

Runiewicz-Wardyn, Małgorzata; Rutkowski, Jakub; Wñacior, Maciej

Working Paper

Labor markets and modern economic cycles: The growing role of the sixth Schumpeter-Konratiev wave

TIGER Working Paper Series, No. 150

Provided in Cooperation with:

TIGER - Transformation, Integration and Globalization Economic Research, Warsaw

Suggested Citation: Runiewicz-Wardyn, Małgorzata; Rutkowski, Jakub; Wñacior, Maciej (2024) : Labor markets and modern economic cycles: The growing role of the sixth Schumpeter-Konratiev wave, TIGER Working Paper Series, No. 150, Transformation, Integration and Globalization Economic Research (TIGER), Warsaw

This Version is available at:

<https://hdl.handle.net/10419/300314>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

TIGER

TRANSFORMATION, INTEGRATION and GLOBALIZATION ECONOMIC RESEARCH
CENTRUM BADAWCZE TRANSFORMACJI, INTEGRACJI I GLOBALIZACJI

TIGER Working Paper Series

No. 150

**LABOR MARKETS AND MODERN ECONOMIC CYCLES -
THE GROWING ROLE OF THE SIXTH SCHUMPETER-
KONTRATIEV WAVE**

Małgorzata Runiewicz-Wardyn,
Jakub Rutkowski, Maciej Wąciór

Warsaw, June 2024

LABOR MARKETS AND MODERN ECONOMIC CYCLES - THE GROWING ROLE OF THE SIXTH SCHUMPETER-KONTRATIEV WAVE

Introduction

Modern economic cycles are the result of a complex interaction of many internal and external factors that simultaneously influence the labour markets. The latter includes such phenomena as globalization, technological progress, financial innovations, pandemics, climate change and geopolitical events. The subject literature devotes relatively lots of space to the classic short economic cycles, i.e. cycles arising as a result of financial crises, fluctuations in the money supply (Irving Fisher's theory), credit cycles, supply and demand shocks, as well as external global events. Whereas longer cycles, including Kondratiev-Schumpeter cycles, are of equal importance, especially for understanding long-term strategic changes, directions of socio-economic development and the dynamics of modern economic growth. These cycles are primarily caused by key technologies, technological innovations and the related structural changes. The development of technology and global production has resulted both, in the emergence of threats and new opportunities. The role of which was not as important as until recently. In past decades, ecological events, mainly related to the climate situation on Earth and globalisation, have played the key role in determining shocks on the labor markets and other unpredictable events such as the COVID pandemic.

According to the Austrian theory of business cycles, in the face of a decline, all the market adjust themselves without any particular external interference. However, this theory assumes that humans efforts to maximize efficiency and a general welfare is based on fully rational behavior of market participants. Yet, in the modern economics, theoretical assumptions about people's rationality are questioned when confronted with empirical data, hence emphasizing the markets imperfections. This justifies the role of decision-makers, whose intervention is necessary in the face of the crisis. The latter is well documented by the actions of the US governments and other highly developed economies, which, through expansionary monetary policy, prevented the more serious effects of the market collapse in 2008-2009. Similarly in the case of climate change, economic decisions do not necessarily go hand in hand with consumer rationality, ecological awareness or consumer decisions. Climate change is a long-term challenge, which may conflict

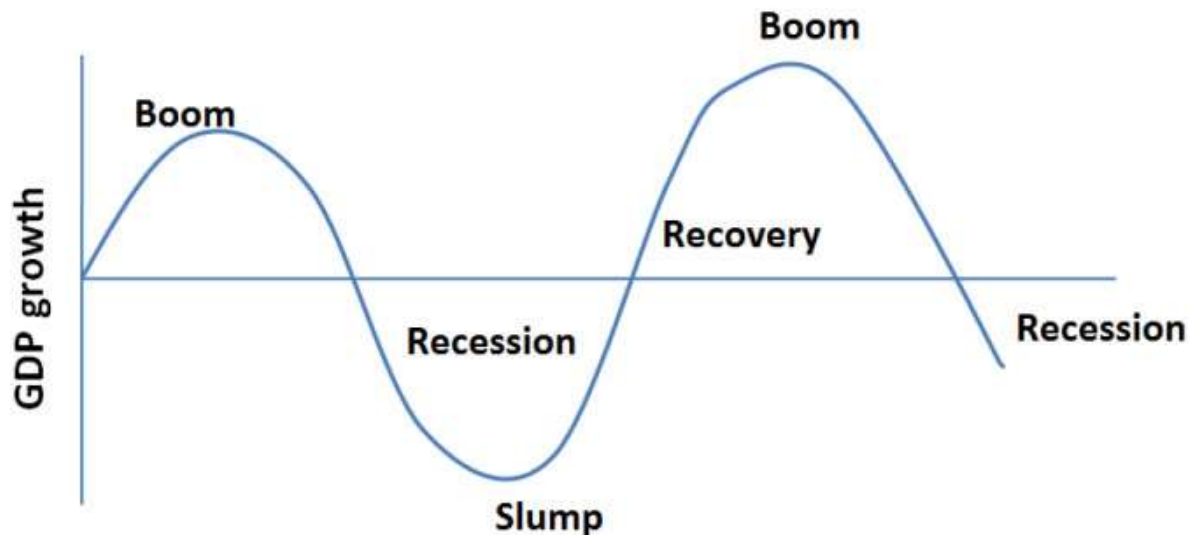
with short-term consumer preferences. Consumers may have difficulty making decisions that benefit the future at the expense of present conveniences. Hence, governments play a key role in mitigating the business cycles associated with climate change by implementing policies and strategies that promote sustainable development, reduce greenhouse gas emissions and increase resilience to the effects of climate change.

The following paper addresses several key questions related to the selected contemporary economic cycles and their role in the global labor markets dynamics, in particular: *What was the impact of the recent economic cycles on the labour markers? How does climate change affect the labor market and the economic cycles? What technologies and innovations are causing the sixth wave of economic growth? How do policies and regulations influence the development and dynamics of the sixth wave? What is the role of consumer behavior in the development and dynamics of the sixth wave?*

1. Economic cycles and the labor markets

Economic cycles have a significant impact on the labor markets, and their impact is visible in different phases of the cycle. In simple words, as Warżała (2013) notes, good economic conditions improve the situation on the labor markets, and bad economic conditions worsen it. The relationship between changes in GDP and the level of unemployment was also studied by Arthur Okun. He based his research on the economic performance of the United States in the 1950s. According to Okun's theory, for every percentage point by which unemployment exceeds the natural rate, the value of gross domestic product deviates from the potential level by three percentage points. However, it should be noted, as the author of the theory himself suggests, that the value of the Okun coefficient varies over time. Currently, the value of the discussed coefficient is estimated at 2 (Prachowy, 1993). Thus, the dynamics of labor markets is closely linked to economic cycles, and hence can both influence and be shaped by it (Snowdon et al., 1998). The average economic cycle consists of several phases, including expansion, peak, recession and trough. In each of these phases, the labor markets react in a particular way. In the expansion phase, we observe an increase in employment - companies increase production, which leads to increased employment, higher salaries (to attract and retain talents), and growing investments (including in employee training). During the peak phase employment stabilizes (during the peak phase, economic growth reaches its maximum and the labor markets become very tight). Unemployment is low and further employment growth is more difficult.

Figure 1. Phases of the classic economic cycle



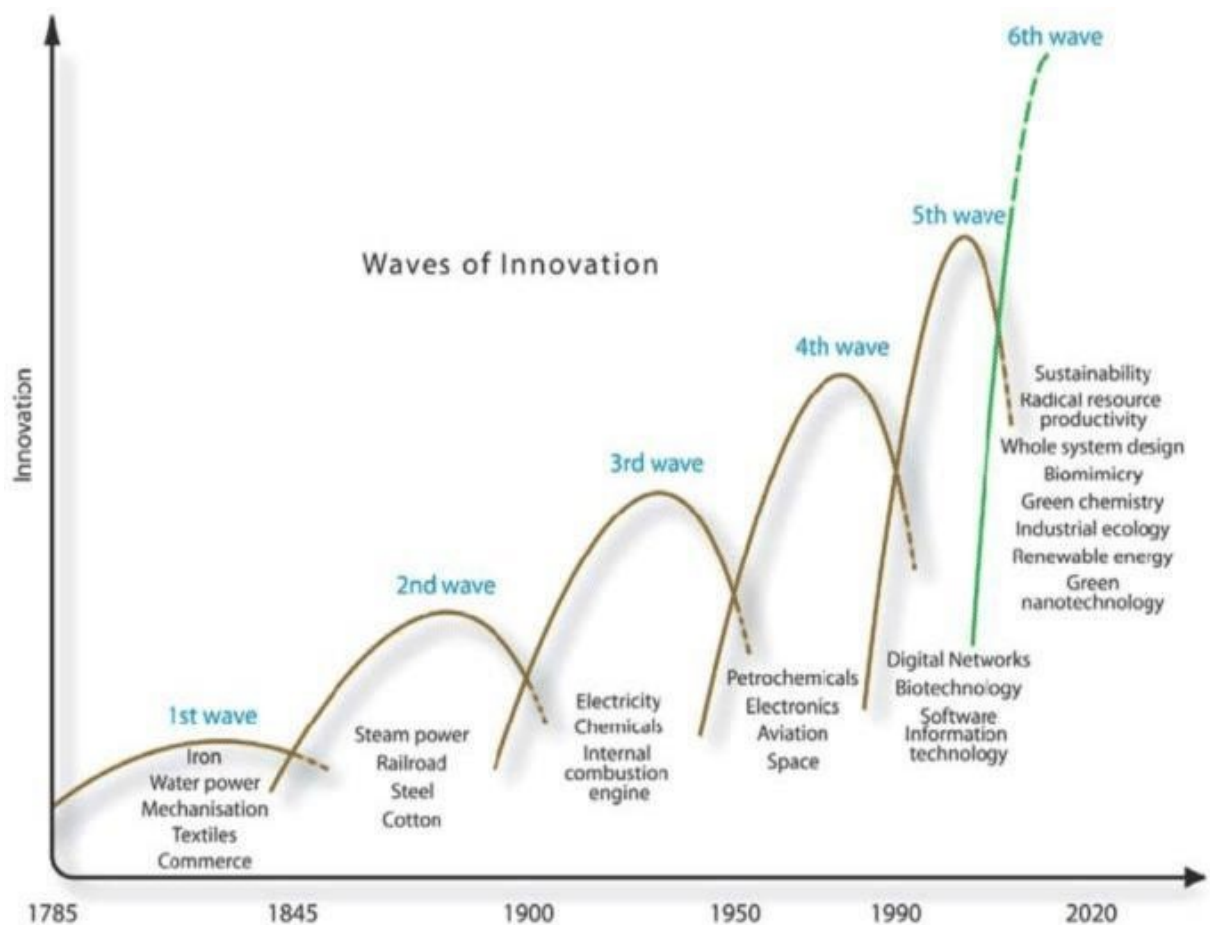
Source: <https://www.goconqr.com/note/207353/block-1>

During the recession phase, companies limit production and reduce employment in response to the decline in demand. Unemployment is rising and companies are increasing employment on short-term or temporary contracts instead of permanent jobs. In the bottom phase, unemployment is at its highest level and the labor market is in its worst condition - it is witnessing a decline in wages, an outflow of workers to other locations and a gradual reorientation of skills.

The so called long-term Kondratiev cycles also include periods of expansion, stability and contraction of economies, but their main difference is the future orientation and hence their partial predictability. A well-known example in history is how the First Industrial Revolution ushered societies into a new era of production and consumption. Joseph Schumpeter's theory of innovation and "creative destruction" made a significant contribution to Kondratiev's theory. Joseph Schumpeter (1939) emphasized the role of innovation and technological change as key factors driving economic cycles (disrupting existing industries leads to new models of economic growth). Kondratiev and Schumpeter's long-term cycle model can be understood as a series of long-term waves driven by technological innovation and economic change. Each cycle usually begins with the introduction of breakthrough technologies (e.g. steam engine, electricity, information

technology) that stimulate economic growth, then goes through the diffusion phase (increase in productivity, creation of new jobs and inflow of investments), the market saturation phase and ends phase of economic recession (deterioration of the economic situation and increase in unemployment). The next cycle begins with the introduction of new innovations (Schumpeter, 1939).

Figure 2. The Kondratiev cycles – waves of innovation



Source: https://www.researchgate.net/figure/Waves-of-innovation-The-Kondratiev-cycles-five-long-term-technology-and_fig1_259513304

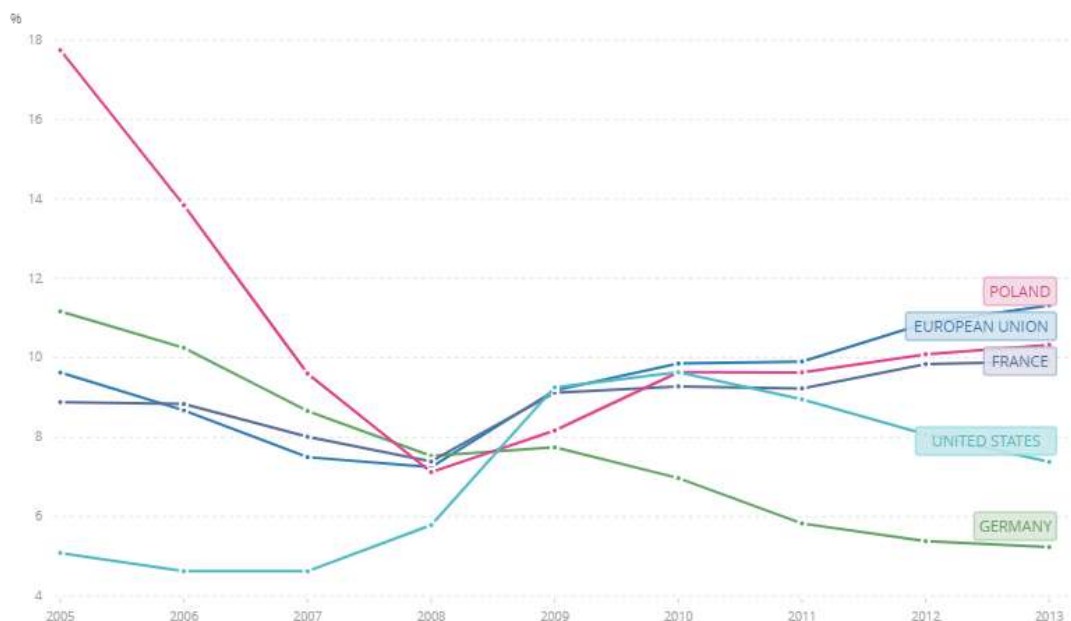
Historical examples include innovations such as the steam engine and mechanized textile production (first wave: 1780-1830); development of railways, steel and telegraphy production (second wave: 1830-1880); development of electricity, chemicals and cars (third wave: 1880-1930); development of petrochemistry, aviation and electronics (Fourth wave: 1930-1970); information technology, computers and telecommunications (The Fifth Wave: 1970-2010). Finally,

technologies based on AI, biotechnologies and environmental technologies, introducing the economy into the sixth wave of innovative and technological changes.

2. The impact of financial crises on the labor markets

Financial crises affect the labor markets at various levels, both locally and globally. The network of connections of the financial system in the world causes the economic situation of cooperating countries to influence each other. An example is the financial crisis of 2008. The real estate bubble in the US and the abuse of public trust by the financial sector resulted in an economic collapse in the US and then particularly affected Western European countries.

Figure 3. Unemployment rate in selected countries 2005-2013



Source: <https://data.worldbank.org/indicator/SL.UEM.TOTL.NE.ZS?end=2013&locations=EU-DE-FR-PL-US&start=2005>

The Figure 3 shows the unemployment rate in selected countries, including during the financial crisis of 2008. There is a clear increase that affected all indicated countries, while the period preceding the next decline varies.

As a result of the crisis in the US, approximately 30 million people lost their jobs and the average household wealth decreased by 18%. Young people, usually occupying lower positions in the hierarchy and unskilled people, felt the particular effects of the crisis. Moreover, when entering the

labor market during the crisis, they could count on lower earnings, while the number of jobs was significantly smaller, and those available were often of low quality.

As a result of the loss of public trust in the banking sector, it became the subject of reforms aimed at increasing the transparency of its operations. As a result, new institutions and companies were created to control and analyze the operation of financial institutions. In this way, a certain structural change took place because people previously working in banks or other institutions co-responsible for the outbreak of the crisis could use their experience in a different role.

Unlike the 2008 crisis, during the Great Depression of 1929-1932, the government's failure to respond quickly enough to the collapse in the financial sector led to an increase in unemployment in the US from 4.2% in 1928 to as much as 23.6% in 1932. Unemployment fell below the 1928 level only 15 years later. Wage levels dropped by 42.5% in 1933 compared to 1929. It was the worst economic disaster in US history. More than 12 million Americans lost their jobs, many lost their homes, and as a result, homeless villages called "Hoovervilles" emerged in cities. A clear rebound occurred only after the introduction of the "New Deal" aid plan by the new president, Franklin Delano Roosevelt. The main goal of the project was to create jobs and stimulate the economy. For example, the Civilian Conservation Corps was an organization aimed at unemployed people aged 18-25. It was involved in the construction of structures in the USA. Thanks to manual labor, workers earned \$30, while an additional \$25 was donated to their families. It was one of over 40 different programs aimed at all sectors of the crisis. The U.S. government pumped more than \$10 billion into the economy in government investment, while creating jobs that were essential to the further deepening of the crisis.

3. The impact of the COVID pandemic on the labor market

Another category of events that define the state of the labor market will be rare global events, such as a pandemic. The Figure 4 shows the change in the unemployment rate in the US as a result of the COVID pandemic.

Figure 4. Unemployment rate in the USA 2017-2024

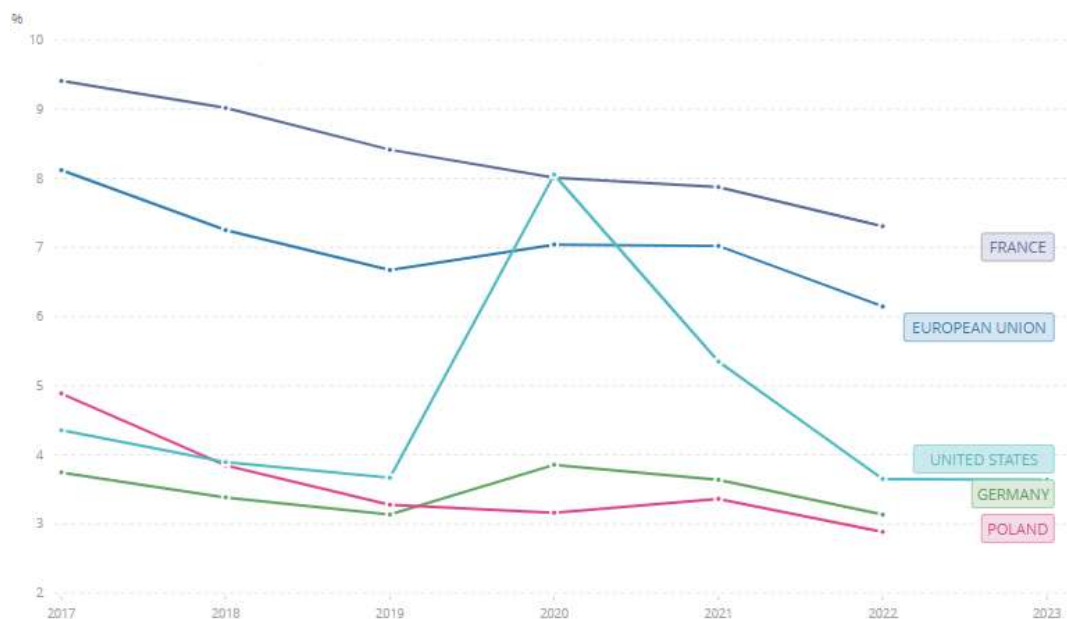


Source: <https://fred.stlouisfed.org/series/UNRATE>

As the figure shows, it took about two years to return to the pre-pandemic level, but the extremely dynamic increase to almost 15% shows how much impact the COVID pandemic had on the labor market. In less than two months after the outbreak of the pandemic, the unemployment rate reached the highest level in years (Figure 4). In response to such a large increase, aid plans were implemented, which in the following months helped to significantly reduce the unemployment rate, but compared to the previous growth rate, it was a relatively slow process.

The next figure shows changes in the unemployment rate in selected countries at annual intervals during 2017-2023. A significant difference in the specificity of the US labor market can be seen when comparing the data to the same period in Europe.

Figure 5. Unemployment rate in selected countries 2017-2023



Source: <https://data.worldbank.org/indicator/SL.UEM.TOTL.NE.ZS?end=2023&locations=EU-DE-FR-PL-US&start=2017>

The US labor market, based largely on dynamic changes in the workplace, clearly reacted to the shock of the pandemic. Employers who did not have long-term contracts with their employees in search of cost cuts quickly reduced the number of full-time jobs, which is why such a large increase in unemployment could be observed. Financial support from governments in Europe significantly contributed to maintaining jobs, but at the expense of inflation in the following years, a problem affecting most economies. Even though the unemployment rate in the USA may suggest that the subsidization of the economy was not large enough to pay for it with inflation in the following years, the problem of inflation in the USA is as severe as in European countries. Therefore, it can be argued that in the face of the pandemic, the European labor market model fulfills its role better.

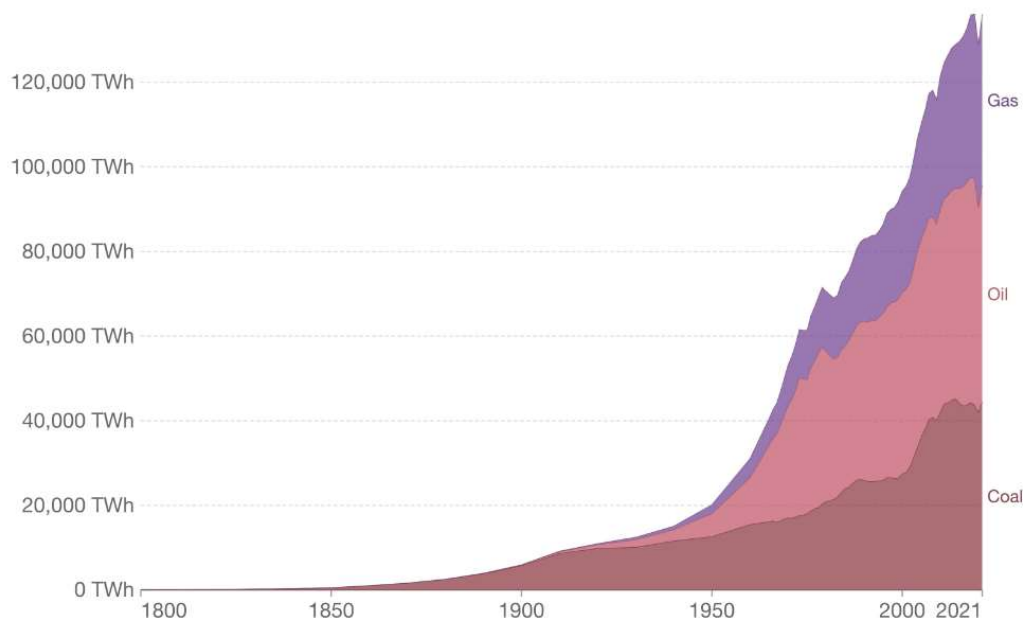
4. Environmental challenges of labour markets and the rise of sixth wave of innovations

Ecological conditions have become less predictable as a result of global warming, and the potential threats resulting from its effects pose a tangible threat to labor markets in many parts of the world.

The growing world population, which has already exceeded 8 billion and according to UN forecasts may reach 10 billion by 2060, causes the Earth's resources to be increasingly exploited. The energy

consumption of industry subordinated to maximizing profits and at the same time striving to meet the needs of such a large number of people significantly contributes to the increase in the amount of CO₂ in the air (more than doubling since 1974) and the temperature increase by more than 1 degree Celsius in the same period. Another aspect is the depletion of non-renewable raw materials.

Figure 6. Global energy consumption by fossil fuels in TWh



Source: <https://ourworldindata.org/fossil-fuels>

The above figure shows how dynamic the growth in fossil fuel consumption has been, especially since 1950. The energy mix has changed over the years, starting with wood before 1850, then a growing share of coal and, since 1950, oil and gas. Currently, the global climate situation forces a change and reduction of the share of fossil fuels as energy sources in favor of more ecological energy such as renewable energy or nuclear energy.

The above-mentioned factors will determine drastic changes in employment around the world in the near future. The issue of rising temperatures, especially in equatorial and tropical countries, may result in the need to migrate large masses of people to areas where everyday existence will be less burdensome. Taking the example of Europe, we can expect an inflow of people from northern Africa to western and central Europe. The vast majority of them will probably be unskilled labor

for whom the European labor market will be an opportunity to raise their standard of living. Due to the low level of unemployment in Europe and the disproportionately low number of jobs in low-skilled professions in relation to the potential number of immigrants, changes in the employment structure may occur. Too high opportunity costs related to the need to pay social benefits to job-seeking immigrants may force decision-makers to introduce programs supporting the training of unskilled workers in order to make jobs available in sectors that need cheap labor.

Another issue is the record high temperatures in southern Europe during the summer season, which often exceed 50 degrees Celsius, increasing year by year. Such conditions pose a direct threat to people's health, and an increase in the frequency of such weather may force the inhabitants of, for example, Spain to move to the northern part of the continent. Due to global warming, it is possible that in the near future it will not be Spain, but the countries of northern Europe that will become the cradle of tourism, which is why this sector is thriving, for example in Poland.

With Europe's population likely to increase due to immigration, economic growth will need to be maintained to provide enough jobs. In turn, in this matter, the problem is the "apparent" trade-off between economic growth and environmental protection. It might seem that by investing in environmental protection and imposing sanctions on industry, we are limiting development. However, when counting economic growth, in order to obtain a measurable effect, the future costs of removing the effects of further environmental pollution should also be included. Moreover, postponing decisive action to limit environmental destruction could result in future opportunity costs increasing exponentially, as environmental restoration may become more expensive over time. In turn, quickly and skillfully entering the period of industrial transformation may also be an opportunity for Europe to increase competitiveness on a market that will need environmentally friendly solutions (using AI and other technologies). Although China is currently the leader in most sectors, it is possible that in the future it will lose its advantage due to the need to incur large financial outlays to adapt its economy, which is currently responsible for almost half of CO₂ emissions in the world.

In 2014, Triple E Consulting estimated that if no adaptation actions are taken, 240,000 potential jobs may be lost by 2020, and by 2050 their number may reach 410,000. Loss of jobs is associated with the negative effects of climate change in the most affected economic sectors and side effects on the entire economy. They are also related to a general decline in labor productivity caused by increasing natural hazards such as heatwaves and droughts. Triple E estimates that the greatest job

losses will occur in Bulgaria, Croatia, Cyprus, Estonia, Greece, Latvia, Lithuania and Romania (*Adaptation to Climate Change and the world of work, 2020*).

The benefits of implementing adaptation policies outweigh their costs. As the report shows floods in Europe claimed the lives of over 2,500 people, affected over 5.5 million people and caused direct economic losses of over €90 billion, during the period of 1980-2011. In 2020, minimum cost of failure to adapt to climate change was estimated at EUR 100 billion per year and would rise to EUR 250 billion in 2050. These investments can also stimulate demand for new types of goods and services, thus increasing innovation and new market opportunities. As for the EU the aforementioned study by Triple E estimated the employment impact of implementing adaptation measures for the two possible scenarios: reference scenario - average annual spending on adaptation measures for EU countries corresponding to 0.5% of GDP, and the ambitious scenario - corresponding 1% of GDP. According to the results of this study, the implementation of such adaptation measures could lead to the creation of new 500,000 (reference scenario) to one million jobs (ambitious scenario) by 2050 (*Adaptation to Climate Change and the world of work, 2020*).

5. The sixth wave of innovation: AI, green technologies and their impacts on labour markets

As per Kondratiev-Schumpeter theory each wave of innovation lasts approximately until the corporate profits it generates begin to decline in favor of more traditional sectors. At this point a technology reaches its limits in terms of financial incentives, and to maintain them it must be replaced by another, more modern technology. Each wave therefore ends with a decline in production or economic decline. Although computerization was historically limited to routine tasks, AI and big data algorithms are now rapidly entering various industries and sectors and can easily replace human work, especially in a wide range of cognitive tasks that are not routine. Moreover, advanced robots are increasingly performing manual tasks, which is changing the nature of human work in companies and many professions (Brynjolfsson and McAfee, 2011).

Artificial intelligence and other technologies in fields such as synthetic biology, computer science, nanotechnology, quantum computing, additive manufacturing, autonomous vehicles and robotics will have a fundamental impact on the structure of work, economies and societies in the coming decades. Therefore, if current socio-economic systems do not accelerate the technological and digital transformation of labor markets, then a significant part of the global mass of workers may

be unemployed by 2050 (Glenn and Florescu, 2015). From the perspective of Kondratiev-Schumpeter theory in order the sixth wave to expand governments must not slow down the progress and use of AI, but rather enable its smooth implementation and operational agility, especially in the labour markets. McKinsey (2017) estimates that career change needs will be enormous and will involve at least 375 million workers who will need to develop new skills (in the scenario of successful rapid adoption of digitalization by individual countries). If the transformation is slow, unemployment will slowly increase, depreciating the value of human work (McKinsey, 2017).

The implementation of AI technologies may cause some challenges to the labour markets, yet in the same time harbour great opportunities for more effective management of climate change and the energy market, more efficient resource usage, and create sustainable conditions at many levels (e.g. AI solutions can provide forecasting, diagnosis, and better control of our living systems).

The rising environmental awareness among consumers, the sense of responsibility for environment, support and advocate for policies and initiatives that promote sustainability, will help the implementation of AI in labour markets. Simultaneously, the promotion and explanation of AI based green technologies within government policies are believed to provide consumers with a deeper understanding of these technologies and encourage the application of AI solutions in daily consumption and work routine.

Summary and conclusions

The labor market and its resistance to economic cycles in a global perspective is a subject that is difficult to generalize and draw conclusions common to the whole world. Its complexity and local conditions mean that it should be studied from a regional perspective. The authors predict a growing impact of geographical location on the size and structure of the labor market in the future. It is possible that due to the shortage of jobs in some regions, the opportunity costs of supporting people who cannot find a job will become so high that a basic income will become universal. Such an event will redefine the concept of work, as its basic role as a source of income will change.

The sixth wave of long-term growth, driven by a combination of advanced technologies and interdisciplinary approaches, will address global climate challenges and will fundamentally transform various sectors through the active implementation of green technologies, renewable energy, circular economy models, and although forecasts for economic growth and productivity is modest, they can have a significant impact on improving quality of life, including innovations in

health care, energy and communications that improve living standards around the world. Of course, the cost of these positive changes may be the loss of work, for example, of miners as a result of the energy transformation.

Nowadays, when dealing with the dynamic development of technology, climate change or anomalies such as the COVID pandemic, the labor markets are constantly changing. Less stability, new technology or new legal conditions require quick adaptation to market needs, which creates new threats, but also opportunities. The common denominator for all the above discussed cycles is the growing role of decision-makers in supporting companies and employees in adapting to functioning in the current reality. In the era of the post-GDP economy, due to the multitude of events taking place simultaneously, it is necessary to create a comprehensive development strategy that responds to the challenges of the modern world.

The development of AI technology may potentially be painful and displace many professions from the market, which certainly generates the need to retrain parts of society affected by this change. Artificial intelligence has significant potential to contribute to the protection and restoration of the natural environment (Runiewicz-Wardyn, 2022; 2023). By leveraging AI technologies, we can improve efficiency, make better decisions, and implement innovative solutions to address various environmental challenges.

References

- Stavins, R. N. (2019) *Economics of the environment. Selected Reading*, Seventh Edition.
- Dorn, D., Patterson, K.L., Van Reenen, J. (2020) *The Fall of the labor share and the rise of superstar firms*, *The Quarterly Journal of Economics*, Volume 135, Issue 2, May 2020, Pages 645–709.
- McAfee, A., Brynjolfsson, E. (2016) *Human Work in the Robotic Future: Policy for the Age of Automation*. *Foreign Affairs*, Vol. 95, No. 4, pp. 139-150.
- Kołodko, G. (2022) *Świat w matni*, Warszawa.
- Federal Reserve Bank (2023), FRED, <https://fred.stlouisfed.org/series/UNRATE>
- Prachowny M. (1993), Okun's law: Theoretical foundations and revised estimates, *Review of Economics and Statistics*, No. 55.

Runiewicz-Wardyn, M., (2023). Can sharing economy save environment degradation and fix the capitalist economy? *TIGER Working Paper Series*, No. 149. Kozminski University.
https://www.tiger.edu.pl/TWP_149.pdf

Runiewicz-Wardyn, M. (2022). A look at COVID-19 recession through Schumpeterian “creative destruction” forces. *TIGER Working Paper Series* No. 148. Kozminski University. Warsaw.
https://www.tiger.edu.pl/TWP_148.pdf

Snowdon B., Vane H., Wynarczyk P. (1998), *Współczesne nurty teorii makroekonomii*, Wydawnictwo Naukowe PWN, Warszawa.

The World Bank Data Unemployment Total (% of total labor force)

Warżala, (2013) Wahania koniunkturalne a rynek pracy w Polsce. *Studia ekonomiczne/ Economic studies*. nr 4 (LXXIX) 2013 https://inepan.pl/images/pliki/SE/Studia_2012_4_%2002_Waraa.pdf

Glenn, J., Florescu., E. (2015). *Future Work/Technology 2050*. Real-Time Delphi Study: Excerpt from the 2015-16 State of the Future Report 05(03), January 201605(03).

Adaptation to Climate Change and the world of work, 2020. Syndicat EU Trade Union.
https://www.etuc.org/sites/default/files/publication/file/2020-09/ETUC-adaptation-climate-guide_PL.pdf

Schumpeter, J. (1939) *Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process*, New York and London, McGraw – Hill Book Company Inc.