mixed method research. The study considered articles published in the last 15 years. In addition, the latest reports from institutions such as the ILO, IMF, WEF, AIID, ETUI, and IFR were examined when obtaining statistical data. In some cases where comparisons were made with past data, data from previous years were also considered.

The fundamental research questions to be addressed in this study are as follows:

Q1: Do advanced technologies such as artificial intelligence, robots, and automation systems lead to unemployment?

Q2: What problems does the use of advanced technologies in all areas of life pose regarding cybersecurity and occupational health and safety?

Q3: What should be done to solve the problems arising from the use of advanced technologies?

Dialectic of Technological Developments and the Unemployment Paradox

The expansion of digital access to all areas of life creates a transformative effect in all areas, especially in working life. Among the developing digital technologies, specific developments such as artificial intelligence and information processing, robotics and automation, energy production, storage, and distribution are expected to transform working life. Although the industry, which has reached the level of "Industry 5.0" and is progressing to the level of 6.0, is seen to have very important benefits for humanity at first glance, some important negative consequences are emerging in coordination with its benefits (Verma, 2024). When it comes to the "Industry 6.0" stage, although some conveniences and advantages will be achieved with the unmanned use of autonomous vehicles and the general artificial intelligence (AGI) form, which can do all kinds of challenging work that humans can do, such as consulting the vehicle owner at the same time, on the other hand, it should be kept in mind that security and ethical risks will arise with the loss of jobs to AI in terms of the labour force. The issue of how to combat the security, control, and ethical problems that AI will create at this high-level stage is an issue that needs to be reasoned about for the future of humanity (Nahavandi, 2019; Yücebalkan, 2020; TRAI, 2024).

Artificial intelligence is being integrated into working life in many fields. For example, in the finance sector, high-speed algorithms make autonomous decisions on share trading and somehow replace brokers/human brokers working in stock exchanges. In journalism, algorithms can determine the news to be published. In the health sector, robots can assist doctors, measure vital signs of patients, and provide guidance and counselling services to elderly people in nursing homes. In the security sector, robots are used hybrid with other technology systems, such as the Internet of Things (IoT) and algorithms. In manufacturing, robots or worker-robot automation are rapidly replacing labour. Robots with deep learning capabilities are reaching autonomous or semi-autonomous levels, able to learn, sense their environment, identify patterns, change the original framing of a problem, and adjust their behaviour to their environment. The fact that they play an active role in the decision-making process, such as surgical robots or stock market algorithms, shows that the versatile and multi-layered interaction capabilities of advanced technology still have the potential to develop (Ponce del Castillo, 2017).

There are increasing views that artificial intelligence automation systems obtained by integrating with robots and other electronic tools are not human-oriented, as mentioned, but rather focused on replacing manpower. The ability to respond to new or unexpected conditions without human support, swarm intelligence, brain-machine interfaces, individual and person-centred AI, informed deep learning, expert knowledge combined with AI, skill matching of people and tasks, productive AI in terms of security and energy, the ability to establish and process relationships between complex, interrelated data of different origins and scales in dynamic systems, etc. The advantages that some skills will provide in terms of efficiency and productivity are indisputably important (Müller, 2020).

It is estimated that the widespread use of productive artificial intelligence (GenAI), which harbours such skills and capabilities, could lead to an increase in the World Gross Domestic Product (GDP) by about 7% (around USD 7 trillion) and an increase in productivity by 1.5% per year over a 10-year period (Goldman Sachs, 2023). For example, the use of artificial intelligence, which has great potential in terms of growth and productivity, in call centres has been observed to make unskilled or less skilled workers 34% more efficient and productive (Georgieva, 2024). There is an increasing demand for labour in fields such as software and application developers, environmental engineers, big data specialists, artificial intelligence specialists, machine learning specialists, autonomous and electric vehicle specialists, fintech engineers, and renewable energy engineers, all of which are related to information technologies such as big data, artificial intelligence, cybersecurity, networks, automation, and technology literacy.

It is evident that artificial intelligence (AI) systems have a major impact on labour markets worldwide and in every sector. The changes caused by AI and automation in workflows are equivalent to approximately 300 million full-time jobs by 2023. Economists, for example, state that about two-thirds of over 900 occupations in the US, whose workflows are analysed, are exposed to AI and automation. It is estimated that the workloads of about half of the occupations exposed to AI and automation can be changed (Goldman Sachs, 2023). The fact that robotics and AI are shaping our business and private lives, automating and digitalising them faster and faster, from the execution of simple automated tasks such as work organisation, working conditions, quality, and outsourcing of responsibility to making complex and fast decisions, is a sign of socioeconomic change. While this change has positive aspects, its destructive effects on society should also be carefully monitored (Broersen 2014; Degryse 2017).

Economists state that the impact of AI on the labour market is significant, but for now, most jobs and industries are only partially exposed to automation, as AI technologies have only partially entered working life. Although automation systems seem to partially substitute or complement the labour force today, it is estimated that automation systems will replace the entire labour force when artificial intelligence is fully adapted to working life (Goldman Sachs, 2023). Concerns and predictions that robots and AI, which are also expressed by some futuristic scientists, such as Stephen Hawking, will replace human labour in working life and transform jobs, predict that humanity is moving towards a very difficult world in this process. The benefits and harms of AI should be discussed, and transparency should be ensured by sharing the possible risks with the public (Hern, 2016).

The Problem of Unemployment Created by Technological Developments

While artificial intelligence and hybrid automation systems are beneficial for the growth of developed economies, there is a risk that they may have less beneficial or even harmful effects in emerging markets and economies. Therefore, the digital-cyber gap and income inequality gap between countries are likely to increase. Even at its current level, AI-based applications have reached the capability and potential to perform most basic tasks carried out by humans. Due to the substitution of labour by AI programmes and hybrid automation systems, the demand for labour is decreasing significantly and at an increasing pace. Since this situation increases the pool of unemployed, i.e. labour supply, much more than labour demand, wages are reaching lower and lower levels, and recruitment is decreasing. Many jobs related to artificial intelligence and robotic automation are disappearing. The increasing use of AI threatens to deepen inequalities in the global labour market and trigger a flood of unemployment, leaving millions of people unemployed globally (Fan, 2025, Georgieva, 2025).

Due to the substitution of the labour force with digital technologies, robots, artificial intelligence, and automation systems due to advances in automation systems because of technological developments (Ngo, 2019);

- Labour-labour matching mismatches created by the difference between the pace of development and the latest levels of technology and society.
- Security, ethical and legal problems due to the chaos that will arise as a result of changes in society and working life.
- Mismatch between the increase in the number of people of working age due to population growth and the supply of labour.
- Reduced human intervention in processes and industries due to new technologies. Security and ethical issues caused by the misuse of technology.
- Risk of jobs disappearing due to IT automation and dependence on artificial intelligence

- A number of negative consequences and risks arise, such as the risk that the labour force does not keep pace with the evolution of skills and is unwilling to change.

Artificial intelligence and information processing technologies are considered effective factors in the transformation or elimination of jobs by 86% and robots and autonomous systems by 58%. It is predicted that approximately half of the jobs will be carried out by artificial intelligence-robot-automation systems in the near future. On the other hand, 1.6 million jobs are expected to disappear after 2030 due to inflation and slow growth. On the other hand, office and secretarial workers, cashiers and ticket clerks, administrative assistants, executive secretaries, postal services officers, bank tellers, data entry clerks, and it is foreseen that professions such as factory workers will disappear (WEF, 2025).

When the levels of exposure to natural language processing-based generative artificial intelligence (GenAI) for so-called white-collar, mind-powered occupations are calculated, higher-paid occupations are generally more exposed to AI substitution. Exposure rates are shown in Table 3. More than 90% of professions, such as correspondence clerks, blockchain engineers, court reporters and clerks, editors, and 100% of professions, such as mathematicians, accountants and auditors, news analysts, reporters and journalists, legal secretaries, administrative assistants, and clinical data managers, are at risk (Hurst, 2023).

Table 1

Exposure Rates of Professions to Artificial Intelligence

Occupations	Exposure Rate
Mathematicians	100%
Tax Preparers	100%
Web And Digital İnterface Designers Are Exposed.	100%
Survey Researchers	84,4%
Writers	82,5%
Interpreters and Translators	82,4%
Public Relations Specialists	80,6%
Zoologists	77,8%
Average	**88,5**

Source: Hurst, 2023

While there is talk that technology will take some jobs away from the labour force, software developers, the most secure labour group, will also lose their jobs. Now, software is made by artificial intelligence. In other words, software developers will soon join the ranks of the unemployed. OpenAI announced the acquisition of artificial intelligence (AI)-assisted coding tool Windsurf, formerly known as Codeium, for about $3 billion in its largest acquisition to date. Windsurf is the innovation leader as the software development industry transitions from traditional software development methods and tools to AI-native, where generative AI, natural language, and agentic agents increasingly take on development tasks performed by developers today. The acquisition of Windsurf by OpenAI marks a pivotal convergence point in the hotly contested and rapidly growing AI-powered software development tool markets (Swartz, 2025). For years, the mental projection power of the software labour force has been copied, and now the human mind has become imitable. In other words, people have invested in technologies that will leave them unemployed with their own hands.

Anthropic CEO Dario Amodei said that artificial intelligence could eliminate 50% of entry-level office jobs soon. Amodei said that the risk of unemployment caused by artificial intelligence and other technologies is being concealed from the public by governments and companies. Recent data supporting Amodei's claim

show that large technology companies have seen a 50% drop in the rate of hiring new graduates compared to prepandemic levels. If no action is taken, unemployment is expected to increase by 10-20% in as little as five years. Amodei noted that the development of large language models is progressing rapidly and that they are now capable of matching and even surpassing human performance. In 2024, the proportion of entry-level candidates in total hires at large technology companies decreased by 25% compared to 2023, accounting for 7% of total hires (VandeHei & Allen, 2025).

In emerging economies, both in manufacturing and in modern services, sufficient productive employment is not being created, except in a few countries. While there is a lack of labour force training and matching processes, even if these were to be completed, it is believed that the overflow of the growing pool of unemployed due to technology could not be prevented (Fan, 2025). With the rapid rise of new digital technologies, many countries are trying to capitalise on the developmental potential of AI by designing and often implementing specific industrial policies for local digital ecosystems. However, given the significant requirements in terms of skills, only a few countries are able to capitalise on the high value-added outputs of the digital economy due to the high cost of digital infrastructure and energy. In contrast, in many countries, including some of the digitally advanced countries in Southeast Asia, an increasing number of workers are working on temporary data platforms, where they face worse working conditions and fewer prospects for professional advancement (ILO, 2025).

In the industrial field, high-tech robot and automation installations continue intensively worldwide. Approximately 80% of the installations are taking place in China, Japan, the USA, Korea, and Germany. In 2022, the global operational stock of industrial robots was 3,903,633 units, an increase of 12% compared to the previous year. From 2017 to 2023, the global operational stock of industrial robots is increasing by 13% on average each year. China's robot stock has been above this average, growing impressively by an average of 25%t each year since 2017. China's operational stock of industrial robots surpassed the 1 million unit mark in 2021 and grew by a further 22% to 1.5 million units in 2022. This corresponds to 38% of the global stock of industrial robots (Industrial Federation of Robots, 2023).

Robots and autonomous systems recorded a steady growth of approximately 5-7% annually between 2020 and 2024. According to the "World Robotics Industrial Robots 2024" data prepared by the Robot Industry Federation, in 2023, the global average robot density reached 162 units per 10,000 employees. This rate is 2 times the amount measured 7 years ago. The United States ranks 10th in the world among the countries with the most automation in the manufacturing industry. Asian economies such as South Korea, Singapore, China, and Japan are among the top 10 countries with the most automation. In this sense, Korea ranks 1st in the world with 1012 robot units per 10,000 labour force. Robot and autonomous systems are expected to grow at an average annual rate of 4% until 2027. The ratios of robot units per 10,000 employees of the continents are given in Table 2 (IFR, 2024a; 2024b).

Table 2

The ratios of robot units per 10,000 employees of the continents

Continents	Robot Unit per 10.000 Employee	Rate of Increase (%)
European Union	219	5,2%
North America	197	4,2%
Asia (S. Korea)	182 (1012 S. Korea)	7,6%
Global Average	**162**	**5-7%**

Source: Industrial Federation of Robots, 2024a; 2024b.

On the other hand, it is also observed that new production-oriented plants and factories are being established in different parts of the world. However, while these investments based on AI, robots, and

automation systems create jobs for, for example, a dozen highly qualified software specialists and engineers, they also destroy the demand for thousands of blue-collar or white-collar lower-middle-level labour force and create unemployment in inverse proportion to the jobs created. The size of investment and labour demand, the number of jobs created, and the number of unemployed labour force are far from matching each other. For example, Arçelik, a Türkiye-based manufacturer of white goods and consumer durables, decided to invest 110 million dollars in its factory in Italy while simultaneously laying off 2,000 employees (Fan, 2025; Bloomberg, 2024). The world giant Google, which increased its investments in AI on the one hand, laid off 12,000 workers in 2023 due to cost-cutting measures. Continuing to lay off workers in 2024, the world giant company carried out at least 11 rounds of layoffs. In 2025, the company, which offers a 'voluntary exit' programme, is expected to lay off thousands of employees again (The Economic Times, 2025).

Layoffs are progressing similarly in other major companies around the world. In particular, hundreds of thousands of workers have been laid off since the Coronavirus pandemic began. The latest layoff decisions announced at the end of October by global giants, which announced billions of dollars in new investments in production technologies, reveal a significant paradox, as shown in the table below. While companies are investing billions of dollars in artificial intelligence, electric vehicle, and autonomous robot technologies, on the one hand, they are accelerating layoffs due to technology replacing the workforce. According to company statements, approximately 170,000 more workers in the US alone will lose their jobs (The Kobeissi Later [TKL], 2025).

Table 3

Layoff figures were announced at the end of October 2025.

Company	***Workforce to be laid off (person)***
UPS	48.000
Amazon	30.000
Intel	24.000
Nestle	16.000
Accenture	11.000
Ford	11.000
Novo Nordisk	9.000
Microsoft	7.000
PwC	5.600
SalesForce	4.000
Paramount	2.000
Target	1.800
Kroger	1.000
Applied Materials	1.444
Meta	600
Total	**171.000**

Source: Kobeissi Later, 2025

U.S.-based employers announced 153,074 layoffs in October, a 175% increase compared to the 55,597 layoffs announced in October 2024. This represents an 183% increase from the 54,064 layoffs announced a month earlier. The adaptation of artificial intelligence and high technologies to the business world, along with rising labour costs, has led to belt tightening and hiring freeze policies, causing this situation. Those who have been laid off are finding it difficult to transition to new job roles or professions. This could further increase unemployment in the US and Global labour market in the coming period and further slow down

employment (Challenger, 2025). This, combined with layoffs worldwide, is expected to condemn millions of families to poverty due to unemployment.

In November, 71,321 job cuts were announced, marking a 24% increase from the 57,727 job cuts announced in the same month last year. In the first 11 months of 2025, 1,170,821 layoffs were announced, a 54% increase from the 761,358 announced in the first 11 months of last year. On the other hand, in the first 11 months of 2025, 497,151 planned hires were announced, a 35% decrease from the 761,954 announced in the first 11 months of 2024. This is the lowest number of hires since 2010. Telecommunications companies announced 268% more layoffs than in the same period last year, while technology companies announced 17% more. 54,694 of these layoffs were attributed to the use of artificial intelligence. Since 2023, artificial intelligence has led to 71,683 layoffs. It is clear that the impact of artificial intelligence is increasing (Challenger, 2025b).

It is estimated that the adoption of AI will lead to a 9% job loss over the next 10 years in companies with an average company size of more than 10,000 employees, which employs a large percentage of the working workforce. This job loss cannot be compensated by the 19% job increase provided by FinTechs, which are existing internet finance companies with an average company size of less than 50 employees (Zhang et al., 2021). adjustment process and increases negative effects in terms of wages. When clustering in mental jobs and skill-based mobility restrictions come together, the situation is seen to be negative, contrary to the narrative that new jobs are created to replace those replaced by technology (Fan, 2025).

Looking at the number of working people as a percentage of the total working age (+15) population, i.e. the employment-population ratio, it is seen that increasing robotisation and technological automation since the 90s have reduced this ratio to the detriment of working people. While in 1991, the ratio of the working population to the working age (+15) population was 62.2%, this ratio decreased to 57.9% by the end of 2024 despite technological developments (ILOSTAT, 2025b). While automation systems based on developing technological tools and software continue to enter the working life with increasing momentum, and this increases efficiency and productivity in production, on the other hand, these technologies reduce the ratio of the labour force in the working life by substituting the labour force. In this framework, one of the reasons for unemployment due to the integration of AI and technological innovations in working life is the difficulties in education, training, skills development, and job matching (European Council [EC], 2017).

Technological developments increase profitability by saving on labour costs for employers, but at the same time, they lead to disaster for the workforce by increasing unemployment. Increased unemployment, that is, increased labour supply, causes worker poverty by lowering wages. In the long term, this equation creates balanced growth equivalent to the standard neoclassical growth model for employers, but it creates a negative picture in terms of unemployment, leading to higher unemployment and a decline in the labour share of income (Casey, 2018). As labour costs rise, the power and capabilities of machines increase. If a company wants to remain competitive in the global market, it must invest in skilled machines and automation systems, thereby turning a blind eye to the unemployment of its workforce. With the spread of automation across all areas of production, companies' original labour-based model is changing and transforming, and labour, which plays a key role in the production process of goods or services, is becoming redundant due to the increasing autonomy of machines (Novakova, 2020).

Interaction of Global Socioeconomic Changes with Technological Unemployment

The global economy as of 2025 appears to be a combination of persistent uncertainties and cautious optimism. In 2025 and beyond, global growth is expected to be slow and insufficient. The global growth rate of 3.3% in 2023 decreased by 0.1% to 3.2% in 2024. In 2025, it is expected to remain constant at this rate. In emerging markets, growth, which was 4.4% in 2023, decreased by 0.2% to 4.2% in 2024. The decline is

expected to continue in 2025. (International Monetary Fund, 2024). A global inflationary and recessionary economic conjuncture is expected due to tariffs imposed by the Donald Trump administration.

On the other hand, the working age population (+15) is increasing worldwide. The world population of working age, which was 3,380,108,000 in 2015, increased to 3,743,714,000 in 2024. In 2025, it is estimated to be 3,781,214,000. This shows an increase of approximately 12% (400 million people) in 10 years (ILOSTAT, 2025c). At the same time, it is observed that the proportion of the population outside the labour force has also increased considerably over the years. In 2024, the out-of-work population, which was 1,489,948,600 in 1999, increased by approximately 1 billion 900 million people to 3,398,344,000. In a period of 25 years, a remarkable increase of approximately 130% cannot be overlooked (ILOSTAT, 2025d). Looking at the course of the world labour force participation rate, which is an important data set, it is observed that the global labour force participation rate, which was 65.6% in 1990, decreased significantly to 62.6% in 2010 and 61% in 2024 (ILOSTAT, 2025e). Based on these data, it can be concluded that labour force participation has been substituted by technology since the 90s, the years when robots and automation systems entered the business life intensively.

Although the general unemployment rate seems stable, youth and female unemployment are increasing. Although artificial intelligence is seen to destroy jobs, it is claimed that it creates new ones instead of the destroyed jobs. There is no precise information on the extent to which the newly emerging jobs will replace the jobs that have disappeared. There is also a great concern that labour inequality caused by artificial intelligence will increase. However, it is possible to talk about the increase in unregistered unemployment in the world and a hidden unemployment that is not reflected in the rates. It is said that the unemployment rate in the world is 5% (187 million). However, approximately 220 million people in the world are excluded from the unemployment rate in the calculations because they are not actively looking for a job and have completely given up looking for a job. When we include these 7% hidden unemployed, it would be more realistic to accept the actual global unemployment rate as 12%. In reality, the number of unemployed is 400 million people (Houngbo, 2025). When calculated together with the hidden unemployed, unemployment, which is claimed to have decreased, has actually increased.

Although ILO data show that employment has increased and unemployment has decreased, it is thought that the strategy behind this is to divide the jobs left over from AI and robotic automation into more labour force by reducing working hours. Working hours are divided into shifts and part-time. Reducing working hours means dividing and multiplying the jobs that are decreasing due to advanced technology. Looking at ILO data, it is seen that working hours decreased between 2020 and 2023, and thus, overtime was divided into more labour force (ILO, 2024; De Jesus, 2024). OECD data also show that part-time employment has been increasing over the years. For example, while 10.4% of the population worked part-time in 1990, this rate increased to 14.7% in 2023 (Organisation for Economic Co-operation and Development, 2025). Part-time employment is also seen to act as a convenient mask to conceal the unemployment created by advanced technologies.

In the end, the adaptation of artificial intelligence and automation systems, i.e. advanced technological developments, to the labour market increases unemployment. Against unemployment and similar risks, efforts have increased in recent years, for example in the US labour unions, and in the social sense, initiatives and demands have been expressed to make regulations against the risks of AI and advanced technologies and to freeze the activities of technology companies. Although the necessity of the free market is an indisputable fact, the monopolisation of the market by existing technology companies by taking advantage of the vulnerabilities of the free market does not promise a positive future for the labour force and society. If legal and ethical measures are not taken to protect people and society, the free market philosophy will

be distorted in line with the profit and productivity goals of large technology companies and will create great disappointments for the future of the labour force and the welfare of societies. In addition, the fact that artificial intelligence technology is in the hands of a few companies that have reached the budgets of states in the global sense poses the risk of manipulating the information in line with the political views of these companies and presenting it to the public, in fact, the risk of manipulating democracy in favour of the political group desired by these technology dynasties and to the detriment of others (Acemoğlu, 2023). One of the biggest risks of artificial intelligence is the risk that the state, company, or individuals who produce artificial intelligence have a structure that is not objective and impartial in line with ideological, theological, or cultural prejudices or goals.

The complex ecosystem of technologies, industries, labour markets, and societies must be addressed from a holistic perspective and a governance approach that integrates and balances different needs. The needs of workers should be integrated with the needs of employers and society as a whole. Current challenges such as youth unemployment, labour poverty, ageing society, and social inequality should be addressed by creating a new pact between society and industry to prevent medium- and long-term problems caused/will be caused by technology (Müller, 2020).

Cybersecurity Issues arising from Technological Developments

Another risk as important as unemployment that emerges with advanced technology products and artificial intelligence is cyber security risks. Basic AI interface models accelerate the digital transformation of businesses by providing some benefits, such as improving workforce productivity, automating and enhancing customer experience, and reducing the costs of new products and services . However, in addition to its benefits, companies and organisations that cannot sustainably prevent the risks of artificial intelligence (AI) are experiencing negative consequences, such as security risks, threats, high failures, and ethical violations. Such unethical and unintended negative consequences in the scope of cybersecurity can be caused by process failures and the intervention of malicious actors, leading to economic losses and reputation loss, legal liability and criminal sanctions, and social and cultural damages (Gartner, 2023).

To create a flexible and agile production system using AI and advanced technologies, an interactive data warehouse is required where employers and manufacturers can monitor and analyse a wide range of data streams in a robust manner. Flexibility and agility require a series of technical and technological processes with new forms of data integration. In this regard, the concept of "big data" refers to an important phenomenon where accurate and valuable information is quickly processed to generate new data or actions in various formats. Big data are created to automatically feed scanning techniques and large databases. This massive data collection means the development of a dense network of sensors, wearables, or other smart devices. These technological and complementary advances open up a wide range of business applications (Bérastégui, 2024).

Thanks to the Internet of Things, all devices are interconnected, leading to semi-autonomous or fully autonomous automations that can collect and share data in real time without requiring human-human, human-robot or human-computer interaction. Processing large amounts of data requires significant storage capacity and computing power and exceeds the capacity of physical servers. Cloud computing, a solution to this problem, provides users with on-demand access to a common pool of configurable computing resources. In big data, data sets exceed the intuitive and analytical capacities of humans and even the capacities of traditional computing tools. AI needs big data and cloud storage to learn and improve decision-making processes and patterns. These synergistic relationships make AI, big data, the Internet of Things, and cloud computing inseparable (Wang N. & Wang K., 2022).

However, this new ecosystem also harbours enormous dangers and vulnerabilities. The complex interrelationships between AI systems, big data, cloud computing, and the internet of things harbour potential dangers and risks that permeate many stages of data processing. These range from data breaches and cyber security threats to system failures that can result in accidents or injuries. Although artificial intelligence systems are developed precisely because of high engineering, they can also pose several unique problems. In order to help artificial intelligence systems improve themselves and produce more accurate outputs, the algorithm is fed with selected data. When the system encounters data different from the data sets on which the algorithm is trained, it is often unable to integrate these new data into its algorithm. The fact that AI systems are highly sensitive to changes in their inputs is not only a potential security problem but also a vulnerability that can be used by malicious people. It is possible to experience malfunctions and accidents by exploiting the vulnerabilities of an AI with different data, i.e. sabotage (Eykholt et al., 2018).

In a digital conjuncture where many private and confidential information, such as identity numbers, social security numbers, passwords to access bank accounts or other financial accounts, personal e-mail passwords, e-application passwords, passwords to access social media accounts, medical private data, and information within the scope of personal data are made online, the risk of theft or sabotage of these data and information by malicious persons is very high. If we consider this risk at the company level, if confidential data related to customers or personnel are leaked, the company will face both a financial penal liability and the risk of losing its commercial reputation. Another issue where confidentiality is breached is the process of collecting data on the orientation and behaviour of internet users or users of smart technological products. Such information is sold on the data market for use by manufacturers without the consent of the users. The cost of controlling these risks caused by digitalisation and technological development or ensuring privacy at acceptable levels is high (Ngo, 2019).

Global production and supply networks are becoming increasingly integrated with each other and are naturally in need of and exposed to intense data flows. As a result, cloud-based systems are indisputably important for companies to survive. All parties agree that the confidentiality of personal data belonging to individuals or legal entities must be protected and that attacks must be prevented. For example, attacks such as the "WannaCry" ransomware attack in 2017 have shown how vulnerable computer systems are. With this attack, it has become clear that the world is facing a new and extraordinary risk, such as AI-supported cyber attacks. Artificial intelligence has added speed and agility to the ability to attack companies and individuals by making the size of cyber attacks more dangerous, allowing cyber hackers to automate attack procedures (Brundage et al., 2018).

The development of big data and artificial intelligence technology has brought great opportunities and challenges. For example, advanced technologies used in various cyber financial transactions, especially in the field of Internet finance (Fintech), provide unique benefits and conveniences on the one hand, but on the other hand, they open the door to new dangers that did not exist before regarding information and data security. In China, for example, there have been problems due to gaps and deficiencies in many aspects of the management of the online financial sector. These information security or general cybersecurity risks create great dangers in the sector, whether open or hidden. These hidden dangers have unpredictable and irreparable destructive socioeconomic consequences on society. The interviewed experts stated that information security should be built and relevant laws and regulations should be improved against these dangers and risks. There is still ambivalence that artificial intelligence can reduce and increase these risks. It is estimated that societal risks will increase more than organisational level risks due to risks. The ineffectiveness and absence of legal and ethical regulations on data security or cyber security increase the chaos created by risks and threats. FinTechs are more vulnerable and exposed to these threats than other established companies in terms of the destructiveness and irreparability of the damage (Zhang et al., 2021).

Thanks to a method called "phishing," people suffer large amounts of financial losses due to e-mails created by artificial intelligence and looking extremely realistic. For example, in the email phishing scam in the town of Grey in Main, USA; a legal payment order was prepared on Town of Grey letterhead created by artificial intelligence with the signature of Doug Webster, the town's planning director, and sent by email to Steven Souchek, a resident of the town who had previously requested a zoning change for his property to the town administration. Steven Souchek was asked to send $22,500 to pay for the processing of this transaction via a bogus link provided in the email. This e-mail was sent the day before the zoning board meeting to compress the action into a short period within hours so that the victim would be in a hurry and unable to think clearly. In such frauds, it is impossibly difficult to reach the offender (Tomic, 2025).

Another source of threat, the ransomware group FunkSec, established its data leakage site (DLS) at the end of 2024 to centralise its ransomware activities. The group has attracted attention for its aggression tactics and its ability to damage numerous targets in a short period. In a short period of about a month, it organised cyber-attacks that affected approximately 85 people. Although they demand extremely low symbolic ransoms and sell the stolen data very cheaply to third parties, their ability to use artificial intelligence is frightening. FunkSec's activities and DarkWeb are high-risk threat possibilities that warrant closer scrutiny. The fact that some members associated with FunkSec have previously engaged in hacktivist activities and that the group's motivations walk a fine line between "hacktivism" and cybercrime creates a complex picture that prevents a clear judgement of their true goals. This particular ransomware was developed with the help of artificial intelligence by an inexperienced Algerian programmer. (Check Point Software Technologies, 2024). This example shows that in the coming days, such crimes committed by malicious people, even inexperienced ones, with the help of artificial intelligence will become widespread. The mixture of hacktivists and crackers, such as FunkSec, creates a high risk of legitimising cybercrimes.

In another case study, in 2016, a hacker stole 3.6 million Ethereum (ETH) in a few hours because of a vulnerability he found in the coding of the withdrawal system of a Decentralised Autonomous Organisation (DAO) (Thornburg, 2018). The attacker created a child DAO and transferred the stolen funds to this child DAO. In the DAO smart contract, creating a child DAO is a legally permitted option. Therefore, the "splitting" function that allows the creation of child/child DAOs is not a bug but a permitted feature (Coppola, 2016). In the most recent attack, hackers stole $1.5 billion from Dubai-based cryptocurrency exchange Bybit, making it the largest digital theft to date. The cyber attacker reportedly took control of an Ethereum wallet and transferred its contents to an unknown address. Bybit, the world’s second-largest cryptocurrency exchange by trading volume with over 60 million users worldwide, reported that the attacker could transfer crypto assets by abusing security controls during a routine Ethereum transfer from an offline “cold” wallet to a “hot” wallet (Partridge, 2025).

In the field of cyber security, extremely risky and destructive cases are observed in the field of "deepfake" related to artificial intelligence. Yahoo Boys, a global and effective cyber hacking crime network in this field, emerged from the virtual meeting of independent individuals and small groups engaged in cyber crime hacking. Yahoo Boys fraudsters organise, chat with each other, and sell information and training on how to perform different types of fraud through the social media platform Telegram. The hackers use the Telegram platform as a marketplace. It is seen that Yahoo Boys have been blackmailing by hacking with deepfake technology since 2021 and that these blackmails have shown a significant increase since 2023. Yahoo Boys members cause millions of dollars in damages per case by imitating news websites, television channels, or celebrity voices (Sumon & Pan, 2025; Burgess, 2025; Gozzi, 2025).

In addition, on the one hand, "industrial artificial intelligence," which can predict possible malfunctions before they occur by continuously monitoring equipment performance and production line by using

sensor data, thus minimising unplanned downtime, reducing maintenance costs, and extending the life of machines, on the other hand, creates a very important risk in terms of causing the confidential information of enterprises regarding production to be captured by competitors in today's highly competitive world. A hacker who infiltrates the production network may cause unfair competition by selling confidential commercial and production secrets to rival companies. On the other hand, it is possible to cause irreparable damage to machines and robots by carrying out cyber attacks on the automation system of the competing company by hackers of the rival company (Konzek, 2024; IIoT World, 2024). Generally, developing countries import artificial intelligence, robots, and similar advanced technology products. However, some problems arise due to excessive dependence on the outside. In such situations, companies appear profitable in the short term, but this creates a disadvantageous situation for countries in terms of increasing the trade deficit. Thus, the dependence of developing countries on developed countries becomes a vicious cycle (Gür et al., 2024).

Another worrying high-risk danger from artificial intelligence threatens democracies. The risk of irreparable deterioration of political ethics with AI-supported politics is increasing day by day. Political parties have reached the power to influence voters by organising disinformation campaigns with the help of artificial intelligence to consolidate their own voters as well as gain votes from their competitors. It is possible for artificial intelligence companies established by any ideology or party, or later partnered with, to direct their users to the ideology or political formation they are a partner of. It would be a bit too optimistic in the current capitalist world to expect artificial intelligence, which produces new results by processing the data provided by algorithms that can be designed by the company to which it belongs, to be impartial and objective towards its users (Brundage et al., 2018).

The Occupational Health and Safety Dimension of Technological Developments

In addition to cyber data security risks, another important risk arising from advanced technologies is occupational health and safety (OHS) risks. Since technologies such as AI, robotics, and automation are part of the same ecosystem, their effects on occupational health and safety should be discussed together. Recognising the complex interactions between AI, robotics, and automation systems, workers, and the social environment, as technological products create a hybrid working environment with humans, will lead to a more meaningful and scientific understanding of the potential consequences of technological advances, including their implications for occupational health and safety. The fact that research on AI does not address occupational health and safety (OHS) in a significant way causes blindness to the nature and risks of human-machine interactions in AI-integrated automation systems (Neumann et al., 2021).

According to the 2024 data prepared by the Federation of the Robot Industry, robots and autonomous systems have rapidly participated in all areas of working life with an annual growth rate of approximately 5-7% between 2020 and 2024. For example, North America's robot density increased by 4.2% to 197 units per 10,000 employees during these years. The USA ranks 10th in the world in terms of robot density (IFR, 2024a; 2024b). With this intensive robotisation and automation, on the one hand, the risk of unemployment is increasing, and on the other hand, there is an alarming and remarkable increase in the number of occupational injuries and diseases in terms of occupational health and safety for the labour force, which continues to work in ever decreasing numbers. The number of nonfatal occupational accidents by year is given in Table 3. (ILOSTAT, 2025a).

Table 4

Non-fatal occupational accidents

Years	Number of Accidents (per year)	Increase (Compared to the previous year)
2017	882.700	
2018	900.400	17. 700
2020	2.654.700	1.754.300
2021	2.607.900	−46.800
2022	2.804.200	196.300
Average	**1.969.980 (per year)**	**492.075 (per year)**

Source: ILOSTAT, 2025a

The focus on productivity and efficiency rather than worker safety in the use of advanced technologies has increased the number of accidents. For example, in an accident at Amazon's New Jersey warehouse, 24 employees were hospitalised in an emergency after an autonomous robot accidentally punctured a can of bear repellent containing concentrated capsaicin, a harmful chemical (Jolly, 2018). As a matter of fact, this is not the first and only incident. Amazon warehouses are constantly on the agenda with autonomous robot-related work accidents. There are numerous cases where Amazon employees have suffered irreparable harm after similar workplace accidents, leaving them homeless, unable to work, or without income. The use of robot automation systems in mass production and distribution networks, such as Amazon, poses serious threats to the occupational health and safety of employees (Sainato, 2018).

The fact that the high risk of hazards associated with the use of AI is increasing daily in working life makes it necessary to seriously establish an audit and surveillance mechanism in this field. The "Artificial Intelligence Incident Database (AIID)", which was created in response to this need, classifies and statistics occupational accidents or cybersecurity-related damages involving or caused by artificial intelligence-centred automation systems that occurred worldwide as of the last quarter of 2020. Although AIID is still in its development phase, it is a database project that successfully compiles several problems that may arise in AI systems. Thousands of incidents caused by AI and semi-autonomous-autonomous systems, such as an autonomous vehicle crashing and killing a pedestrian, a cyber market built around a commercial algorithm and transferring billions of dollars between the parties collapsing due to algorithms, causing irreparable financial and psychological damage, or a facial recognition system misperceiving an innocent person and causing that person to be arrested, are recorded by AIID (Corfield, 2017; Hawkins, 2019; Kath, 2020; AI Incident Database [AIID], 2025; McMillan, 2025). For example, the Mitsubishi Outlander was remotely controlled by hackers due to a security vulnerability in its Wi-Fi system. The Fiat Chrysler group recalled 1.4 million vehicles due to a hacking risk that could remotely hijack the engine (Keach, 2018).

When the accidents registered in the AIID Database System were analysed, it was seen that 17% of the accidents caused physical damage and 17% caused psychological damage as of the end of 2022. 5.4% of the accidents were classified as severe and 12% as moderate. Another 17.4% of accidents were recorded as unrated cases. AI cases almost doubled between 2018 and 2022. This increase is expected to accelerate further in the coming years. It is seen that US technology companies are the companies with the highest number of occupational accidents. Between 2018 and 2022, Tesla ranks high with 65, Facebook 47, Google 30, OpenAI 22 and Amazon 21 accident reports. In addition, many new high-tech accidents, such as how a worker in an automotive parts factory was killed by a robot arm programmed to weld metal sheets, an autonomous subway crashed into a wall during a trial run, and the Lion Air plane crash in 2018, which killed all 189 people when a Boeing 737 crashed into the sea due to faulty sensor data causing the automatic manoeuvring system to continuously push the nose of the plane downwards (Bérastégui, 2024; AI Incident Database [AIID], 2025).

While it has reached a dangerous risk level even in the form of productive AI, the potential dangers that will arise when an AI that has reached the size of superintelligence is not taken under control will not be limited to working life. For example, autonomous weapons and armies controlled by super artificial intelligence point to a significant danger for the future. It is obvious that if autonomous armies consisting of millions of super artificial intelligence robots weighing less than an ounce (30 grams), capable of hitting their targets without error, running faster than a human can run, or flying, humanity will experience great extinction. International legal and ethical frameworks must be urgently established to manage future AI technologies and keep them under human control. In a future scenario where artificial intelligence may surpass human intelligence and machines will potentially control humans, legal and ethical standards for keeping these systems under human control and preventing them from making autonomous decisions should be established today (Russel, 2021). In order to emphasise the necessity of legal and ethical legislation, academia and bureaucracy should act together to find solutions.

Ethical Issues and Legal Resolution

The most important issue arising alongside these risks stemming from the use of advanced technologies such as AI, robotics, and automation is the legal definition of the responsibilities of the technologies that give rise to these risks and their evaluation within an ethical framework. There are also a number of ethical and legal issues surrounding the functions performed by robots or AI-based hybrid automation systems, such as managing operations autonomously or semi-autonomously, solving complex problems, and making real-time decisions. Those who argue that robots should be defined as electronic persons with specific rights and obligations are debating the application of legal procedures in cases of harm and risk arising from situations where robots make decisions or interact with humans. Granting robots legal personality would mean that they could be held liable for any negative consequences arising from their actions (Chopra 2010; Chopra and White, 2011).

In criminal law, the first person held responsible for a traffic accident is usually the driver in control of the vehicle. In the case of an accident occurring in automatic driving mode in autonomous or semi-autonomous vehicles, the vehicle manufacturer would be liable. The extent to which software developers would be liable is not yet clear. For example, in the UK, under current law, if your car crashes because you did not keep your hands on the steering wheel, you are liable, even if it is a semi-autonomous car. However, as cars become fully autonomous, determining liability becomes significantly more difficult. When cyber hacking enters the picture, the issue of liability becomes even more complex. It is thought that it would be unfair to assign responsibility to the driver or car manufacturer for fatal accidents caused by a driverless autonomous car being hacked, but it remains unclear who would be liable. At this point, there is a consensus that if an autonomous vehicle is hacked, and it is proven that neither the manufacturer nor the driver is at fault, and the perpetrator cannot be found, a fund should be established with the support of car manufacturers and governments to assist the victims (Keach, 2018). Legal solutions are being developed, such as establishing a compensation fund for damages caused by robots, adopting liability standards, creating a mandatory insurance scheme supported by a fund to cover damages, assigning numbers similar to citizen numbers, and establishing a specific legal status for robots in the long term (European Parliament, 2017).

From autonomous cars driving themselves on urban or interurban roads to robots that produce goods on their own, artificial intelligence is increasingly supporting complex human activities or completely replacing human intelligence. The most important point of debate regarding deaths caused by autonomous vehicle accidents is ethical. The central question in these debates is what ethical decision an autonomous vehicle will make when faced with an accident. The question of whether a vehicle should prioritise the lives of its passengers, pedestrians, or other living beings in traffic is also a relative issue that has not yet been clarified

for drivers of manned vehicles. Creating an algorithm that can mimic human ethics in traffic is very difficult. This is because there are an infinite number of possible scenarios that can arise while driving (Awad, 2017).

While people's ethical acceptance and decision-making preferences are relative, discussions continue on what ethical standard should be set for autonomous vehicles. If your vehicle's ethical code prioritises pedestrians or other living beings on the road, your life is at risk in the event of an accident. Similarly, if it has adopted an ethical standard that protects the passenger, it may make manoeuvring choices that are ethically questionable depending on the situation. It would be quite difficult to predict the decision of an autonomous vehicle when faced with a series of ethical possibilities where it must choose between killing one passenger or three pedestrians, or vice versa. R&D studies on autonomous vehicles show that these vehicles are not yet successful in making the complex ethical decisions required for driving. This is because conditions in traffic occur randomly and there is a potential for proactive interactive circulation that is very difficult to predict (Noothigattu et al., 2018).

Artificial intelligence is emerging as a revolution that changes standards in every field, not just technological or industrial ones. It is not considered reasonable to regulate this superior and extraordinary technology through a complex method based on countless ethical rules such as self-regulation. Instead, there is a need for an ethical framework focused on universal principles such as integrity in human work, human dignity, autonomy, privacy, beneficence, justice, non-maleficence, and responsibility, as outlined in the report of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST, 2017).

There is a clear need for an environment of trust and accountability in the development and use of artificial intelligence and technological products. Important issues arising from AI and automation systems, such as occupational safety, product liability, information security, e-privacy, cybersecurity, and the protection of personal data, are currently regulated within the existing general legal framework, which is based on standards relating to the free flow of non-personal data. When the draft guidelines based on the work carried out by the European Ethics Group on this subject gain legal certainty, it is expected that they will create a regulatory basis not only for the misuse of AI but also for fundamental rights such as individual privacy, personal dignity, consumer protection, and non-discrimination. Within the scope of these studies, solutions to current problems or future possibilities regarding other issues such as the future of work, justice, safety, security, social participation, and algorithmic transparency are also being discussed (EC, 2017).

The European Union Artificial Intelligence Act, prepared by the European Commission in 2021, was approved by the Council of the European Union and entered into force in 2025. This law establishes seven ethical principles: technical robustness and safety, human oversight and control, transparency, privacy and data governance, non-discrimination and fairness, diversity, accountability, and social and environmental well-being. The law subjects the risks posed by AI systems to a four-tiered analysis and classification: unacceptable, high, limited, and low risk. Rules and regulations are also established according to these risk levels. The high-risk level creates certain requirements and obligations for providers and implementers. The law provides deterrent financial penalties for violations committed by artificial intelligence system operators, artificial intelligence model providers, and EU institutions. It provides administrative fines for SMEs and start-ups, increasing from low to high levels. Penalties for general artificial intelligence model (GenAI) providers and EU institutions will be imposed by the Commission and the European Data Protection Supervisor. At the national level, criminal penalties will be subject to the national legal systems of member states (TRAI, 2024; Future of Life Institute, 2025; European Commission, 2025).

An interdisciplinary approach related to technology, environment, life sciences, social sciences, and humanities is required to solve unemployment and related socioeconomic and sociopsychological problems. Economic goals such as productivity, efficiency, and competition should be limited in a way that does

not conflict with universally agreed ecological, cultural, and social values (Müller, 2020). In order to make artificial intelligence and tecnologies a positive factor that increases economic growth in a balanced and inclusive manner, states should cooperate with society and moderate the aspects that harm social benefit. Artificial intelligence has the power to transform the world economy if the risks and benefits it will create are properly measured and its harmful aspects are honoured (Georgieva, 2024).

Conclusion

Thanks to technological developments that began with the Industrial Revolution, while work and social life became easier for labour and society on the one hand, on the other hand, the process of disqualifying labour from working life for the sake of capital was carried out step by step. Capital finances technological and scientific efforts aimed at disqualifying labour from the working environment in order to eliminate labour costs and earn more profit. This article examines the advantages and problems created by technological developments financed by capital for the workforce and society from a dialectical perspective.

In response to our first research question (Q1), it has been concluded that the use of artificial intelligence, robots, and automation systems leads to unemployment. As the findings of the research show, technological developments in robotics, automation, and artificial intelligence have positive outcomes on the one hand, while on the other hand, they create problems for the workforce in terms of unemployment, cybersecurity, and occupational health and safety. It is seen that while capital invests in new technologies on the one hand, it continues to lay off workers on the other. The use of robots, automation, and artificial intelligence is rapidly becoming widespread, and as a result, the need for labour in production is decreasing. This indicates that layoffs will increase in the coming period.

In response to our second research question (Q2), we concluded that the use of artificial intelligence, robots, and automation systems creates significant problems in terms of cybersecurity and occupational health and safety. Particularly, there are signs that very dangerous consequences will emerge in the field of cybersecurity in the coming period. The dangers and risks posed by technology in terms of cybersecurity are increasing, and it is seen that this affects not only the workforce but also all members of society. On the other hand, new areas of illegal cybercrime have emerged as a result of technology, threatening every aspect of life, including politics and democracy. Accidents caused by the use of robots and automation systems in production are seen to lead to critical issues in terms of occupational health and safety.

This study addresses the problems created by technology considering the available data. However, as this is still a dynamic process, the ultimate extent of the problems that technology will create is not yet clear. Therefore, the real results will emerge when new data and dimensions of the problems come to light in the future. In particular, academic and bureaucratic studies are needed to ensure that the methodologies used to obtain unemployment data accurately reflect reality and reveal the true unemployment rates. It is highly probable that the true extent of unemployment is concealed due to the influence of capital. Furthermore, the problem of cyber security resembles a bottomless pit. No clear methodology or decision has yet emerged on how to solve this problem.

On the other hand, technological advances have generated ethical and legal paradoxes. Technology is advancing in an uncontrolled area, outside the bounds of ethics and law. In response to our third research question (Q3), we concluded that the problems caused by technological developments can be prevented by establishing international legal and ethical regulations. Limiting technological developments with legal and ethical rules can prevent the problems they cause from threatening humanity's common future and social peace. By placing technology within an ethical and legal framework, preventive measures will also be taken against the dangers and risks posed by technology in terms of labour, such as unemployment, cybersecurity,

and occupational safety. Academia and bureaucracy must come together to address technology-related socioeconomic, legal, and ethical issues through an international approach. These issues are not national but international in scope, and their solutions require the contribution of all countries. The goal of capital efficiency must be balanced and limited in a way that does not create a paradox with humanity's universal values. States must act with a protective responsibility towards their societies and ensure peace between technologies and society.

It is evident that the source of all these problems is the neoliberal globalisation paradigm that advocates the unlimited freedom of capital. The global conjuncture shows that this paradigm has been replaced by a mercantilist paradigm focused on localisation and regionalisation. This new transformation, resembling paternalistic state capitalism, is thought to have laid the foundations for a more social liberalism paradigm. Social liberalism is the capitalist paradigm closest to the liberalism advocated by Adam Smith. In this paradigm, where the state also participates in the market and balances capital, unemployment and other ethical risks are anticipated to be subject to limitations that prevent them from causing harm due to conservative tendencies that protect society.

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