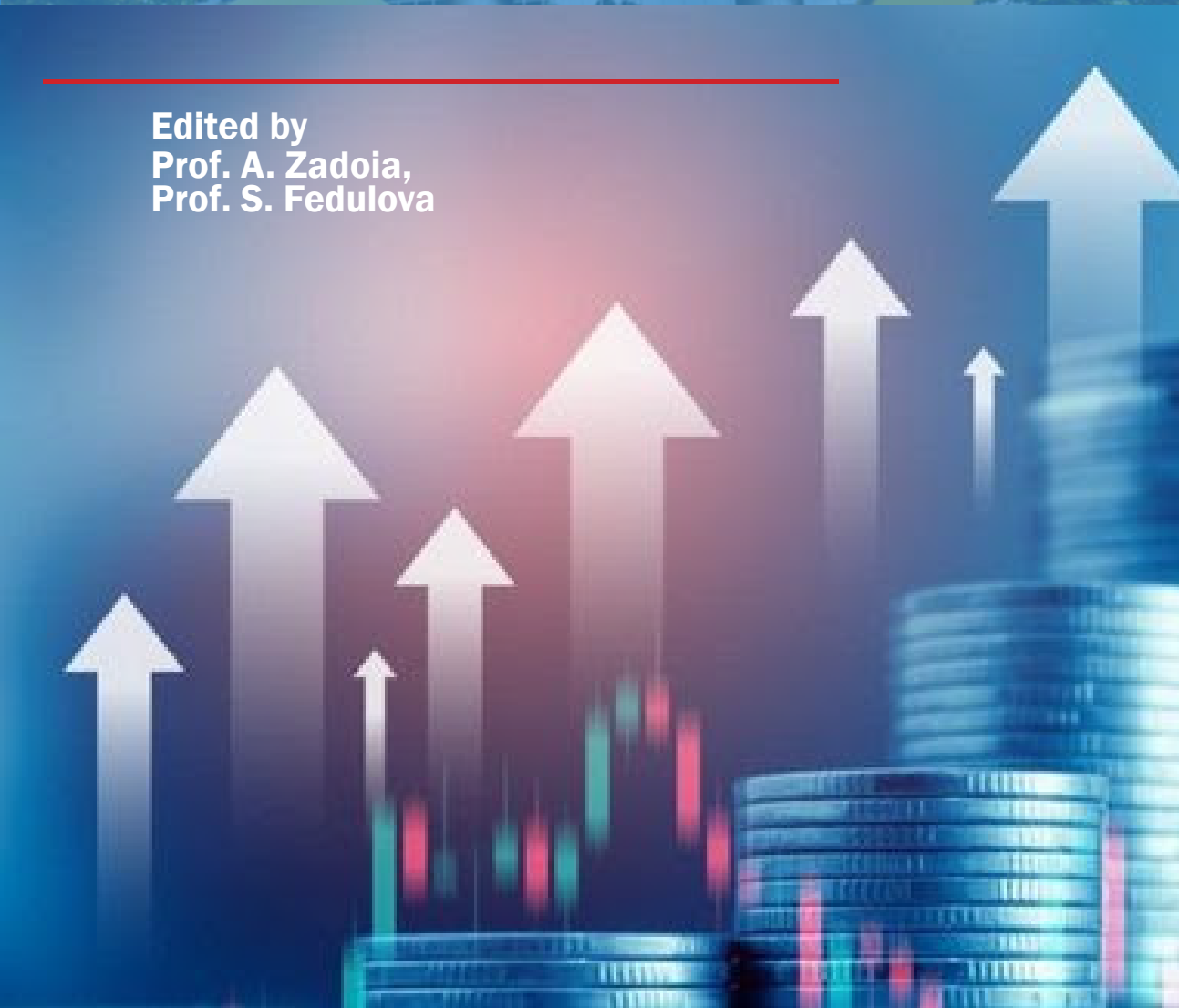
EUROPE'S COMPETITIVENESS IN THE NEW GLOBAL ECONOMY

Edited by
Prof. A. Zadoia,
Prof. S. Fedulova



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This textbook contains educational materials for studying the system of issues in the field of building European strategic autonomy and ways to ensure the competitiveness of the EU in new geostrategic realities, with an emphasis on the close connection of Ukraine to the European market and business culture; as well as ways to achieve a sustainable energy future in Europe; digital transformation; the growth of jobs under the influence of the war in Ukraine; new solutions to global social problems. It consists of six chapters (two topics in each chapter), which sequentially reveal the content of the nine mutually complementary drivers of the EU 2030 Competitiveness Strategy.

It is intended for all those who are interested in the issues of competition in the modern world and want to understand how the factors that ensure leading positions in this struggle operate.

УДК 327.5

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Introduction

The modern world lives according to the principles of a market economy. Success in it is achieved by the one who can demonstrate better competitiveness. And this is manifested at all levels: from moving up the career ladder to positions in the world rankings of a particular country or group of countries.

For a long time, Europe was the undisputed world leader. Although it remains one of the most innovative, safe and prosperous regions, Europe is lagging behind the US and losing ground to China in various key indicators.

The EU's decision to start negotiations with Ukraine regarding its accession actualizes the issue of researching the level of competitiveness of the European Union and the impact of EU enlargement and its position in the modern world. The issue of EU competitiveness goes beyond the scope of theoretical research and acquires important practical significance.

On the one hand, the future accession of Ukraine to the EU can strengthen the competitive position of a united Europe. After all, Ukraine is a significant market for European goods, additional labor potential and important minerals and technological infrastructure that will reduce the EU's dependence on suppliers from other regions of the world (sometimes unreliable). On the other hand, the accession of Ukraine will have a negative impact on some generalizing indicators for the European Union due to the insufficiently high level of economic development of Ukraine. Therefore, it is extremely important that at the stage of negotiations, all parties clearly imagine the potential advantages and possible threats to European competitiveness in the event of EU enlargement.

Under these conditions, it is extremely important for current students to study the issues of competitiveness, which in the coming

years will depend on the realization of potential advantages and the minimization of possible threats to the European competitive position.

Today, given the growing geopolitical uncertainty and growing global challenges, Europe needs decisive action to strengthen its resilience to external shocks and maintain its international authority.

Europe's long-term economic competitiveness depends on deep and sustainable value chains. The Green Deal agenda, Europe's economic and social development strategy, aims to make the EU carbon neutral by 2050 and become the world's most competitive center for innovation and manufacturing and digital technology.

The course "Europe's Competitiveness in the New Global Economy" is devoted to the consideration of these and similar problems. The purpose of our course is to develop a comprehensive knowledge system for students in the field of building European strategic autonomy and ensuring the EU's competitiveness in new geostrategic realities. Emphasis is placed on Ukraine's close ties to the European market and business culture, along with strategies to achieve a sustainable energy future in Europe, foster digital transformation, and address the impact of the war in Ukraine on job growth. Additionally, the course explores new solutions to global social challenges.

Throughout the course, students will develop both general competences, such as the ability to think broadly and comprehensively, understand the interrelationships and cause-and-effect dynamics of events, and appreciate diversity and multiculturalism, as well as specific competences, including the ability to analyze the external environment and assess its impact on their future professional development.

The textbook was prepared as part of the implementation of the international project "Europe's Competitiveness in the New Global Economy" No. 101176059 – EuCompet – ERASMUS-JMO-2024-HEI-TCH-RSCH. It consists of six chapters (two topics in each chapter),

which sequentially reveal the content of the nine mutually complementary drivers of the EU 2030 Competitiveness Strategy.

The content of the textbook, the extensive use of official materials of the European Union in combination with numerous facts and analysis of real indicators, the use of the language of live communication to present the complex problems of competitive relations in the modern world, make it interesting not only for applicants, but also for all those interested in economic problems of the modern world.

The textbook was prepared by the author's team of the Department of Global Economics of the Alfred Nobel University, consisting of: Prof., Doctor of Sciences (Economics) ***A. Zadoia*** (introduction, chapter 1, chapter 3), prof., Doctor of Sciences (Economics) ***S. Fedulova*** (introduction, chapter 2, chapter 6), Associate Professor, Ph.D. (Economics) ***A. Mahdich*** (Chapter 2, Chapter 4), Associate Professor, Ph.D. (Economics) ***E. Lymonova*** (chapter 4, chapter 5), Associate Professor, Ph.D. (Economics) ***O. Zadoia*** (chapter 1, chapter 3), Associate Professor, Ph.D. (Politic) ***R. Kliuchnyk*** (Chapter 5, Chapter 6).

We wish you to always be competitive!

Chapter 1

THE SINGLE MARKET AS A FACTOR OF EUROPE'S ECONOMIC STABILITY

Topic 1. Competitiveness of the European Union: current state and prospects

Questions that reveal the content of the topic

1.1. The essence of the international competitiveness of countries and the indicators that measure it

1.2. Assessment of the current state of EU competitiveness and diagnosis of the main problems

1.3. Prospective directions for achieving stable competitiveness

Competitiveness is a cross-cutting category that describes certain characteristics of the subject of relations at various levels and in various situations. In order to convince a student of the need to study a certain course, the teacher quite often refers to the growing competitiveness of a graduate with relevant knowledge. Arguments for the introduction of a new product into production are the potential improvement of its competitive position on the market. Investors, making a decision to invest money in an enterprise, try to assess its competitiveness. When choosing a model to follow in carrying out economic reforms, politicians pay special attention to the international competitiveness of a particular country... And there are many such examples. The market nature of the modern economic system, the key component of which is competition, turns competitiveness into an indispensable condition for success.

Today, not only people, products, enterprises or countries compete with each other. We can talk about the competition of entire large regions and associations of countries. And this competition, or rather the level of competitiveness of certain components of the global economy, largely determines the direction in which the world is moving, its dynamics and geopolitical conditions. Therefore, understanding the ratio of competitive forces in the modern world and trends in its changes creates the basis for making the right decisions both at the state level and at the level of an enterprise or individual.

The study of our course will logically begin with clarifying the essence of international competitiveness, its indicators and methods of measurement.

1.1. The essence of the international competitiveness of countries and the indicators that measure it

A country's international competitiveness is determined by its ability to create, produce and sell goods and services on international markets more efficiently and profitably than other countries. This concept covers not only economic indicators, but also social, political, technological and institutional factors that affect a country's ability to ensure sustainable economic growth, improve the welfare of the population and attract investment.

For a better understanding of the category of competitiveness, you should pay attention to its following features:

1***. Competitiveness is a characteristic of the country at the present time and for the given conditions***. In other words, you cannot count on achieving certain results to "rest on your laurels" for a long time. The situation can change quite quickly and not always in favor of this country.

2. ***Competitiveness is a relative category***. That is in order to assess the competitiveness of a country or a group of countries, it is not enough to deeply study the state of its internal processes.

Comparison with other participants in the world economy is mandatory. Therefore, it is not possible to assess the level of competitiveness in any absolute value. It should be a certain "rank" compared to others. We can say that competitiveness has increased or worsened, but we cannot say that it is equal to 5 or 10 of some units.

3. ***The country's competitiveness is determined not only by its internal processes and achievements, but also by changes in the external environment***. Let's say that a country has made significant progress in the field of production compared to previous years. However, this cannot clearly mean that its competitive position has improved. After all, it is possible that competitors could achieve more in the same time.

A country's competitiveness is influenced by numerous factors. Depending on the classification criteria, they can be grouped into different groups. First of all, factors are divided ***into external and internal***.

External factors that determine a country's competitiveness are those factors that are outside the country's domestic economy, but have a significant impact on its competitiveness in the global market. They include global economic, political, technological and social changes that can both create new opportunities and threats to the development of the national economy. The main external factors are presented in fig. 1.1.

1. ***Global economic conditions***. These include, in particular:

- *price fluctuations for raw materials*. This factor affects exporters and importers differently. For example, the increase in the price of energy carriers, which occurred in the first year of Russian aggression, significantly worsened the competitive position of European countries, since a significant part of their needs is covered by imports. On the other hand, those countries that export gas and oil have gained significantly. The competitive position of Ukraine significantly depends

on world food prices, as its export constitutes a significant part of Ukrainian foreign trade income;

- *international trade barriers*. The introduction of import duties (or changes in their rates), quotas or the application of sanctions can significantly impair the competitiveness of the countries in respect of which these measures are taken. That is why the process of creating free trade zones and common markets is so popular in the world. In this regard, the common market of the European Union is a great competitive advantage of this union, which will be discussed in the next topic;

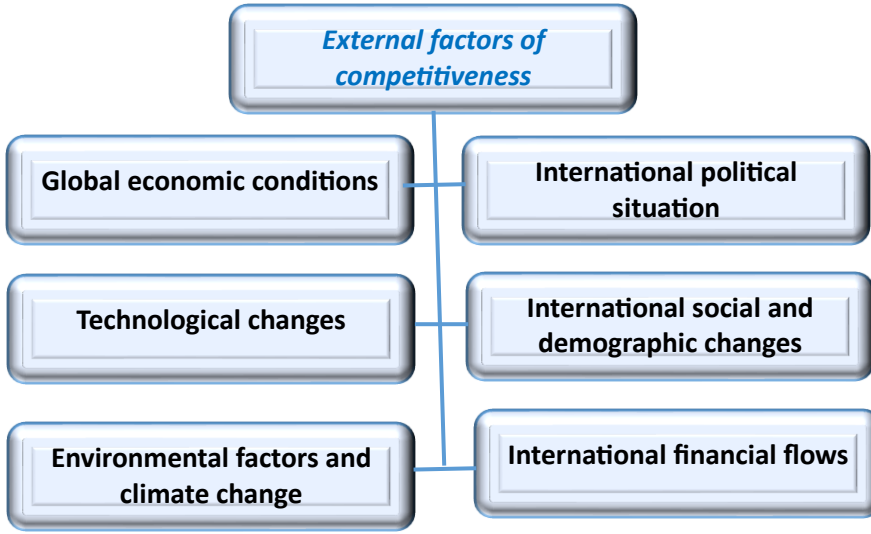


Fig. 1.1. Classification of external factors of the country's international competitiveness

- *instability of exchange rates*. This factor operates and remains external even when the country fixes the exchange rate. After all, it can do this only in relation to one (the so-called anchor currency), while a much larger number of currencies take part in international calculations, the relationship between which is beyond the influence of

an individual state. At the same time, it should be recognized that the manipulation of the national currency rate to some extent refers to the internal factors of competitiveness. It should be added that the introduction of a single European currency within the Eurozone significantly limits the impact of this factor on the competitive position of countries within the European Union.

2. ***International political situation***. It affects international competitiveness in the following areas:

- *geopolitical stability*. For example, the aggravation of the situation in the Middle East not only requires a number of countries to spend additional unproductive costs (which affects their competitiveness), but also causes significant flows of migrants to European countries, which puts an additional burden on their central and local budgets. Russian aggression in Ukraine not only directly negatively affected the competitiveness of our country, but also destroyed a significant number of trade routes, which also affected other countries of the world;

- *international alliances and agreements*. The world community is trying to reduce the effect of the factor of political instability through the conclusion of international agreements. An example can be the World Trade Organization, which to some extent regulates the process of world trade and makes its conditions more predictable;

- *global sanctions*. A clear example of the effect of this factor is the system of sanctions against the Russian Federation, as a reaction of the democratic world to the war it unleashed in Ukraine.

3. ***Technological changes*** today have the following forms of manifestation:

- *global technological innovations*. Artificial intelligence, nanotechnology, carbon-free energy... On the one hand, a country that does not use these innovations is doomed to fall behind. On the other hand, the successful use of innovations allows those countries that for

a long time could not achieve this in traditional industries to become leaders. For example, China has long been behind other countries in the production of gasoline and diesel passenger cars, but in recent years it has been significantly ahead of others in the production of electric cars;

- *global digitalization*. Access to modern digital technologies and their widespread adoption can significantly increase the productivity of the economy, allows for the creation of new business models, and provides communication with the client without physical presence in the appropriate place. Therefore, a country that widely uses the possibilities of digitalization has more chances to win in the competition.

4. ***International social and demographic changes***:

- *global demographic trends*. Changes in the world economy found their manifestation in the role of the population as a factor of economic growth. If a few decades ago countries with a relatively small population developed most dynamically, today India and China - the countries with the largest population - hold the lead. After all, the population is not only workers, but also consumers. Since today the growth of GDP occurs mainly at the expense of the service sector, and people are the final consumers of services, the internal market created by them is the decisive engine of development. In addition, the country's population has increased, which allows for the formation of an economy that is able to provide for itself and reduce dependence on the foreign market;

- *international labor mobility*. Here we are talking not just about migration (illegal migration, on the contrary, creates many problems), but rather about the mobility of the labor force. For example, within the EU, there is essentially barrier-free labor movement. In most cases, the recipient countries are the winners, and the donor countries are the losers. Thus, Poland suffers from the fact that a significant part of the skilled workforce has migrated to Germany. And it is ready to create

appropriate conditions for Ukrainian workers, which would be able to smooth out the acuteness of the problem.

5. ***Environmental factors and climate change***:

- *introduction of global environmental standards*. Today, humanity is concerned about excessive emissions of greenhouse gases and is trying to regulate these processes at the international level. Ukraine's introduction of European environmental standards on the way to the EU may weaken its competitive position, for example, in the field of ferrous metallurgy;

- *global warming*. Climate change, on the one hand, provokes more frequent natural disasters, which causes direct damage to the economies of individual countries. On the other hand, it requires a review of the structure of agricultural production, reduces environmental sustainability.

6. ***International financial flows***. Attracting foreign direct investment (FDI) depends not only on the situation in the recipient country, but also on the situation of the donor country and other countries interested in new investments. In addition, the cost of borrowing capital is significantly influenced by the assessment given to the country by international rating agencies (Moody's, S&P, etc.). All this also affects the country's international competitive position.

External factors have a significant impact on the country's competitiveness, determining the conditions in which it conducts its economic activities. Managing these factors requires governments to strategically plan and adapt to changes at the global level, helping the country remain competitive in the global economy.

At the same time, most often the country does not have the opportunity to change external factors: it has to adapt to them. Internal factors are more influenced, and therefore deserve a special analysis.

Internal factors of international competitiveness can be grouped into three groups: ***factors of basic requirements (or basic***

factors); efficiency factors and innovation and improvement factors (Fig. 1.2). Let's take a closer look at each of these groups.

1. ***Factors of basic requirements (basic factors).*** These factors are basic for the functioning of the economy and create a basis for the development of other aspects of competitiveness. These include, in particular:

- *institutional factors*. The quality of institutions formed in the country determines the efficiency of state administration, ensures transparency of decision-making, which minimizes corruption, guarantees legal protection and protection of property rights, and forms an effective regulatory environment. Institutional factors also include political stability in the country. It should create favorable conditions for doing business and confidence in the future of both domestic entrepreneurs and consumers, as well as foreign partners;

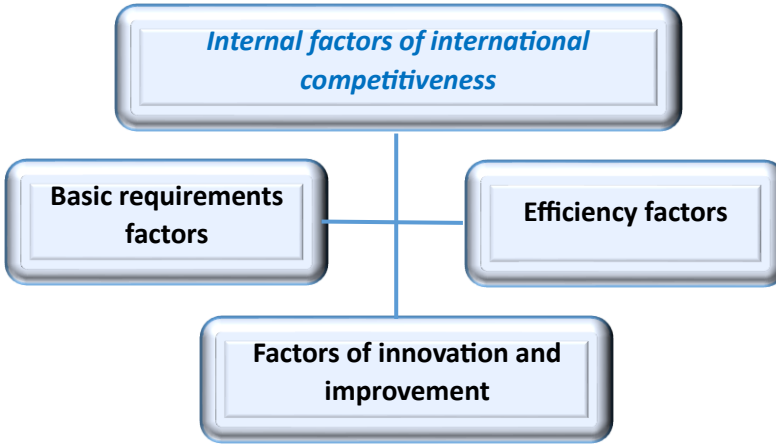


Fig. 1.1. Classification of internal factors of the country's international competitiveness

- *infrastructure*. The presence of a developed transport infrastructure in the country, in particular, highways, railways, airports,

etc. are Important conditions for achieving a high level of competitiveness. After all, this allows country to build efficient logistics and achieve the desired results with lower costs. In addition, the modern economy also needs a developed information and communication infrastructure, which would provide access to the Internet, mobile networks, etc.;

- *macroeconomic stability*. One of the main indicators of macroeconomic stability is controlled inflation. A more or less stable level of prices with creeping inflation provides business with a predictable operating environment. Also, the macroeconomic situation can be disrupted due to an unbalanced (as a rule, deficit) budget, which generates an increase in public debt. Its excessive growth threatens to increase the cost of new loans and worsen the country's competitive position;

- *health and primary education*. It may seem that these things are quite far from the country's international competitiveness. In fact, let's recall that we are talking about basic factors that do not directly affect competitiveness, but indirectly, through the factors of the two following groups. And without high-quality primary education, it is difficult to count on high-quality higher education, the impact of which on competitiveness will be discussed later.

2. ***Efficiency factors***. This is perhaps the most important group of factors whose impact on competitiveness is almost obvious:

- *the quality of the workforce*. It is primarily determined by the quality of secondary, professional and higher education. It is important for society to be aware of the need for lifelong learning. And educational programs must meet not only today's, but also tomorrow's market needs;

- *efficiency of the goods market*. It is determined, first of all, by the level of development of competition. It is known from the course of microeconomics that the closer the market is to perfect competition, the more the production volumes and costs approach the optimum. A

country that is trying to achieve an appropriate level of competitiveness is concerned about removing unnecessary barriers to the entry of new manufacturers into the market and limiting the regulatory burden on business.

- *efficiency of the labor market*. The labor market is one of the most important resources. It should be quite flexible, able to adapt to new needs in a short period of time. On the other hand, it is necessary to create conditions for efficient use of this resource, which is reflected in high productivity. It is also important to ensure that remuneration corresponds to the level of productivity;

- *level of financial market development*. The financial market must fulfill one of its main functions: to transform savings into investments. This requires a securities market, ease of obtaining loans, access to venture capital, etc. And this, in turn, is not possible without a stable banking system and functioning stock market institutions.

3. ***Factors of innovation and improvement***. These factors determine a country's ability to create new products, services and business models that are key to long-term growth and competitiveness:

- *innovative capacity*. It is determined by the amount of funding and the efficiency of the use of funds directed to research and development (R&D), the number of patents received by the country (both in absolute and relative terms), the degree of cooperation between universities, scientific institutions and the real sector of the economy;

- *business development*. Ultimately, all of the above factors are implemented through business development. Business should be dynamic, which is achieved through constant improvement of management methods, introduction of technological and organizational innovations, etc. In order for all this to transform into international competitiveness, ***the business must be ready and***

interested in international expansion, have global strategies for the development of companies and invest abroad.

The presence of such a significant number of factors that determine international competitiveness makes it difficult to measure. As already mentioned, competitiveness is a relative indicator: the competitiveness of a country can be assessed only in comparison with others. Therefore, the main method used to determine the leaders and outsiders of international competitiveness is the compilation of international ratings. Developers of ratings can try to find the most generalizing indicator that would assess the competitiveness of the country as a whole, or they can concentrate on a special analysis of one of the factors of competitiveness, which in their opinion is the most important.

The main international ratings used to assess the competitiveness of countries are:

1. ***Global Competitiveness Index (GCI)*** [1].

This index has been developed since 1979 according to the methodology of the World Economic Forum (WEF). The assessment of competitiveness is carried out on the basis of 12 key categories (so-called pillars), which include 131 indicators:

1. Quality of institutions.
2. Infrastructure.
3. Macroeconomic stability.
4. Health and primary education.
5. Higher education and professional training.
6. Efficiency in the market of goods and services.
7. Efficiency in the labor market.
8. Development of the financial market.
9. Level of technological development.
10. The size of the domestic market.
11. Competitiveness of companies.
12. Innovative potential.

It should be noted that the subjective factor in the calculation of this index is quite large, since it is formed by 2/3 from the results of a comprehensive survey of company managers (to cover a wide range of factors that affect the business climate in the studied countries), and by one third - from publicly available sources (statistical data and research results, which are carried out on an ongoing basis by international organizations).

2. ***Index of Economic Freedom (IEF)*** [2].

It is developed by the Heritage Foundation in association with the Wall Street Journal. The index assesses the level of freedom in 10 areas (Fig. 1.3). Accordingly, ten indices ranging from 0 to 100 are calculated (the higher the index value, the greater the degree of freedom). The generalized index is the average value of these 10 indices.

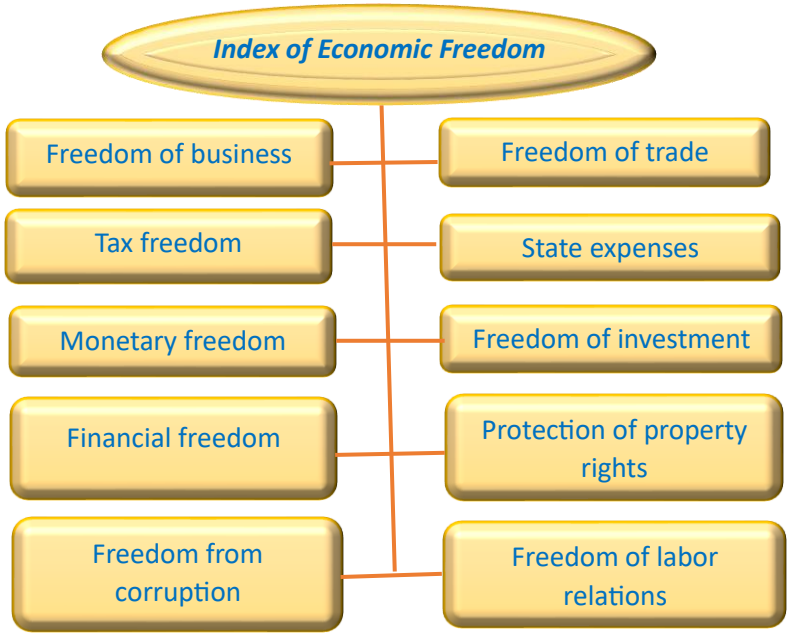


Fig. 1.3. Structure of the Index of Economic Freedom

As can be seen from the structure of the index, it is not a direct indicator of competitiveness. However, its developers proceed from the assumption that greater freedom makes it possible to more fully implement entrepreneurial and creative initiative, which are direct factors of competitiveness. At the same time, it should be understood that there is not a functional but a correlational relationship between the level of freedom and the country's competitiveness. In other words, it will not manifest itself in every specific case, but acts as a trend. Therefore, it can be observed that sometimes countries with a low index of freedom demonstrate high competitiveness due to the action of other factors.

3. ***Human Development Index (HDI)*** [3].

Since 1990, this index has been calculated annually by the United Nations for publication in the Human Development Report. It combines three indices: life expectancy index; education level index (average number of years spent on education and expected duration of education) and standard of living index (gross national income per capita, calculated at purchasing power parity) (Fig. 1.4).

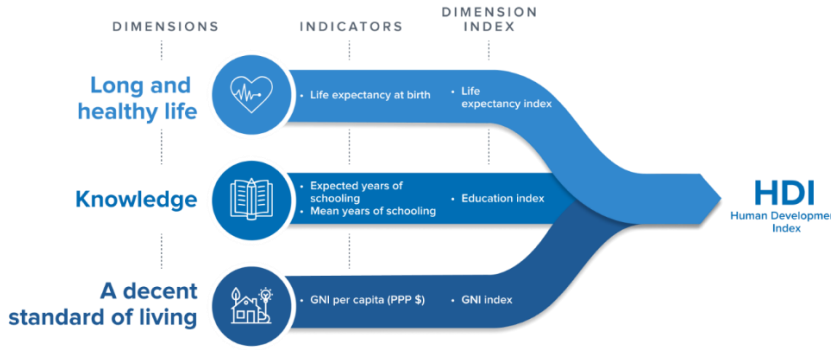


Fig. 1.4. The structure of the human development index [3]

4. ***Global Innovation Index (GII)*** [4].

If you focus only on the name, you may get the false impression that the Global Innovation Index provides information only on purely innovative processes. In fact, it is a rather complex indicator, in which various aspects of society's activity are reflected in a generalized form. 82 indicators are combined into seven blocks: institutes; human capital and research; infrastructure; sophistication of the market; sophistication of business; knowledge and technology results and creative results. Therefore, the analysis cannot be limited only to the comparison of the final rating. It must necessarily be supplemented by a study of the value of individual indicators, since this is how it will be possible to identify reserves for improving the overall result [5].

Of course, this list of indices is not exhaustive. Depending on the goals of the analysis, one or another index is involved that reflects various aspects of competitiveness.

At the same time, the majority of international ratings are focused on finding out the potential of the country's competitiveness. In fact, it is important to see its realized results and the trends of their changes. Then they pay attention to the dynamics of economic growth indicators, their correlation with the indicators of other countries. They also use a number of partial indicators at both the macro and micro levels.

1.2. Assessment of the current state of EU competitiveness and diagnosis of the main problems

For centuries, Europe was the undisputed world leader in economic, military, ideological, and cultural aspects. However, the 20th century put an end to such dominance. Two world wars, the epicenters of which were Europe, caused significant damage to this region. At first, the United States of America moved to the first positions, and later Asian countries began to create real competition.

An important step in the revival of European competitiveness was regional economic integration, which led to the creation of the European Union. The EU has seriously affected the competitive situation in the world and the stabilization of the situation in Europe. In particular:

- the united Europe caught up with the USA in a fairly short period of time in terms of the main macroeconomic indicators;

- the involvement of Southern European countries in the EU made it possible to solve the issue of political instability in this region;

- the accession to the EU of the post-socialist countries of Eastern Europe accelerated their market transformation and overcoming the consequences of the centrally planned economy [6].

The European Union is one of the largest economic blocs in the world, which includes developed and dynamic economies. The EU's competitiveness is based on several key factors, including a high level of innovation, significant human capital, developed infrastructure and a favorable business environment.

The world economy is built on market principles. Therefore, competition is a form of its existence. In one or another situation, it is necessary to take into account the competitiveness of each country, if economic interests intersect with it. However, the main competitors of the European Union in today's world are the USA and China (these three players account for 60% of world GDP). The ratios of some indicators of these leaders of the world economy are given in the table. 1.1.

As you can see, in terms of GDP, these players are comparable and they are significantly ahead of other countries. However, the relationship between them is quite dynamic. Unfortunately, the EU is losing ground (both in terms of current prices and purchasing power parity). On the contrary, China has strengthened its position in both indicators, becoming the undisputed leader in terms of GDP volumes calculated at purchasing power parity in 2021 prices. Also, the development between the world average indicators of GDP per capita

and similar indicators of the EU and the USA is gradually decreasing. Although in general the gap is still quite large.

Table 1.1

The main indicators of the EU, the USA and China (2010/2023) *

Indicators	EU		USA		China		World
	Absolute value	% of the world	Absolute value	% of the world	Absolute value	% of the world	
Population (million people) (2024)	449	5,5	345	4,2	1419	17,4	8172
GDP (trillion dollars, current exchange rate)	14,56 18,35	21,9 17,4	15,05 27,36	23,3 25,9	6,09 17,79	9,2 16,9	66,51 105,44
GDP (trillion dollars, PPP, 2021 prices)	20,13 24,18	18,1 14,6	18,50 24,66	16,6 14,9	13,74 31,23	12,3 18,8	111,47 165,80
GDP per capita (thousand dollars, current exchange rate)	33,0 40,8	347 311	48,7 81,7	513 624	4,6 12,6	48 92	9,5 13,1
GDP per capita (thousand dollars, PPP, 2021 prices)	45,6 53,8	285 260	59,8 73,6	374 356	10,3 22,1	64 107	16,0 20,7
Export of goods and services (in % of GDP)	40,3 52,7	-	12,3 11,6	-	27,2 19,7	-	28,7 29,3

Calculated by: [7-9]

The volume of foreign trade in goods and services is the only indicator where the EU is the undisputed world leader. If over the past 14 years, the share of exports of goods and services in the GDP of the USA and China has slightly decreased, then in the EU, on the contrary, it has increased significantly.

Such a general picture of the distribution of forces in the world economy should be supplemented by an analysis of the values of individual international ratings, which were discussed in the previous question.

Main indicators of EU competitiveness.

As already noted, competitiveness is most often assessed using generalized ratings. We will also use this approach.

Global Competitiveness Index (GCI).

The EU as a region shows high positions in the global competitiveness index. EU countries such as Germany, the Netherlands and Sweden have traditionally been among the world's most competitive economies thanks to innovation, labor market efficiency and developed infrastructure. If we compare the composition of the TOP-10 countries according to the GCI rating in 2013-2014 and 2021-2022, it is possible to notice the strengthening of the positions of European countries in general and EU members in particular (Table 1.2). So, if in 2013-2014 the TOP-10 included 6 European countries (5 EU members), then in 2021-2022 there were already 8 of them (7 EU members). Only the USA and Japan occupied their traditional places - 5 and 9, respectively. Another leader of the world economy, China, also practically remained in the same position during this period (29th in 2013-2014 and 28th in 2021-2022).

GCI is a comprehensive assessment. Therefore, the leading positions are occupied by those countries that ensure the balance of the main indicators. If we take Finland as an example, which is in second place, its profile is quite balanced. Finland has a very well-functioning financial market with the highest level of financial availability and stability of the banking system (1st place), public institutions that are among the most independent and efficient in the world (2nd), a high level of security and social cohesion (2nd), higher education and skills (2nd), very good public health (3rd), strong social protection (3rd) and relatively good environmental performance (8th). Instead, the US combines the highest global rankings for innovative capacity (1st place), future-oriented business (1st place) and competition (1st place), on the one hand, with low scores, in particular for security and social cohesion (61st place), public health (29th) and environment (27th). Germany's rankings range from second for its innovation ecosystem and healthcare to 25th for labor market dynamism and 28th for security and social cohesion. Japan, in turn, provides unparalleled infrastructure (ranked 1), shows outstanding

innovation potential (ranked 3), and its health care (ranked 4) and competition (ranked 6) are among the best in the world, but the dynamics of labor and opportunities (30th place), environmental conditions (28th place), education and skills system (25th place) more correspond to countries with a lower level of competitiveness [1].

Table 1.2

Changes in the composition of the TOP-10 countries according to the GCI rating*

2013-2014		2021-2022	
No.	**Country**	**No.**	**Country**
1	Switzerland	1	Switzerland
2	Singapore	2	Finland
3	Finland	3	Denmark
4	Germany	4	The Netherland
5	USA	5	USA
6	Sweden	6	Sweden
7	Hong Kong	7	Germany
8	The Netherland	8	Austria
9	Japen	9	Japen
10	UK	10	France

Compiled by [1].

Thus, only those countries that equally effectively ensure the solution of all problems related to competitiveness can claim higher places in the GCI.

Global Innovation Index (GII).

This index does not so much describe the current state of the country's competitiveness as the possibility of its change in the coming years. If it is higher than the Global Competitiveness Index, it can be expected that the latter will begin to improve in the near future. Conversely, an insufficiently high position on the innovation index threatens to worsen the competitiveness index.

As noted in the Global Innovation Index 2023 report, modern innovation processes are affected by two waves. The first of them is related to digitalization, the emergence and comprehensive use of artificial intelligence, computerization and automation. The other wave finds its manifestation in the spread of the use of bio- and nanotechnologies [4, p.6]. The level of its international competitiveness and its place in the global innovation rating depend on the extent to which this or that country is able to ensure its activities in the direction of these waves.

As can be seen from table 1.3, the countries of the European Union occupy quite high places in this ranking, which is important for assessing competitiveness. The analysis of the given data and their comparison with the indicators of the leading players of the modern world allow us to draw several conclusions.

1. Practically all EU countries are in the first third of the rating. Their distribution is more or less even: 1-10 positions - 5 countries; 11-20 positions – 3 countries; 21-30 positions - 8 countries; - 31-40 positions – 6 countries; 41-50 positions - 5 countries. That is, there are no countries among today's EU members that would openly lag behind in this rating.

2. There is a fairly close connection between the value of the global innovation index and the country's level of development. The "old" EU members are at the top of the table, while the countries that joined the Union in the last 20 years close the table. The only exception is Estonia, which is rapidly increasing the value of its indicator and now ranks among the TOP-10 EU countries according to the innovativeness index.

3. The average value of the innovativeness index for the EU has a steady upward trend: 45.4 in 2021 and 47.5 in 2023. However, this growth occurs mainly at the expense of countries that occupy places at the top of the table (these are countries with a high GDP per capita), while countries from the last ten are losing their positions. This allows us to suggest that more innovative and more developed countries are

less vulnerable to the upheavals that have occurred in Europe in recent years (Covid-2019, war in Ukraine, etc.).

Table 1.3

Global innovation index of EU countries and Ukraine *

	Country	2023		2022		2021	
		rank	indicator	rank	indicator	rank	indicator
1	Sweden	2	64,2	3	61,6	2	63,1
2	Finland	6	61,2	9	56,9	7	58,4
3	The Netherland	7	60,4	5	58,0	6	58,6
4	Germany	8	58,8	8	57,2	10	57,3
5	Demark	9	58,7	10	55,9	9	57,3
6	France	11	56,0	12	55,0	11	55,0
7	Estonia	16	53,4	18	50,2	21	49.9
8	Austria	18	53,2	17	50,2	18	50,9
9	Luxembourg	21	50,6	19	49,8	23	49,0
10	Ireland	22	50,4	23	48,5	19	50,7
11	Belgium	23	49,9	26	46,9	22	49,2
12	Malta	25	49,1	21	49,2	27	47,1
13	Italy	26	46,6	28	46,1	29	45,7
14	Cyprus	28	46,3	27	46,2	28	46,7
15	Spain	29	45,9	29	44,6	30	45,4
16	Portugal	30	44,9	32	42,1	31	44,2
17	Czech Republic	31	44,8	30	42,8	24	49,0
18	Slovenia	33	42,2	33	40,0	32	44,1
19	Lithuania	34	42,0	39	37,3	39	39,9
20	Hungary	35	41,3	34	39,8	34	42,7
21	Latvia	37	39,7	41	36,5	35	42,4
22	Bulgaria	38	39,0	35	39,5	40	39,9
23	Poland	41	37,7	38	37,5	40	39,9
24	Greece	42	37,5	44	34,5	47	36,3
25	Croatia	44	37,1	42	35,6	42	37,3
26	Slovakia	45	36,2	46	34,3	37	40,2
27	Rumania	47	34,7	49	34,1	48	35,6
28	Ukraine	55	32,8	57	31,0	49	35,6

** Compiled by: [4; 10;11]*

4. The European Union is quite heterogeneous according to the global innovation index. The positions of its members range from second place (Sweden) to 47th (Romania), and the absolute value of the leader's indicator is almost twice the value of the outsider's indicator. Moreover, in recent years, this gap has been increasing: if in 2020 the "leader/outsider" ratio was 1.76, then in 2023 it increased to

1.85 [8; 15]. At the same time, such significant differences between countries are not an obstacle for them to find one integration union.

5. According to the index of innovation, Ukraine in 2023 is inferior to all EU members. However, this lag is not critical: the EU outsider is ahead of Ukraine by only 1.9 points. Moreover, in previous years (2020 and 2021), the value of the innovativeness index for Ukraine was even higher than for Romania. However, in recent years, Ukraine has worsened its indicator, which can be explained by Russia's aggression against our country [5].

At the same time, attention should also be paid to the problem that appears when comparing the Global Competitiveness Index and the Global Innovation Index. With the exception of Sweden, all EU member states in the GCI TOP-10 have worse GII indicators. Thus, Finland occupies the sixth position against the second, Denmark - the ninth against the third, the Netherlands - the seventh against fourth, Austria - the eighteenth against the eighth. At the same time, the main competitors show a different ratio: the USA occupies the 3rd position against the fifth, and China occupies the 12th position against 28th. This creates a potential threat for Europe to lose its competitive positions on the world market in the coming years.

Despite its many advantages, the EU faces several challenges that may affect its competitiveness. Let's highlight the most important ones among them.

1. ***Uneven economic development between EU member states***. We have already paid attention to this problem when analyzing the Global Index of Innovativeness. It should be emphasized that the difference in GDP per capita between the highest and the lowest indicator in the EU is almost 10 times (Luxembourg and Bulgaria)! Of course, differences in the level of economic development give rise to differences in interests, which is the cause of internal contradictions and makes it difficult to reach consensus when making decisions. It is rather difficult to find single, common programs that would satisfy all EU members.

Moreover, the situation may become even more acute with the accession of new countries that are currently candidates to the EU. After all, they do not differ in a high level of development. Therefore, their entry will lower the average indicators for the EU and worsen its competitive position.

2. ***Slowing down the pace of economic growth***. Compared to its competitors, the EU has the lowest rates of economic growth, which is caused by lower labor productivity, insufficient implementation of innovations, lower costs for scientific research than other countries, and most importantly - their implementation. That is why the innovation index for many EU member states is lower than the existing competitiveness index, which is already beginning to affect the latter.

3. ***Energy dependence and environmental challenges***. Especially this factor began to act with the beginning of Russian aggression in Ukraine. Dependence on Russian energy carriers led to a number of problems that the EU had to solve during 2022 and 2023. This also affected the rates of economic growth, inflation, living standards and, of course, international competitiveness.

In addition, the high concentration of production and population led to aggravation of environmental problems. Their solution requires additional costs, huge investments, which are sometimes not enough.

4. ***Demographic problems***. EU countries are characterized by an aging population. On the one hand, this reduces the amount of labor force and leads to its shortage in a number of countries. It is partly replenished at the expense of migrants. However, quite often there is a mismatch between the structure of additional labor needs and those offers of labor services that migrants can offer. On the other hand, the aging of the population leads to an increase in the share of pensioners, which requires additional costs and creates a burden on the budget, diverting funds from the implementation of possible investment projects.

5. ***Political and regulatory issues***. Unlike its main competitors (the USA and China), the European Union is not a country. Although it

is a deeply integrated union, it is still an independent state. Therefore, quite often in situations that require a quick response, the EU faces complex administrative and bureaucratic obstacles, which reduces the efficiency of the entire system. Populism and Euroscepticism, which are becoming quite a powerful force in modern Europe, are also causing significant damage.

6. ***Competition from other countries and regions***. We mentioned only the USA and China. In fact, the EU has to compete with other players as well. Today, India and South Korea, in particular, are growing rapidly. They claim their share of the world market, sometimes displacing even the largest players from it.

The deterioration of the EU's international competitiveness is the result of a combination of economic, demographic, innovative, political, social and environmental factors. To overcome these challenges, the EU needs comprehensive reforms aimed at increasing productivity, innovative activity and management efficiency, as well as at strengthening internal unity and adaptation to new global realities.

1.3. Prospective directions for achieving stable competitiveness

The question of increasing the competitiveness of the European Union today is a real concern of both the participating countries and the governing bodies of the EU. In March 2023, the European Commission prepared a special Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions "Long-term competitiveness of the EU: a view after 2030". The document emphasizes that "economic productivity cannot be built only on the basis of reactive measures. Now is the time to focus on the EU's long-term competitiveness in an increasingly complex geopolitical context. It is time to look beyond 2030, the year for which most of the EU's policy goals were set" [12].

The European Commission identifies nine factors, focusing on which will improve Europe's competitiveness and ensure its sustainable development. Such factors are:

1. ***A functioning single market***. This is exactly what the European Union started with. However, with the formal recognition of the existence of a single barrier-free market within the EU, in reality there are a number of unsettled issues that turn into administrative and bureaucratic obstacles for business activities. Improving and synchronizing the regulation of the European market is one of the key tasks of both the EU governing bodies and the national governments of the member states of the European Union.

2. ***Access to private capital and investments***. Investments are the engine of progress. Europeans save more than representatives of other countries. However, the capitalization of the stock market as a percentage of GDP in the EU is half that of the USA. Therefore, to create normal conditions for the transformation of savings into investments is to provide new opportunities for increasing productivity, which means competitiveness.

3. ***Public investments and infrastructure***. Outdated infrastructure is one of the factors holding back economic growth in Europe. This is not a business problem. This is a social problem. Therefore, it should be solved by actively attracting public investments in partnership with private ones.

4. ***Research and innovation***. Earlier, we focused on Europe's lagging behind in terms of development and implementation of innovations. A modern innovation policy, which would balance the market mechanism of business interest in improving technologies, products and organization with state regulation, should be developed and implemented in all EU faucets.

5. ***Energy***. In order to achieve the desired level of competitiveness, it is important not only to achieve energy security by diversifying the suppliers of traditional energy carriers. It is necessary to switch to the use of mainly renewable energy sources. The task is

to increase the share of these sources in the total energy balance of the EU to 45% by 2030. At the same time, it is important to make energy cheaper to make it more accessible to consumers.

6. ***Circularity***. The idea of circularity has become quite popular in the last decade. It is considered as a means of ensuring sustainable development. After all, the circular economy offers a great opportunity to reduce resource dependence and waste, as well as to increase resource productivity, employment and growth.

7. ***Digitization***. Researchers draw attention to the fact that the European Union lags behind its global competitors in matters of digitalization. Therefore, the European Commission pays special attention to this factor of increasing overall competitiveness.

8. ***Education and skills***. The European Commission is aware that without an appropriate level of personnel training, it is impossible to achieve significant results in increasing the competitiveness of individual industries or the economy as a whole. That's why the European Action Plan for Social Rights calls for at least 60% of all adults to participate in learning each year by 2030, up from 37% in 2016.

9. ***Trade and open strategic autonomy***. The EU will continue to work to open markets for EU companies by deepening ties with allies and trading partners. In particular, the Commission will continue to develop the EU's network of free trade agreements (FTAs), while making the most of those already in place through effective implementation and enforcement. The EU will also continue to engage with the World Trade Organization, in particular on its reform, and defend multilateral trade rules as the most effective way to ensure a level playing field for economic operators around the world.

Of course, each of the selected factors deserves special, deeper analysis and consideration. This is what our course will be devoted to.

References

1. The Global Competitiveness Index (GCI) 5.0. The World Economic Forum. URL: https://www.weforum.org/about/the-global-competitiveness-index-gci-5-0/

2. Index of economic freedom. URL: https://www.heritage.org/index/

3. Human Development Index (HDI). URL: https://hdr.undp.org/data-center/human-development-index#/indicies/HDI

4. Global Innovation Index 2023. Innovation in the face of uncertainty. URL: https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2023-en-main-report-global-innovation-index-2023-16th-edition.pdf

5. Zadoia A. Innovativeness of the Ukrainian economy on the way to the EU. European Vector of Economic Development. 2024. No.1 (36). P. 6-17. https://doi.org/10.32342/2074-5362-2024-1-36-1

6. Ketels Ch., Porter M.E. (2018) Towards a New Approach for Upgrading Europe's Competitiveness. Harvard Business School Working Paper, 19-033, September. URL: https://www.hbs.edu/faculty/Pages/item.aspx?num=55046

7. World Bank. URL: https://data.worldbank.org/indicator

8. Worlddometer. URL: https://www.worldometers.info/world-population/population-by-country/

9. EU population increases again in 2024. URL: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240711-1#:~:text=After%20a%20decline%20in%202020,people%20on%201%20January%202024.

10. Global Innovation Index 2022. What is the future of innovation driven growth? URL: https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2022-en-main-report-global-innovation-index-2022-15th-edition.pdf

11. The Global Innovation Index 2021 captures the innovation ecosystem performance of 132 economies and tracks the most recent

global innovation trends. URL: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_2000-section1.pdf

12. Communication from the Commission to the European parliament, the council, the European economic and social committee and the Committee of the regions (2023). Long-term competitiveness of the EU: looking beyond 2030. URL: https://commission.europa.eu/system/files/2023-03/Communication_Long-term-competitiveness.pdf

Topic 2. The EU single market: problems of adaptation to new realities

Questions that reveal the content of the topic

2.1. Stages of formation and current scope of the EU single market

2.2. Instruments of state and interstate regulation of the single market

2.3. Problems of Ukraine's entry into the single European market

In 2023, the single market of the European Union celebrated its 30th anniversary. According to the European Commission, it is "one of the greatest achievements of the EU. Since its creation in 1993, citizens and businesses have benefited from the free movement of people, services, goods and capital to an extent that exceeds even the most visionary expectations of thirty years ago" [1].

In fact, the foundations of the formation of the single European market began to be formed long before its official announcement. In order to understand its importance, functioning mechanism, problems and ways of further improvement, it is necessary to follow the stages of formation of the single market, to find out the effectiveness of the instruments of state and interstate regulation of market relations within the EU. Sometimes researchers are limited only to the list of those advantages that Europe received from the formation of a single market. However, it should be understood that this is a "living" organism that develops, sometimes produces contradictory results and needs constant improvement.

The assessment of the main problems that Ukraine will face on the way to the single European market, and the search for ways to

solve them is of particular importance to us. This topic is devoted to the study of just such questions.

2.1. Stages of formation and current scope of the EU single market

The formation of the single market of the European Union is a long-term process that includes several important stages of development and expansion. Let's focus on the most important of them.

1. ***Treaty of Paris (1951).*** The result of this agreement was the creation of the European Coal and Steel Community (ECSC). This is the first integration formation of its kind in post-war Europe, which aimed, above all, to unite Franco-German coal and steel (the main products of the industry at the time) in order to achieve a better understanding, reduce the threat of conflicts and open the way to integration. The agreement was signed by 6 leading European countries: France, Germany, Italy, Belgium, the Netherlands and Luxembourg.

Treaty of Paris (1951)

The idea of creating such an association belonged to the French economist and politician ***Jean Monet***, who became the first chairman of the board of this community.

ECSC ceased to exist in 2002 after the end of the term for which it was created.

2. ***Treaty of Rome (1957).*** A new step in the establishment of a single European market was the signing of a new treaty in Rome: the ***Treaty Establishing the European Economic Community*** (EEC) [2]. In this treaty, for the first time, the task was set to ensure the

formation of a single European market for goods, services, capital and labor, based on a customs union. Of course, this could not be achieved at the same time. It was envisaged to solve customs problems in 3 stages within 12 years. In reality, customs duties between the six countries were completely abolished on July 1, 1968, which was a decisive step towards the formation of a single market.

The success of the EU has encouraged a number of other countries to join this community. In 1973, Denmark, Ireland and the United Kingdom became members of the EEC, and in the 1980s Greece, Spain and Portugal joined the community. Thus, the common market united almost all the countries of Western Europe.

3. ***Single European Act (1986)***. The expansion of the European Economic Community, the fulfillment of the main tasks that were formulated in the Treaty of Rome, required some revision of its provisions and further progress on the path of forming a single market. Although the main customs barriers were eliminated, it was still too early to talk about the full formation of the single internal market. There were bureaucratic and administrative obstacles in the way of movement of goods, services and factors of production. The concept of four freedoms required the harmonization of the legislation of member countries, the elimination of physical, technical and fiscal barriers that limited the realization of these freedoms [3].

Signing of the Single European Act (Luxembourg, 17 February 1986
https://www.cvce.eu/en/obj/signing_of_the_single_european_act_luxembourg_17_february_1986-en-467feb25-c409-46d2-862e-ac5cc029febf.html

4. ***Maastricht Treaty (1992).*** The creation of the European Union as a political and economic union was the final stage of the formation of the foundations of the single European market [4]. Strictly speaking,

the official history of the single European market begins with the entry into force of the Maastricht Treaty (November 1, 1993).

In thirty years, the single European market has turned from a good and promising idea into a reality. As the European Commission notes, "Originally conceived as an area of free trade without tariff or non-tariff barriers among its members, the Single Market has developed into much more than that. It has successfully become the world's largest integrated single market area, while remaining one of the most outward oriented. Yet the Single Market is much more than a legal framework or indeed a market: it is an area of freedom, progress, opportunity, growth, shared prosperity, resilience and a means of geopolitical projection" [1].

What are the key characteristics that should be highlighted when characterizing the modern single European market?

1. ***Four freedoms***.

- *movement of goods*. The single market ensures the free movement of goods between EU member states without customs duties. This led to the fact that a significant part of the foreign trade of the EU member states is precisely trade with other members of the association. However, it should be understood that at the same time the EU is externally oriented, in particular on trade with the rest of the world. At the same time, we must not forget that there are still numerous non-tariff barriers to the movement of goods and services between countries. The EU will work on their elimination in the coming years;

- *movement of services*. EU citizens and companies can provide services in any EU country, subject to local rules and standards. The EU is doing a lot to unify the requirements for these services and unify the terms of their provision. As a result, these services become more accessible. For example, the removal of roaming charges reduced the cost of international phone calls;

- *movement of capital*. The free movement of capital allows you to invest, buy real estate and carry out financial transactions without restrictions within the EU. The flow of capital from one country to another averages its profitability and equalizes economic conditions, bringing them closer for the entire union of countries;

- *labor force movement*. EU citizens have the right to work, live and study in any EU country without additional visas or work permits.

2. ***Scales of the single market***.

As you know, today the EU has 27 member states with a total population of more than 450 million people. It is one of the largest markets in the world both in terms of the number of consumers and their ability to pay. According to the European Commission, the Single Market includes 23 million enterprises, which employ almost 128 million people, and contributes to the structural increase of the EU GDP by approximately 9% [5].

The level of trade in goods and services between member states compared to the size of the EU economy has roughly doubled over the past 30 years. Thus, the share of trade in goods in the total GDP increased from 11 to 23%, and a similar indicator for trade in services - from 2.5 to 6% (Fig. 2.1)

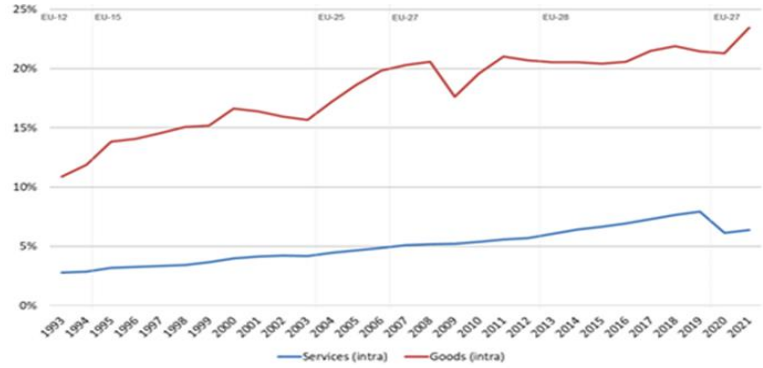


Fig. 2.1. The share of trade in goods and services between EU countries in the total GDP [1]

The social benefits of the Single Market for employment are also significant, as up to 56 million EU jobs depend on intra-EU trade [1].

3. ***Directions of expansion of the single market***.

The EU single market is attractive for other countries due to its scale and stability. Thus, Iceland, Norway and Liechtenstein decided to create a ***European Economic Area*** with the EU. Therefore, the four freedoms mentioned above also apply to these countries. A number of countries of the Southern Balkans and the Eastern Partnership (in particular, Ukraine) are candidates for EU membership. The European Union is taking measures to attract these countries to at least some segments of the single market. The EU is also using every opportunity to further integrate Ukraine into the Single Market, for example by connecting to the EU electricity grid, suspending import duties on Ukrainian exports to the EU, creating solidarity lanes to improve the movement of goods and people, and bringing Ukraine into the European roaming zone at domestic tariffs.

At the same time, the impact of the EU enlargement process due to the acceptance of new members on the functioning of the single market is controversial. In addition to the benefits for all participants in this process, one should not forget about certain threats, which will be discussed later.

There are threats to the effective functioning of the single market, which come from the participating countries themselves. First of all, you should pay attention to the presence of internal disagreements. The dominance of national interests and political disagreements sometimes lead to the fact that decisions made at the international level are not actually implemented by individual countries, which creates barriers to the realization of the four freedoms.

Euroscepticism and disintegration processes, the scale of which has been growing in recent years, also pose a serious threat. Suffice it to say about Brexit, because the exit of the United Kingdom from the

EU in 2020 created new challenges for the single market, especially in the field of trade and labor movement.

An equally important problem is timely adaptation to new global conditions, which are changing both under the influence of technological progress of climate change and as a result of the actions of influential players in the world economy.

Taking into account all these circumstances, the European Commission intends to work at all levels of governance with all stakeholders to maximize the potential of the single market in strengthening competitiveness and sustainable economic growth. The main efforts will be concentrated in two areas:

- compliance with existing rules of the single market and elimination of barriers at the level of member states, in particular barriers for cross-border provision of services, as well as in industrial ecosystems with the greatest potential for economic integration (retail trade, construction, tourism, business services and the renewable sector energy);

- continued promotion of the green and digital dimensions of the Single Market as a source of innovation, growth and competitiveness.

The successful implementation of the mentioned directions requires constant attention to the improvement of the instruments of state and interstate regulation of the single market.

2.2. Instruments of state and interstate regulation of the single market

The single market of the European Union cannot function as a market of perfect competition without any intervention of state and interstate governing bodies. A mixed economy involves a combination of market mechanisms of self-regulation with an active regulatory policy on the part of the state. Since there is a single market, it is not just the sum of the national markets of the EU members, but a truly independent entity with a synergistic effect, and it should function

according to general rules. Of course, at the national level there may be certain peculiarities in some details, but the general principles must be common, transparent and understandable for all participants, regardless of their country of origin.

Unfortunately, today the European Union cannot demonstrate that all its members fully comply with the norms adopted at the international level. Back in 2007, the European Council introduced the indicator of the transposition deficit of single market directives, setting its value at the level of 1% [6]. However, only 5 countries comply with this indicator (Denmark, Germany, France, Hungary, Finland), while others sometimes exceed it by 1.5-2.5 times [1]. This poses a threat to the unity and efficiency of the of the common market functioning. The European Commission therefore appealed to member states to commit to limiting the transposition deficit to 0.5% for all directives and to 0% in the case of directives whose implementation is overdue by more than two years.

For a better understanding of the mechanisms used in the European Union for state and interstate regulation of the single market, we will highlight groups of main instruments.

1. ***Legal instruments***. No laws or codes of laws are adopted at the level of the European Union. At the same time, there are types of regulatory documents that have different scopes and degrees of obligation:

1.1. *EU regulations*. These documents are adopted at a joint meeting of the EU Parliament and the EU Council at the initiative of the European Commission. In terms of their legal force, they are equal to laws. The regulations are mandatory in all EU member states and do not require national implementation. They have direct effect and are part of national legislation from the moment of their adoption. An example of such a document can be the General Data Protection Regulation (GDPR), which establishes the rules for processing personal data in the EU and is mandatory for all countries and organizations operating within the EU [7].

1.2. *EU directives*. The mechanism of adoption of Directives coincides with the mechanism of adoption of Regulations. But the mechanism of their implementation is significantly different. The directives set goals to be achieved by all member countries, but leave national governments the right to choose the forms and methods of implementing these goals. For example, the Consumer Rights Directive sets minimum standards of consumer protection that member states must implement in their legislation. But how to do it, which national law to include such norms, each state decides independently.

1.3. *EU decision*. All EU management bodies have the right to make decisions within their competence. Thus, the Council of the European Union most often adopts decisions that are addressed to individual EU members or other entities and are binding. The European Commission can take decisions within its powers, especially regarding the implementation of EU legislation or the application of competition policy. For example, a country decides to provide financial assistance to a certain enterprise, and the European Commission can decide whether such assistance violates the general rules of fair competition in the EU market. Thus, in February 2023, the Commission adopted 24 infringement decisions to overcome barriers in the single market for services and facilitate the work of companies in the EU. At the same time, the Commission's tough enforcement measures meant that 18 infringement cases were closed with real improvements in the single market for services [1].

The effective use of legal instruments runs into a typical problem of integration associations: the inconsistency of interstate norms and norms of state legislation. The European Commission emphasizes the existence of such a contradiction. It is the inconsistency of national legislation with the rules of the single market that creates additional barriers to the implementation of the four freedoms, worsens the business environment and reduces its competitiveness. Therefore, the Commission will work on the further implementation of the "once only"

principle, including through the "single window", in areas such as taxation, customs and regulatory reporting [5].

The implementation of this principle, in particular, is facilitated by the creation in 2020 of the Working Group on Ensuring Compliance with the Single Market (The Single Market Enforcement Taskforce, SMET) [9]. Under SMET, Member States agreed to ease restrictions on professionals and businesses providing temporary cross-border services and, based on good practice, to abolish pre-qualification checks for 247 occupations, and to review and reduce administrative and documentary requirements.

SMET has also identified more than 80 of the most pressing obstacles to the smooth and speedy issuance of permits for wind and solar installations. With 50,000 small and medium-sized enterprises actively engaged in renewable energy production, removing these barriers will facilitate sustainable growth.

2. ***Economic instruments***. They are connected either with the use of budget funds or with the formation of a suitable market environment.

2.1. *Budget policy and structural funds*. The EU redistributes funds through its budget, in particular through structural and investment funds aimed at the development of regions, support of small and medium-sized businesses, innovation and job creation. A typical example of the application of this tool is the ***European Regional Development Fund*** (ERDF), the purpose of which is to support the economic and social convergence of the EU regions by reducing the gaps in the levels of development between them. ERDF provides financial support for projects aimed at promoting economic development, creating jobs, improving infrastructure and supporting small and medium-sized businesses [8].

All EU regions are divided into three groups:

- *less developed regions* (GDP per capita is less than 75% of the EU average);

- *regions in transition* (GDP per capita from 75 to 100% of the EU average);

- *more developed regions* (GDP per capita is more than 100% of the EU average).

Money of this fund are distributed taking into account the level of development of the region - less developed regions are given advantages.

The EU forms a fund for 7 years and defines the main tasks of its use. The plan for 2021-2027 is currently being implemented. Its goals are to make Europe and its regions:

- ***more competitive and smarter*** thanks to innovation and support of small and medium-sized businesses, as well as digitization and digital communication;

- ***more ecological***, low-carbon and sustainable;

- ***more connected*** due to increased mobility;

- ***more social***, by supporting employment, education, skills, social integration and equal access to health care, as well as by increasing the role of culture and sustainable tourism;

- ***closer to citizens***, supporting local development and sustainable development of cities throughout the EU [8].

2.2. *Competition policy*. It is aimed at ensuring equal conditions for all market participants, preventing monopolies and abuse of market power, as well as encouraging innovation and increasing the efficiency of the economy. The main directions of this policy are:

- ***antimonopoly regulation***. It, in particular, includes the investigation of anti-competitive behavior, which is done by the European Commission. If facts of such behavior are discovered (for example, it may be a cartel agreement on market sharing or price agreement), the European Commission imposes fines.

The Commission also investigates the abuse of a dominant position in the market. Quite often, fines are imposed on companies with a global name (for example, Google);

In May 2024, the European Commission fined the American company Mondelez 337.5 million euros ***for restricting cross-border trade between EU member states***. This was done through ***anti-competitive agreements and abuse of a dominant position in the chocolate and biscuit market.*** The European Commission found that the company entered into agreements that limited the territories or customers to which its partners could resell products, and also prohibited the sale of products in certain countries without its permission [10].

- ***prohibition of anti-competitive agreements***. The European Commission has the right to prohibit agreements between companies if they may restrict competition in the EU internal market.

For the first time, the European Commission has ordered the termination of the already completed merger between ***Illumina and GRAIL***. This decision was made due to concerns that such an agreement could limit competition in the market for genetic tests [11].

The Commission has banned ***Booking's merger with eTraveli*** due to "ecosystem concerns". This decision was based on a new theory of harm, which takes into account the possible long-term consequences for the online tourism ecosystem created by Booking [12].

- ***control over state aid***. The EU controls state aid to businesses to prevent it from being used to create anti-competitive advantages. The Commission can approve state aid if it is in the general interest.

The Commission approved aid ***measures of €5 billion for Germany to support semiconductor production at a new ESMC plant, €99.5 million for Romania to build a zero-CO_2 tire plant, and €80 million for the Netherlands*** to support innovative renewable energy technology hydrogen [13]

On the other hand, the European Commission can conduct a deeper investigation and even withdraw the support received from the state if it violates the rules of the single market.

The European Commission opened an in-depth investigation into the €321.2 million German restructuring measure for ***Condor*** airline to assess its compatibility with EU state aid rules [13]

- ***protection of consumer rights and promotion of competition***. The commission oversees markets to protect consumer rights and ensure fair competition. Special attention is paid to encouraging competition in digital markets. The EU adopted the Digital Markets Act to regulate large digital platforms such as Google, Amazon, Meta, Apple and Microsoft to prevent anti-competitive practices [14].

3. ***Social tools***. They can be combined into two groups: protection of workers' rights and social policy.

3.1. *Protection of workers' rights*. The EU sets minimum standards for working conditions, including occupational safety, pay, working hours, and ensures equal rights for workers in all member states. An example is the Working Time Directive (Directive 2003/88/EC). This directive, in particular, regulates:

- ***the maximum duration of the working week*** (the working week should not exceed 48 hours, including overtime, on average over a period of up to four months);
- ***minimum daily and weekly rest*** (employees must be entitled to 11 hours of continuous rest every 24 hours and 24 hours of continuous weekly rest in addition to daily rest);
- ***breaks during work*** (employees have the right to breaks if the working day exceeds 6 hours. The duration and conditions of breaks are established by national legislation or collective agreements);

- ***annual paid vacation*** (employees are entitled to at least four weeks of paid vacation per year);

- ***night work and shifts*** (the directive defines special rules for night workers, including limits on the duration of working hours (an average of 8 hours per day) and the right to medical examinations);

- ***protection of health and safety*** (employers are obliged to guarantee the safety and health of employees, especially those who work at night or in conditions that may affect their health) [15].

3.2. *Social policy*. The EU finances programs to support employment, education, social integration and the fight against poverty through the European Social Fund (ESF) and other programs. The most popular programs financed by the ESF are:

- *youth employment support programs*. The program aims to help young people struggling with employment problems, especially in regions with high youth unemployment;

- *skill development and professional training programs*. For example, in 2023, within the framework of the European Year of Skills, an action plan was presented to overcome labor shortages and improve the skills of workers. These measures are aimed at supporting companies (especially small and medium-sized enterprises) in overcoming skills shortages and helping citizens acquire skills for quality work;

- *support of vulnerable population groups*. With the help of programs such as "Internships in social services" in different EU countries, the foundation helps people to change professions and acquire new skills to find work in areas where they have not worked before.

The use of these tools has a significant impact on the labor market and provides one of the freedoms of the single market: the freedom of labor movement.

4. ***Institutional tools***. Certain institutions are required to use all the tools listed above. The main institutions of the European Union are the following:

- ***European Parliament***. It represents EU citizens and participates in the legislative process. Members of the Parliament are elected in direct elections by citizens of the EU member states every five years. The Parliament participates in the development and adoption of legislative acts together with the Council of the EU and has control functions in relation to other institutions;

- ***Council of the European Union***. This body represents the governments of member countries. It is one of the main legislative institutions that adopts regulations, directives and decisions together with the European Parliament (it was discussed above). The meetings of the Council are held at the level of the ministers of the relevant branches;

- ***European Commission***. The European Commission is an executive body representing the interests of the EU as a whole. The Commission proposes new regulations, implements budgets and programs, monitors compliance with treaties and represents the EU on the international stage;

- ***European Council***. It consists of heads of state or government of member countries, its chairman is the President of the European Council. The European Council determines the general political direction and priorities of the EU;

- ***Court of the European Union***. Ensures compliance with EU law, examines cases brought by member states, institutions or individuals and legal entities, and interprets EU law;

- ***European Central Bank*** (ECB). The ECB is responsible for the monetary policy of the Eurozone. The ECB maintains the stability of the euro, controls inflation and regulates financial systems within the EU.

Thus, over 30 years, the European Union has created an extensive system of instruments designed to ensure the effective functioning of the single market. However, constant changes in both the internal and external conditions of EU functioning require their constant improvement and adaptation to new challenges. Having

chosen to move towards the EU as a strategic direction of its development, Ukraine must be ready for significant changes in a wide variety of areas in order to meet the requirements of the single European market and take advantage of the opportunities that participation in it provides.

2.3. Problems of Ukraine's entry into the single European market

Having received the status of a candidate for joining the EU and starting the negotiation process, Ukraine is making every effort to bring its legislation, economy, politics, and social sphere closer to the requirements of the European Union in general and to the principles of the functioning of the single European market, in particular. And although significant progress has already been achieved in this direction, as noted not only by Ukrainian leaders, but also recognized by the official structures of the EU, there are still many unresolved issues ahead. Let's dwell on some of them.

Ukraine's entry into the single European market is associated with numerous challenges and problems, which can be conditionally divided into ***economic, political, legal and institutional***.

1. ***Economic problems***.

The most significant economic problem is the difference in levels of economic development. The level of GDP per capita in Ukraine (at the current dollar exchange rate) is almost three times lower than the corresponding figure in the poorest EU country - Bulgaria. The damage caused by Russia's aggression can further worsen the economic indicators of our country. As a result, significant differences in economic opportunities and living standards can be observed.

Ukraine's accession to the EU will not only worsen the average indicators of unification, but will also lead to a significant redistribution of funds from European funds in favor of Ukraine. Current recipient countries may lose from this. And that is why there will be some

opposition (overt or hidden) to the quick accession of Ukraine to the EU.

Differences in the level of development are also manifested in the state of Ukrainian infrastructure (transport, energy, etc.). Huge funds are needed for its modernization to bring it in line with EU standards.

Earlier, it was already discussed that Ukraine is lagging behind in terms of innovativeness. The technological level of the Ukrainian economy will not allow our manufacturers to compete equally with foreign ones on the single European market. It will be possible to reduce this backlog only by significantly increasing research and development spending.

Attention should also be paid to the problem of energy efficiency. The issue of shortage of energy carriers for Ukraine is not so much a matter of their physical absence as a problem of inefficient use. The high energy intensity of production makes Ukrainian goods too expensive and poorly competitive on the European market.

At the same time, for the sake of justice, we should also mention another problem: the unwillingness of agricultural producers of some EU countries to compete with Ukrainian products. This, in particular, was manifested in the blocking of the supply of Ukrainian products to Europe at the border with Poland.

2. ***Political and social problems***.

One of the goals of the war waged by Russia against Ukraine is to prevent our country from joining the EU and NATO. Indeed, it undermines political stability and complicates integration processes. Hostilities not only destroy the economy, but also make the outlook for partners unpredictable.

Political stability is also disturbed by constant conflicts between political forces. Even during a war, when success depends on the unity of society, one can see the use by certain political elites of certain difficult situations precisely in the political struggle, and not for the sake of finding an effective way out of them.

There is a problem of the lack of a clear division of functions of the branches of government and attempts to interfere in the activities of the executive, judiciary or monetary policy by those branches that do not have such powers.

There remains a significant influence of the oligarchs on the political situation in the country, which does not meet European standards at all.

However, perhaps the most painful problem of Ukrainian society is corruption. Despite the reform, corruption is still widespread in many areas, including the judiciary, law enforcement, public procurement, and political governance. This undermines trust in state institutions and creates an unfavorable business climate.

Among the social problems that will create barriers to entry into the single European market, one should highlight excessive differentiation of incomes and low solvency of a significant part of the population of Ukraine. The inevitable equalization of prices, which will accompany Ukraine's entry into the single market, will make a significant number of goods generally unavailable to a large number of Ukrainian consumers.

3. ***Legal problems***.

The first step in solving the legal problems of joining Ukraine to the single market is the harmonization of legislation. It was already mentioned earlier that such a problem exists even in countries that have been members of the EU for two decades. Ukraine, on the other hand, will have to revise a huge number of norms of its legislation in many areas: from general principles of market regulation to environmental protection. And we need to do this before joining, because in accordance with the Maastricht Treaty, the norms of European law come into force from the moment the country joins the EU. And if at that time the norms turn out to be unharmonized, a legal conflict may arise, which will complicate the implementation of the four freedoms of the single market.

Harmonization should lead to the conformity of Ukrainian legislation with the norms of European Union law, but the degree of this conformity is not clearly defined. The EU does not require Ukraine (as well as its other members) to have one hundred percent identity, as it understands the country's national specifics. However, there should be no fundamental differences and contradictions that hinder the functioning of the single market.

4. ***Institutional weakness***.

The institutional weakness of Ukraine on the way to the single European market manifests itself in several forms:

- *inefficiency of state administration*. First of all, it is the insufficient ability of government bodies to ensure the quality performance of their functions, in particular, regarding the implementation of reforms and compliance with European standards, which weakens the country's institutional development. Opaque decision-making processes exacerbate the problem of institutional instability;

- *weak judicial system*. The judicial system of Ukraine continues to suffer from the influence of corruption and lack of independence. The European Union requires reform of the judicial system to ensure its independence, efficiency and accountability. The inefficiency of the judicial system also increases legal uncertainty, which negatively affects the investment climate and the country's overall ability to meet European standards;

- *lack of agreed reforms and their implementation*. Despite efforts to implement reforms, the process of their implementation in Ukraine is slow and uneven. This is often explained by the lack of coordination between different levels of government, underdeveloped infrastructure, political conflicts and the opposition of certain interest groups. There are often no clear strategic plans or institutional mechanisms to ensure the successful implementation of reforms in various sectors such as energy, economy, health and education;

- *weakness of anti-corruption mechanisms*. Despite the creation of anti-corruption bodies, such as the National Anti-Corruption Bureau of Ukraine (NABU) and the High Anti-Corruption Court, the results of the fight against corruption remain unsatisfactory. Insufficient political will and sabotage of reforms by influential elites weaken the effectiveness of these bodies and undermine trust in them from international partners;

- *low administrative capacity*. Many institutions in Ukraine suffer from a lack of professional staff, especially at the local level, which makes it difficult to perform complex tasks, such as adapting legislation to EU standards, implementing European policies and complying with legal requirements. This is also reflected in the insufficient ability to ensure the provision of quality public services.

Therefore, Ukraine's entry into the single European market is a complex and multi-stage process that requires deep reforms in various areas. Their successful implementation is possible under the condition of purposeful coordinated activity of all authorities and with the active support of society. Only in this case, Ukraine will be able to go through the difficult path of integration into the single European market and get real benefits from its stay there.

References

1. Communication from the Commission to the European parliament, the Council, the European economic and social committee and the Committee of the regions. The Single Market at 30. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023DC0162

2. Treaty establishing the European Economic Community. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:11992E/TXT

3. Single European Act (SEA). URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:11986U/TXT

4. Treaty on European Union. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:11992M/TXT

5. Communication from the Commission to the European parliament, the council, the European economic and social committee and the Committee of the regions (2023). Long-term competitiveness of the EU: looking beyond 2030. URL: https://commission.europa.eu/system/files/2023-03/Communication_Long-term-competitiveness.pdf

6. The Single Market and Competitiveness Scoreboard. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023DC0162

7. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). URL: https://eur-lex.europa.eu/eli/reg/2016/679/oj

8. European Regional Development Fund. URL: https://ec.europa.eu/regional_policy/funding/erdf_en

9. Single Market Task Force continues to tackle barriers in the single market. URL: https://single-market-economy.ec.europa.eu/news/single-market-task-force-continues-tackle-barriers-single-market-2022-11-29_en

10. Violation of EU competition law: Commission fines Mondelez EUR 337.5m for cross-border trade restrictions. URL: https://cms-lawnow.com/en/ealerts/2024/05/violation-of-eu-competition-law-commission-fines-mondelez-eur-337.5m-for-cross-border-trade-restrictions

11. Commission approves Illumina's plan to unwind its completed acquisition of GRAIL. URL: https://ec.europa.eu/commission/presscorner/detail/en/ip_24_1964

12. Mergers: Commission prohibits proposed acquisition of eTraveli by Booking. URL: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4573

13. Competition Police. URL: https://competition-policy.ec.europa.eu/state-aid/latest-news_en

14. The Digital Markets Act. URL: https://digital-markets-act.ec.europa.eu/index_en

15. Employment, Social Affairs & Inclusion. URL: https://ec.europa.eu/social/main.jsp?catId=706&langId=en

Chapter 2

ACHIEVING A SUSTAINABLE ENERGY FUTURE FOR EUROPE: UKRAINE CRISIS

Topic 3. Achieving a climate neutral economy: future energy systems and clean hydrogen

Questions that reveal the content of the topic

3.1. The new global clean energy economy
3.2. Hydrogen economy in the new geoeconomic era

Renewable energy is becoming a cornerstone of the global energy landscape, driving the rise of a new clean energy economy. The 2022 global energy crisis highlighted the vulnerabilities of the fossil fuel-dominated system and had a significant impact on the cost of living, intensifying the urgency for change.

In 2023, global investments in energy transition reached a record $1.8 trillion, marking a 17% increase compared to 2022. China led the charge, installing solar capacity in 2023 equivalent to the world's total in 2022, and remains a dominant force in supply chains for solar panels, wind turbines, electric vehicles, and other critical technologies while expanding production globally [3].

The energy sector is responsible for 72% of global greenhouse gas emissions and is inextricably linked to human well-being and the health of our planet. The transition of the energy system from fossil fuels to renewable energy is crucial for combating climate change and building a sustainable, low-carbon future for all.

3.1. The new global clean energy economy

The Russian-Ukrainian war has exposed weaknesses in the global energy security framework. Nations with sophisticated energy systems and intricate supply chains were compelled to implement urgent measures to maintain energy supplies. Following the halt of Russian gas pipeline deliveries, Europe managed to avert an energy crisis through a mix of strategic political decisions, agreements to source alternative fuels, expedited development of liquefied natural gas (LNG) infrastructure, demand management strategies, and regional coordination on utilizing storage reserves.

The transition from energy systems dominated by fossil fuels to those based on renewable energy will significantly impact existing value chains. For decades, fossil fuels have driven industrialization and economic expansion, yet this development has deepened pre-existing socio-economic inequalities. Due to these disparities, the world has been divided into the Global North and Global South, meaning that the former has already achieved its set goals, while the latter still needs to catch up.

The key question is how to strike a delicate balance between supporting growth while achieving prosperity for all and accelerating the transition to a low-carbon economy. The answer should lie not only in globalization but also in technological innovation.

A country's readiness for the energy transition today defines its **competitiveness strategy**, as they shape new industries to support future economic growth.

The energy transition refers to the global energy sector's shift from energy production and consumption systems based on fossil fuels, such as oil, natural gas, and coal, to renewable energy sources like wind and solar power, as well as lithium-ion batteries

The key clean energy technologies traditionally include [1]:

1. Renewable energy:

– **solar energy** – using solar panels to convert sunlight into electricity;

– **wind energy** – using wind turbines to generate electricity;

– **hydropower** – utilizing rivers or streams to produce electricity.

2. Nuclear energy:

– **nuclear fission** – splitting atoms to produce energy without significant greenhouse gas emissions.

3. Bioenergy:

– **biomass** – using organic materials (e.g., wood, agricultural waste) to generate electricity.

4. Energy storage:

– **batteries** – storing electricity for later use;

– **thermal storage systems** – storing thermal energy for future use.

5. Energy-efficient technologies:

– **energy-efficient buildings** – using technologies and materials to reduce energy consumption in buildings;

– **energy-efficient appliances** – designing and using devices that consume less energy.

The transition to a carbon-free energy system, aimed at preventing global warming, is impossible without the **use of hydrogen**, which is considered the **energy carrier of the future**.

These technologies play a crucial role in achieving a sustainable and environmentally safe energy future. The gradual adoption of clean energy technologies is a key factor in combating climate change and ensuring sustainable development.

The process of energy transition, aimed at ensuring a secure, sustainable, and fair energy future, presents significant challenges and opportunities for countries, particularly for the European Union. In the context of the energy sector and sustainable development strategies, "**competitiveness"** is an important and relevant term.

Ensuring a balance between sustainable development goals, competitiveness, and energy security emerges as a critical task for governments, businesses, and citizens when shaping energy transition strategies (Figure 3.1).

The essence of today's energy transition lies in the fact that it is not just climate change driving Europe and other nations toward

net-zero emissions, but geopolitical factors as well. Russia's war has become a powerful catalyst for countries seeking to enhance their energy security and reduce dependence on fossil fuels.

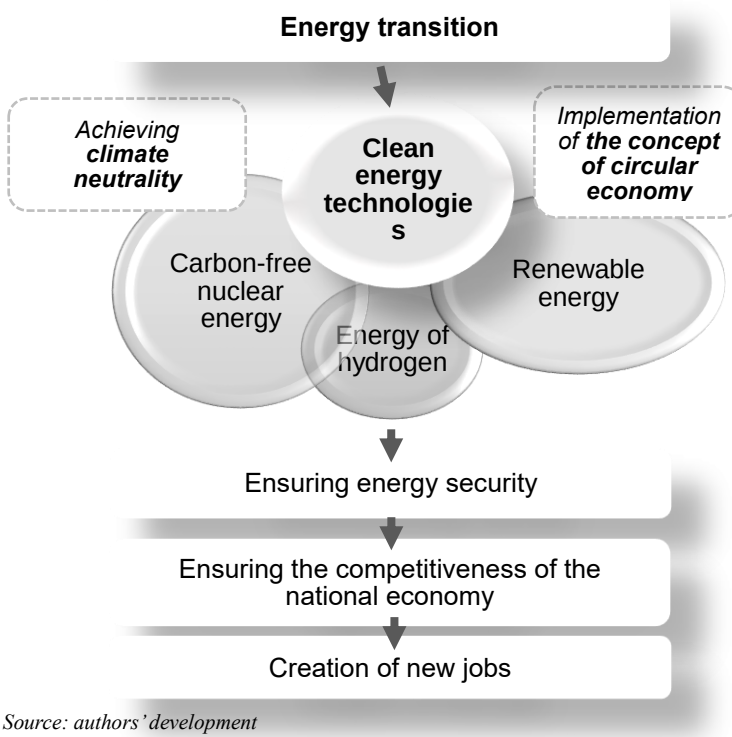
In 2023, the global expansion of clean energy reached unprecedented levels. Clean energy technologies have already become competitive in many key sectors, with costs continuing to decline as production scales up. In most regions worldwide, building new onshore wind and solar power plants is now more cost-effective than constructing new fossil fuel-based energy facilities.

The annual increase in **solar photovoltaic energy and wind energy** grew by 85% and 60%, respectively. The capacity additions for these two technologies reached nearly 540 GW, with the majority of both coming from China [2]. In 2023, China and developed economies accounted for 90% of the capacity increases for wind and solar photovoltaic installations and over 95% of global electric vehicle sales [2].

Electric vehicle prices continue to fall, and their market share keeps growing. In 2020, approximately one in every 25 cars sold worldwide was electric, but just a few years later, in 2023, it was one in five. **Electric vehicles are now the cornerstone of most automakers' strategies** for the future. Along with the rapid growth in investments in battery production, this makes a departure from electric vehicles unlikely and impractical [2].

Electric vehicle sales grew by approximately 35% in 2023, reaching 14 million cars, or one in every five vehicles sold globally. China once again led the market, where one in every three cars sold was electric, while in the European Union, it was one in every four [2].

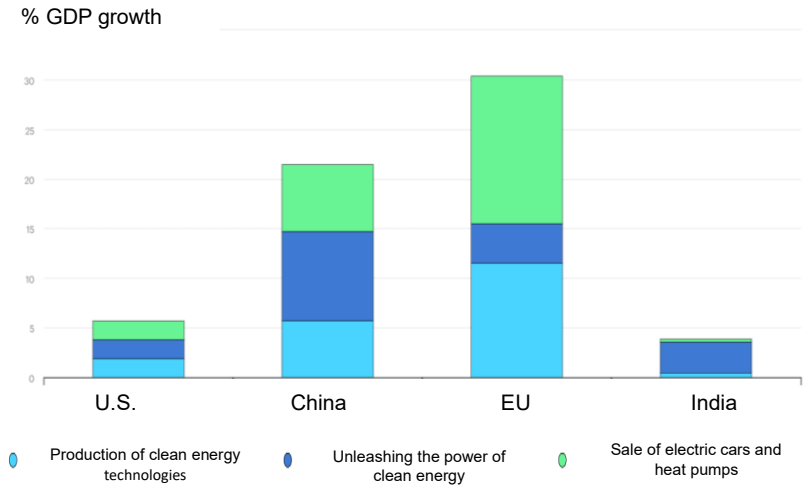
In 2023, construction began on **new nuclear reactors** under five projects. As of early 2024, **58 reactors** with a total capacity of over 60 GW were under construction worldwide [2].



Source: authors' development

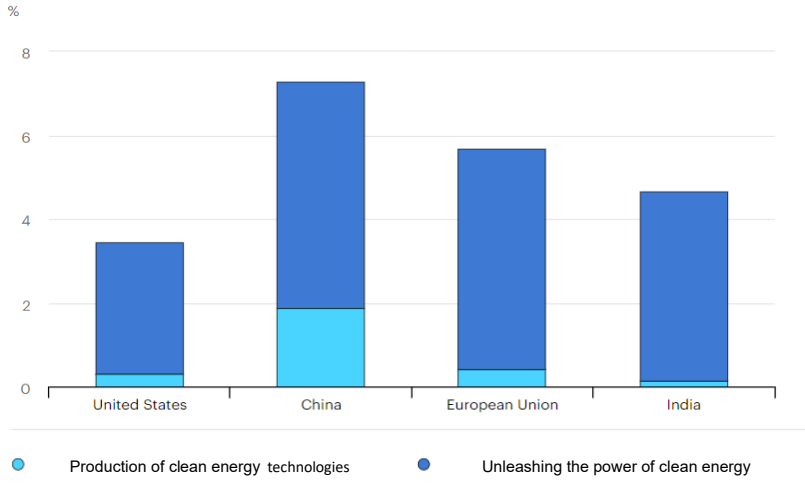
Fig. 3.1. Formalizing the perception of the new global clean energy economy

In 2023, **hydrogen electrolyser** capacity increased by 360%, primarily driven by China [2]. Assessing the extent to which different sectors of the clean energy economy contribute to GDP growth year over year helps to indicate the direction of progress (Figures 3.2 and 3.3). In the European Union, clean energy accounted for nearly one-third of GDP growth in 2023 [4].



Source: International Energy Agency

Fig. 3.2. Investments in clean energy technologies as a % of GDP growth, 2023 [4]



Source: International Energy Agency

Fig.3.3. Share of investments in selected clean energy technologies, 2023 [4]

The modernization of energy and industrial systems to drive energy transitions requires substantial investments and the transformation of vast markets. However, it also brings many significant benefits beyond mitigating climate change and reducing air pollution, such as the creation of new jobs. This shift not only supports environmental goals but also fosters economic growth and job opportunities in various sectors.

In 2023, clean energy contributed a record 11.4 trillion yuan (USD 1.6 trillion) to China's economy, driving an increase in investments and accounting for a significant share of economic growth [5]. There was a huge surge in investments in Chinese clean energy, particularly in the so-called **"new three"** sectors of **solar energy**:

1) electricity;

2) electric vehicles;

3) batteries.

Solar energy, along with manufacturing capacities for solar panels, electric vehicles, and batteries, was the primary focus of China's clean energy investments in 2023.

China accounts for over 80% of the global export of solar cells, more than 50% of lithium-ion batteries, and over 20% of electric vehicles [6]. However, geopolitical tensions cast uncertainty over the future of global production of the "new three". Trade restrictions imposed on China by its main trading partners, particularly the US and Europe, could impact its leading position.

The concept of the "new three" – or *xin san yang* – directly refers to China's **"old three,"** which were once the backbone of its exports: *clothing, household appliances, and furniture*.

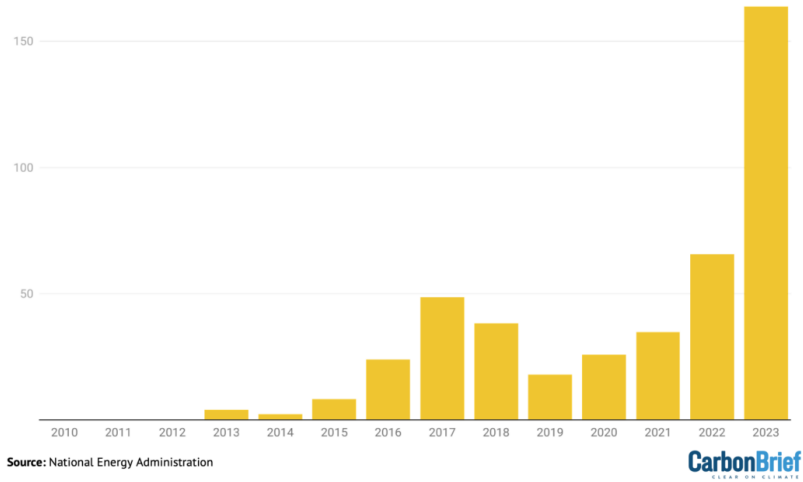


Fig. 3.4. Installed solar capacity in China, gigawatts [7]

According to data collected by Natixis, a French corporate and investment bank, last year China became almost a monopolist in the global export of solar cells, accounting for 83.8% of the total volume [6].

According to some experts, the growth of the "new three" is largely attributed to government subsidies for manufacturers, power producers, and consumers.

Solar panel production at a factory in Hefei, Anhui Province, October 2023. (Image: Alamy)

European companies are opting for the production of **hybrid vehicles**, while China has focused on the production of **electric vehicles.**

Alicia García-Herrero, Belgian think tank Bruegel

As of the late 2010s, the EU accounted for approximately 60% of global solar panel production [6].

A solar farm is being constructed in Saxony, Germany, using 1.1 million solar modules imported from China (Image: Jan Woitas / Alamy)

To stimulate production, European countries, particularly Germany and Spain, actively subsidized the use of solar energy by individuals. However, due to the financial crisis, European countries withdrew their solar energy subsidies. Around the same time, China began expanding its solar energy industry.

Most experts believe that China will maintain its advantage in the "new three" sectors for the foreseeable future. However, many also emphasize the uncertainty caused by geopolitical relations.

The areas where **the US and Europe** may catch up are research and **development of new technologies**.
Alex Wang, UCLA (University of California, Los Angeles) School of Law.

Additionally, in the first 11 months of 2023, China installed 41 GW of **wind power capacity**, an 84% increase compared to the previous year.

China is also rapidly expanding its **energy storage capacity**. This could potentially reduce the country's reliance on coal- and gas-powered plants to meet peak electricity demand significantly.

Investments in electrolyzers for producing **"green" hydrogen** nearly doubled compared to the previous year in 2023, reaching approximately 90 billion yuan [7].

In 2023, China also approved 10 nuclear power units. Currently, China has **77 nuclear power units either in operation or under construction**, making it the second largest in the world.

The energy transition will impact all sectors of the economy. Transitioning to clean, reliable, and affordable energy will require international coalitions to find solutions across all sectors, enhance the deployment of clean energy, and engage communities.

Global spending on renewable energy, nuclear power, energy efficiency, and low-emission fuels such as hydrogen is expected to exceed $2 trillion in 2024, which is double the $1 trillion spent on fossil fuels, according to the International Energy Agency's annual review of global energy spending [8].

> **Investments in clean energy** are setting new records even in challenging economic conditions, highlighting the momentum of **the new global energy economy**. For every dollar spent on fossil fuels today, nearly **two dollars** are invested in clean energy.
>
> *Fatih Birol, Executive Director of the International Energy Agency (IEA)..*

It should also be noted that g**reen hydrogen, produced from renewable energy sources**, is seen as one of the promising solutions for achieving decarbonization goals. Hydrogen energy is an alternative to fossil fuels that could become a cleaner way to power our world.

Nevertheless, the primary obstacle preventing hydrogen from significantly contributing to decarbonization is the investment cost. Achieving a net-zero emissions path will require an additional $460 billion in direct investments in hydrogen by 2030. This investment gap is divided into three categories [9]:

1) **production**. Producing clean hydrogen will require approximately an additional $150 billion in investments by 2030.

2) **transmission, distribution, and storage**. Investments in this area are crucial to ensure access to competitive hydrogen sources. This may include the development of refuelling infrastructure for vehicles or the construction of pipelines to supply industrial facilities. The investment gap here currently exceeds $165 billion.

3) **end-use applications**. Meeting the projected demand across various hydrogen end-use sectors, including steel production and transportation, will require an additional $145 billion in investments.

For hydrogen to contribute effectively to the energy transition, significant expansion over the next decade is essential.

Green hydrogen, produced using **renewable sources** such as solar and wind, holds significant potential for meeting the world's future energy needs. However, the economics of green hydrogen today are challenging, primarily because the baseline costs and availability of renewable energy sources vary significantly.

3.2. The hydrogen economy in the new geo-economic era

The continuous growth of the global population and economy, combined with rapid urbanization, has led to a sharp increase in energy demand. The traditional trend of energy supply relies heavily on hydrocarbon (fossil fuel) energy resources, which are depleting and limited by geographic distribution and ease of extraction.

Since the Industrial Revolution, our reliance on fossil fuels as the primary energy source has significantly increased levels of CO2 and other greenhouse gases in our atmosphere, which is the main driver of global warming. Therefore, decarbonizing energy supply by transitioning to clean, sustainable, and renewable energy alternatives is critical for future energy stability and global security.

Scientists believe that **hydrogen energy** could be a cleaner and more efficient way to power our world. Hydrogen is a natural gas and the most abundant substance in the universe. **Clean hydrogen** refers

to hydrogen that is produced with very low or zero carbon emissions, such as **green hydrogen**.

When combined with other technologies, such as renewable energy sources and biofuels, hydrogen has the potential to **decarbonize** a wide range of industries, including some of the largest emitters of greenhouse gases. According to McKinsey's analysis, by 2050, hydrogen could contribute to over 20% of the annual reduction in global emissions [9].

As of May 2023, more than 1,000 large-scale hydrogen projects worldwide had been announced, representing $320 billion in direct investments [10]. However, there are several challenges that hinder the widespread adoption of hydrogen energy.

The hydrogen value chain is complex and capital-intensive. Furthermore, many segments of the industry are not developing at the same pace.

While hydrogen energy does produce some emissions, their volume is significantly lower and easier to control compared to other energy production methods. For example, green hydrogen can be produced using 100% solar and wind energy in regions rich in renewable resources and then delivered to any fuelling station.

Nevertheless, the primary obstacle preventing hydrogen from significantly contributing to decarbonization is its **high investment cost**. Achieving a net-zero emissions pathway will require an additional $460 billion in direct investments in hydrogen by 2030.

This investment gap forms **the hydrogen value chain**:

- **production**. Clean hydrogen production requires approximately $150 billion in additional investments by 2030.

- **transmission, distribution, and storage**. Investments here are crucial for ensuring access to competitive hydrogen sources. This could include the development of vehicle refuelling infrastructure or the construction of pipelines to supply industrial facilities. The current investment shortfall in this area exceeds $165 billion.

- **end-use applications**. Meeting projected demand in various hydrogen end-use sectors, including steel production and transportation, will require an additional $145 billion in investments.

Figure 3.5 illustrates the "Hydrogen Square," a conceptual framework that outlines the various stages of the hydrogen value chain, from production to end-use. The four sides of the Hydrogen Square represent production, storage, utilization, and safety of hydrogen. The goal of the Hydrogen Square is to balance these four aspects to create a sustainable and efficient hydrogen economy [11].

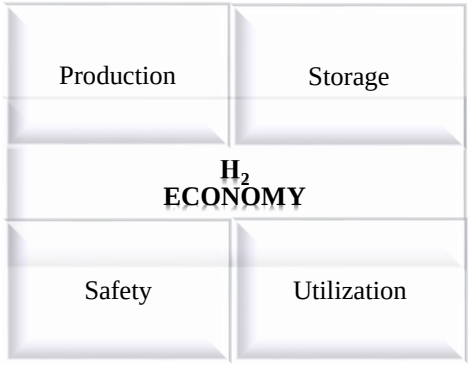


Fig. 3.5. The classic hydrogen square [11, 12]

The mentioned four-vector system significantly impacts the pricing of the final product – hydrogen. Depending on the method of hydrogen production, the price will vary, and similarly, different methods of storage and safe utilization will influence the final product's price.

In pricing methodology, a sufficient number of methods are used, but there are two main principles: the market-based and production-based (government-regulated) approaches. Under the market-based approach, the key factor in pricing is market conditions, including

supply and demand. Under the production-based approach, the price of a product is determined by production costs, primarily material, energy, and labor costs associated with the production of the product.

This means that economically justified prices reflect the socially necessary costs of production and sales of products (services), while also ensuring profitability by meeting consumer demands (service quality parameters). In this context, the structure of the price consists of two components: cost, which expresses in monetary terms the expenses related to production and sales of products (services), and profit margin.

$$P = C \cdot (1 + R_{min} /100) , \quad (3.1)$$

where P – price of the product / service tariff, in monetary units;
C – total cost, in monetary units;
R_{min} – minimum profitability (profit margin – a highly variable component in the hydrogen economy), in percentage.

Among the key features of hydrogen value creation, the following can be highlighted:

1. **Production**. Hydrogen production relies on two main pathways: thermochemical and electrochemical. Unlike other forms of renewable energy, such as solar and wind, which cannot be stored, hydrogen can be produced and stored in various forms, including compressed gas, liquid hydrogen (LH2), slurry, solid, or metallic hydrogen.

For example, Landtop Hydrogen (Qingdao, China), a leading provider of hydrogen production solutions, announced on May 29, 2024, the launch of its revolutionary modular square electrolyser with a normal pressure capacity of 1000 Nm³/h, marking a significant breakthrough in the industry. The new electrolyser is designed to meet the growing demand for clean and efficient hydrogen production, especially in renewable energy sources.

2. **Storage**. Hydrogen can be stored in the following forms: compressed hydrogen, cryogenic compressed hydrogen, liquid hydrogen, and solid-state hydrogen storage systems.

3. **Transportation (safety)**. Hydrogen can be transported through pipelines, similar to natural gas, or in specialized high-pressure containers. This requires the use of specialized equipment and transport vehicles to ensure safety.

4. **Utilization**. There are numerous pathways for hydrogen usage, which underpins the concept of the **"hydrogen economy."** Firstly, hydrogen can be used as a hydrogen-natural gas blend (HyBlend), which helps reduce CO2 and NOx emissions into the atmosphere. Relevant experiments are already being conducted in Ukraine and worldwide.

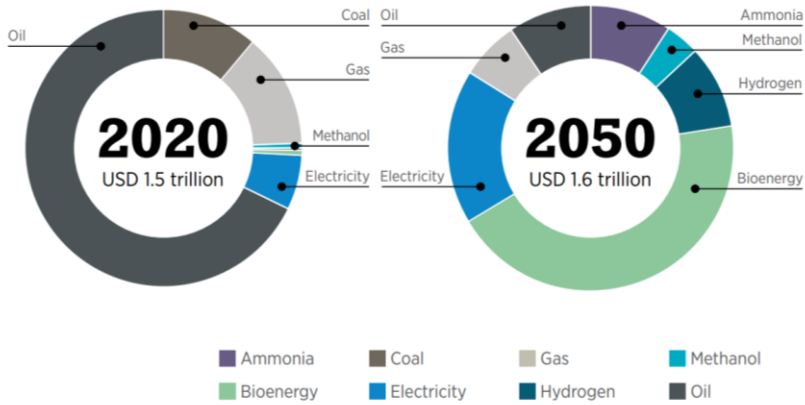
Hydrogen is also used as fuel in industrial processes, helping to reduce reliance on fossil fuels (in its pure form, as HyBlend, and in synthetic gas technologies like Power-to-X). Traditionally, hydrogen has been utilized in the production of ammonia and fertilizers.

There is significant potential for hydrogen use in vehicles powered by hydrogen fuel cells, offering a clean alternative to internal combustion engines.

Hydrogen can also play a role in the energy production sector. When renewable energy generation is high, excess energy from renewable sources can be used to produce hydrogen via electrolysis in an environmentally friendly way.

Trade in hydrogen and investment flows will generate **new models of interdependence** and transform bilateral relations. The rapidly growing number of bilateral agreements indicates that these will differ from the energy relations based on hydrocarbons in the 20th century. More than 30 countries and regions already have **hydrogen strategies** that include plans for importing or exporting hydrogen, signalling a significant increase in **cross-border hydrogen trade** (Figure 3.6). Countries that traditionally do not trade energy are establishing bilateral relations focused on hydrogen technologies and

molecules. As economic ties between countries shift, their political dynamics may also evolve.



Source: The Hydrogen Factor 2022. IRENA

Fig. 3.6. Changes in energy trade dynamics, 2020–2050 [13]

Hydrogen diplomacy is becoming a standard part of economic diplomacy in several countries. Access to hydrogen is often viewed as an element of energy security and overall national resilience, especially for industries where other solutions are either unfeasible or uneconomical. Some countries planning to become importers are already engaging in targeted **hydrogen diplomacy**. Germany and Japan have been pioneers in this field.

Fossil fuel exporters see clean hydrogen as an attractive way to diversify their economies. Many current exporters are focusing on clean hydrogen to develop new export industries. They can leverage established energy infrastructure, a skilled workforce, and existing energy trade relationships.

While blue hydrogen may seem like a natural choice, many fossil fuel-producing countries have sufficient renewable energy potential to transition directly to green hydrogen. The United Arab Emirates' **Hydrogen Leadership** Roadmap clearly adopts this dual approach,

and several other countries, including Australia, Oman, and Saudi Arabia, are also exploring this path.

Europe expects hydrogen to play a key role in significantly reducing emissions between 2030 and 2050 to achieve carbon neutrality.

As a result, Europe will primarily focus on developing green hydrogen from renewable energy sources. Although the cost of green hydrogen remains high, Europe is temporarily utilizing other forms of low-carbon hydrogen to decarbonize hydrogen production processes reliant on fossil fuels. Overall, Europe envisions hydrogen deployment across three distinct phases: the first phase from 2020 to 2024, the second phase from 2025 to 2030, and the third phase from 2031 to 2050 (see Table 3.1).

Table 3.1

European Hydrogen Development Strategy [14]

Stage	Period	Installed Electrolyzer Capacity (GW)	Green Hydrogen Production (million tons)	Industrial Application
Stage 1	2020 – 2024	6	1	Decarbonization of hydrogen production in industries such as oil refining, chemical production, iron and steel manufacturing
Stage 2	2025 - 2030	40	10 (1% of final energy consumption in Europe)	Gradual introduction of hydrogen into new applications/industries, such as transportation, electrical systems, and building heating
Stage 3	2031 - 2050	*Large-scale*	*Large-scale (10% of final energy consumption in Europe)*	Gradual introduction of hydrogen in hard-to-abate sectors to reduce emissions

The European Hydrogen Strategy envisions two key leading markets for hydrogen: industry and the transportation sector. In the long term, the broader use of hydrogen will lead to the complete

decarbonization of steel production in Europe. In the transportation sector, hydrogen can soon be used in urban buses, certain sections of the railway network where electrification is not possible, or in heavy-duty vehicles. In the long term, the EU sees hydrogen playing a role in decarbonizing the aviation and maritime industries. Hydrogen can be used in fuel cells to generate electricity for aircraft or ship engines, or it can be used to produce gas and synthetic ammonia.

References

1. Федулова С.О. Забезпечення балансу між цілями сталого розвитку, конкурентоспроможністю та енергетичною безпекою. European Vector of Economic Development. 2023. №2 (35). С. 113-124.

2. Clean Energy Market Monitor – March 2024. Report. International Energy Agency. URL: https://www.iea.org/reports/clean-energy-market-monitor-march-2024

3. Fatih Birol (2024). Amid all the climate gloom, let's not ignore the good news. The Financial Times. URL: https://www.ft.com/content/9ea0566b-ba34-4bd6-be92-a191bad85aa5

4. Cozzi L., imur Gül T. Spencer Th., Levi P. (2024) Clean energy is boosting economic growth. International Energy Agency. URL: https://www.iea.org/commentaries/clean-energy-is-boosting-economic-growth

5. Lauri Myllyvirta (2024). Analysis: Clean energy was top driver of China's economic growth in 2023. Carbon Brief. URL: https://www.carbonbrief.org/analysis-clean-energy-was-top-driver-of-chinas-economic-growth-in-2023/

6. You Xiaoying (2023). The 'new three': How China came to lead solar cell, lithium battery and EV manufacturing. Dialogue Earth. URL: https://dialogue.earth/en/business/new-three-china-solar-cell-lithium-battery-ev/

7. 国家能源局发布1-11月份全国电力工业统计数据. 国家能源局京ICP备11044902号. URL: https://www.nea.gov.cn/2023-12/20/c_1310756286.htm

8. Global investment in clean energy and fossil fuels, 2015-2024. International Energy Agency. URL: https://www.iea.org/data-and-statistics/charts/global-investment-in-clean-energy-and-fossil-fuels-2015-2024

9. Heid B., Sator A., Waardenburg M., Wilthaner M. (2022) Five charts on hydrogen's role in a net-zero future. McKinsey. URL: https://www.mckinsey.com/capabilities/sustainability/our-insights/five-charts-on-hydrogens-role-in-a-net-zero-future

10. Hydrogen Insights 2023. Hydrogen Council, McKinsey & Company. URL: https://hydrogencouncil.com/wp-content/uploads/2023/05/Hydrogen-Insights-2023.pdf

11. Dawood F. Anda M. Shafiullah G.M. Hydrogen Production for Energy: An Overview. International Journal of Hydrogen Energy, 2020. 45. 3847–3869.

12. Calabrese M., Portarapillo M., Di Nardo A., Venezia V., Turco M., Luciani G., Di Benedetto A. Hydrogen Safety Challenges: A Comprehensive Review on Production, Storage, Transport, Utilization, and CFD-Based Consequence and Risk Assessment. *Energies*, 2024. *17.* 1350.

13. Geopolitics of the Energy Transformation: The Hydrogen Factor. IRENA. 2022. URL: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Jan/IRENA_Geopolitics_Hydrogen_2022.pdf

14. S. T. V. V. Alicia García-Herrero, "bruegel". URL: https://www.bruegel.org/blog-post/hydrogen-development-strategies-global-perspective.

Topic 4. Innovations for a Competitive and Climate-Neutral Economy in Europe

Questions that reveal the content of the topic

4.1. Competitiveness of Europe based on industrial excellence

4.2. Redesigning the energy market and accelerating the decarbonization goals of the European green deal

4.3. The interconnection between EU and Ukraine energy security

For decades, Europe's competitive edge has been rooted in industrial excellence, characterized by continuous innovation in products and processes, intricate global supply chains, a highly skilled and stable workforce, affordable energy, and accessible low- to medium-risk capital.

While Europe remains ambitious, overcoming mounting challenges requires a strategic focus. To fully unlock its potential, attention must be directed toward seven key dimensions: innovation, energy, capital, supply chains, labor markets, economies of scale, competition, and market access. These areas are set to define Europe's competitiveness in the evolving global landscape.

Russia’s invasion of Ukraine has not only caused a humanitarian crisis but also exposed critical vulnerabilities in food security, energy supply, and defense. The war has underscored the necessity of economic resilience, reinforcing the importance of strategic autonomy in these sectors.

If Europe fails to keep pace with other major global players in crucial technologies, its economic growth and competitiveness could suffer, weakening its stability, inclusivity, security, and strategic

positioning. Such setbacks would threaten long-term resilience across all industries.

Currently, the EU is grappling with three major disruptions that have slowed productivity and economic expansion: the COVID-19 pandemic, the war in Ukraine, and the energy crisis. While addressing the immediate impacts of these challenges, it has become evident that a long-term strategy is essential to foster a predictable and competitive business environment within the European social model.

Thus, the European Commission has taken a bold step towards a greener and more innovative future with the recently published "EU Long-Term Competitiveness Strategy 2030." The strategy includes nine strategic drivers [1]:

Source: publyon.com

4.1. Competitiveness of Europe based on industrial excellence

Although there are many highly efficient companies in Europe, collectively, European companies lag behind those in other major regions: they grow more slowly, generate lower returns, and invest less in research and development than their counterparts in the

U.S. This largely reflects the fact that Europe missed the last technological revolution, falling behind in the value and growth of information and communication technologies (ICT) and other breakthrough innovations.

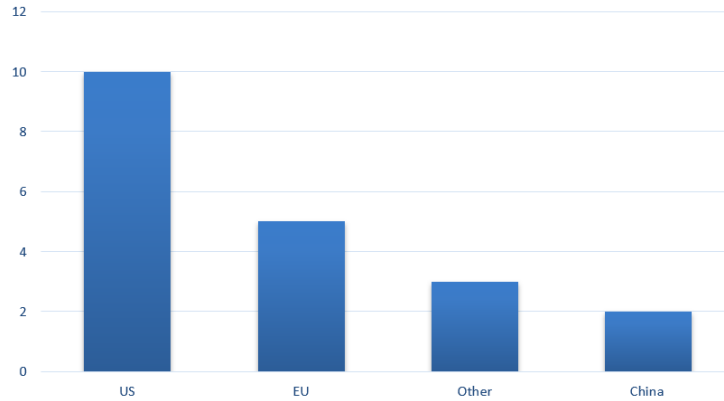
Innovation has become an important tool for businesses and a growth driver for countries seeking to gain a competitive advantage, while also contributing to economic development and increased wealth. In part, digitalization involves the adaptation of new technologies by companies and society as a whole. The achievements of digitalization help ensure a better quality of life. **The relationship between digitalization and innovation** is a research area that has recently gained importance in the literature.

Productivity growth in Europe has been slowing for some time. The difference in productivity growth between the two economies, Europe and the U.S., largely boils down to the technology sector and digitalization as a whole. If the technology sector were excluded, productivity growth in the EU over the past twenty years would have been the same as in the United States.

But the gap could widen even further with the rapid development and **spread of artificial intelligence**. About 70% of the leading AI models are developed in **the U.S**., and just three American companies make up **65% of the global cloud computing market** (Figure 4.1) [2].

Thus, the EU needs to take a number of policy actions to begin addressing this gap. How can the idea of Europe's competitiveness, based on industrial excellence, be turned into reality?

*About 70% of the leading **artificial intelligence** models are developed in **the U.S**., and just three American companies account for **65% of the global cloud computing market** [2]*



Source: weforum.org

Fig. 4.1. TOP-20 supercomputers in 2023 [2]

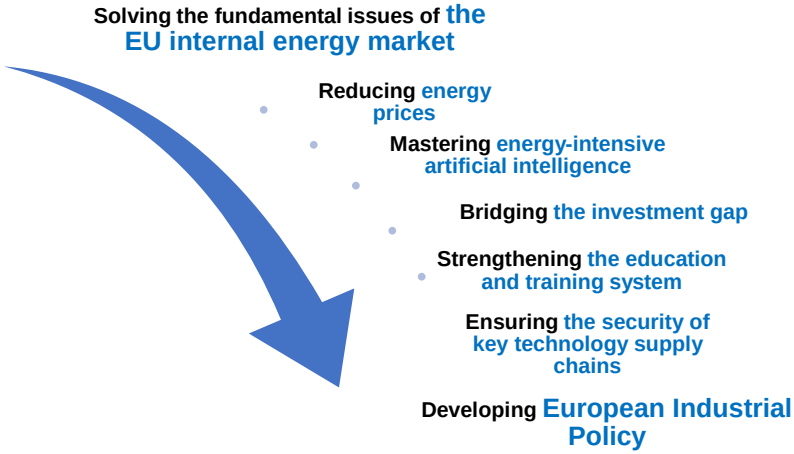
First of all, it is necessary **to reduce the price of energy resources**. Industrial energy consumers in Europe are currently facing a serious competitive disadvantage compared to the U.S., with electricity prices 2-3 times higher (Figure 4.2).

This price difference is due to delays in the installation of new clean energy capacities and a lack of natural resources, resulting in **Europe being the world's largest purchaser of natural gas**. This situation is driven by fundamental issues within the EU's internal energy market.

For example, underdeveloped networks mean that the EU cannot meet energy demand, even if some parts of the European Union have surpluses.

High energy prices are leading to a decline in investments in Europe: last year, about 60% of European companies reported that energy prices were the main obstacle to investment. Moreover, they hinder the digitalization of production, as **artificial intelligence is very energy-intensive**. The International Energy Agency predicts that electricity consumption by data centers will double worldwide

by 2026. Thus, higher **productivity depends** on building a true European **energy market**.



Source: authors' development

Fig. 4.2. Fundamental ways to strengthen Europe's competitiveness based on industrial excellence

European companies spend about half as much on research and innovation as their U.S. counterparts, leading to an investment gap of around 270 billion euros per year. Moreover, none of the world's top ten innovation clusters are based in Europe.

To bridge this gap, the EU must prioritize research and innovation as a shared strategic goal. Scaling up requires dismantling the remaining barriers to cross-border collaboration within the Single Market, particularly those obstructing digital expansion. For instance, cloud computing in public administration should be governed by a unified regulatory framework.

Simultaneously, workforce reskilling is essential. This entails reinforcing education and training systems, fostering lifelong learning opportunities, and streamlining pathways for highly skilled professionals from outside the EU to integrate into the labor market.

A very interesting example is Sweden. In Sweden, the technology sector is more than twice as productive as the European Union average. They also have an overall economy that is approximately twice as productive as the EU average. This demonstrates that a strong social model and technological progress are not only compatible but also mutually reinforcing when focused on retraining and upskilling [3].

Meeting these diverse investment demands presents a significant challenge, necessitating a reevaluation of how both public and private capital are mobilized within the EU. Unlike the United States, the absence of a centralized federal budget places Europe at a competitive disadvantage. Financial instruments are fragmented between the European Union and individual member states, while decision-making on joint initiatives often involves prolonged legislative procedures.

The financing needs for the "green" and digital transitions are enormous, and given the limited fiscal space in Europe at both the national and EU levels, they will largely need to be met by the private sector.

It is not out of the question that the EU will need to mobilize private savings on a massive scale, far greater than what the banking sector can provide. The primary means of raising the necessary funds will be through **deepening markets for venture capital, equities, and bonds**.

The paradigm that previously fueled the EU's prosperity was built on the assumption of geopolitical stability, where national security had minimal influence on economic decision-making. However, as global tensions rise, Europe must rethink its approach. This new reality demands a strategic reassessment of its industrial capabilities, particularly in key sectors such as defense, space, critical minerals, and pharmaceuticals.

Thus, the EU first needs a joint assessment of geopolitical risks. After that, it is necessary to develop a true "external economic policy"

that coordinates preferential trade agreements and direct investments with resource-rich countries, stockpiling in selected critical areas, and establishing industrial partnerships **to ensure the security of supply chains for key technologies**.

The paradigm that once drove the EU's prosperity relied on a global trade system governed by multilateral rules. However, these regulations are becoming increasingly less binding, with major economies frequently taking unilateral actions.

Compared to the United States, Europe is particularly vulnerable. Its manufacturing sector employs 2.5 times more workers than that of the U.S., and over a third of its industrial GDP depends on external markets, whereas in the U.S., this figure is about one-fifth. Additionally, Europe is now facing an influx of lower-cost and, in some cases, technologically superior imports from China.

By 2030, China's annual production capacity for solar photovoltaics is expected to double the level of global demand, while battery cell manufacturing will at least match global demand. In 2019, China spent an estimated three times more on industrial policy than Germany or France.

In response to these challenges, Europe is currently developing an European industrial policy aimed at safeguarding its strategic objectives and ensuring economic resilience for its citizens.

This industrial policy will primarily aim at increasing productivity, maintaining the global competitiveness of EU industries, and fostering

The policy is planned to focus on continuing the *decarbonization of the EU economy* in a way that leads to *lower energy prices* and *increased energy security*.

The policy should also aim to reorient the EU economy in a less stable world, particularly by developing defense-industrial capabilities and trade policies that address geopolitical needs while *reducing geopolitical dependence on other countries.*

Such joint actions may require an unprecedented level of cooperation and coordination between the member states of the European Union.

The Single Market remains the backbone of the EU's economy and society. To sustain its role as a key driver of European competitiveness, further integration and the removal of barriers – particularly in the services sector – are crucial. Given today's geopolitical landscape, the EU faces a pivotal moment to successfully navigate the green and digital transitions while maintaining its appeal as a global business hub.

Thus, Europe has been operating in crisis mode for several years. Multiple crises may very well become the hallmark of our time

4.2. Redesigning the energy market and accelerating the decarbonization goals of the European green deal

The transformation of the **global economy** needed to achieve **net-zero emissions** by 2050 will be universal and substantial, requiring average annual spending on physical assets of $9.2 trillion, which is $3.5 trillion more than today. To put this in perspective, this increase is equivalent to half of global corporate profits and one-quarter of total tax revenues in 2020.

Seven energy and land-use systems that account for global emissions must be transformed to achieve net-zero emissions [4]:

- **energy;**
- **industry;**
- **mobility;**
- **buildings;**
- **agriculture;**
- **forestry and other land use;**
- **waste.**

The *forestry and other land-use system* also acts as a natural absorber of carbon dioxide (CO_2). Below are the systems and their emission footprints [4]:

Energy, consisting of electricity and heat production: 30% of CO_2 emissions and 3% of nitrous oxide (N_2O) emissions.

Industry, which includes various industrial processes such as steel, cement, and chemical production, as well as the extraction and processing of oil, gas, and coal: 30% of CO_2 emissions, 33% of methane emissions, and 8% of N_2O emissions.

Mobility, consisting of road, air, rail, marine, and other forms of transport: 19% of CO_2 emissions and 2% of N_2O emissions.

Buildings, including heating and cooking: 6% of CO_2 emissions.

Agriculture, which includes direct energy use on farms and emissions from agricultural activities and fishing: 1% of CO_2 emissions, 38% of methane emissions, and 79% of N_2O emissions.

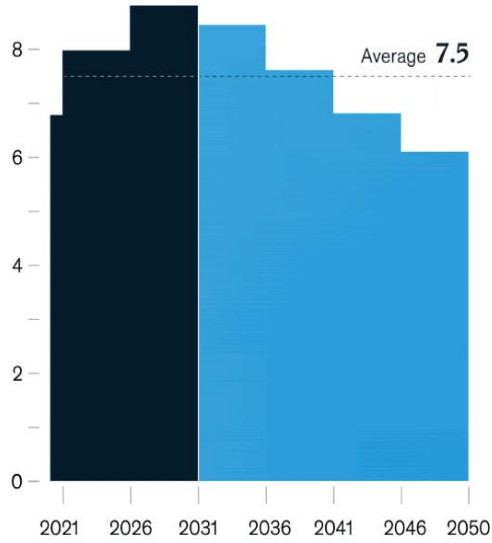
Forestry and other land use, primarily land-cover change: 14% of CO2 emissions, 5% of methane emissions, and 5% of N_2O emissions.

Waste, consisting of solid waste disposal and treatment, incineration, and wastewater treatment: 23% of CO2 emissions and 3% of N2O emissions.

Key strategies for accelerating decarbonization include shifting from fossil fuels to zero-emission electricity and low-carbon energy sources like hydrogen, implementing advanced technologies to modify industrial and agricultural processes, improving energy efficiency and demand management, embracing a circular economy, the deployment of carbon capture, utilization, and storage technologies, and strengthening both short- and long-term greenhouse gas absorption mechanisms.

According to projections based on the net-zero emissions scenario by 2050, global investments in physical assets related to the transition are expected to reach approximately 7.5% of annual GDP between 2021 and 2050 [4]. The most significant rise in this share is anticipated between 2026 and 2030 (Figure 4.3).

This will significantly impact demand. For example, the production of internal combustion engine vehicles will eventually cease as the sales of alternatives (such as battery-electric and fuel cell vehicles) rise from 5% of new car sales in 2020 to nearly 100% by 2050. **Electricity demand** in 2050 will be more than **double** today's levels, and **hydrogen and biofuel** production will increase more than **tenfold** [4].



Source: Report. 2022. McKinsey & Company

Fig. 4.3. Global spending on physical assets to achieve net-zero emissions by 2050, % of GDP per year [4]

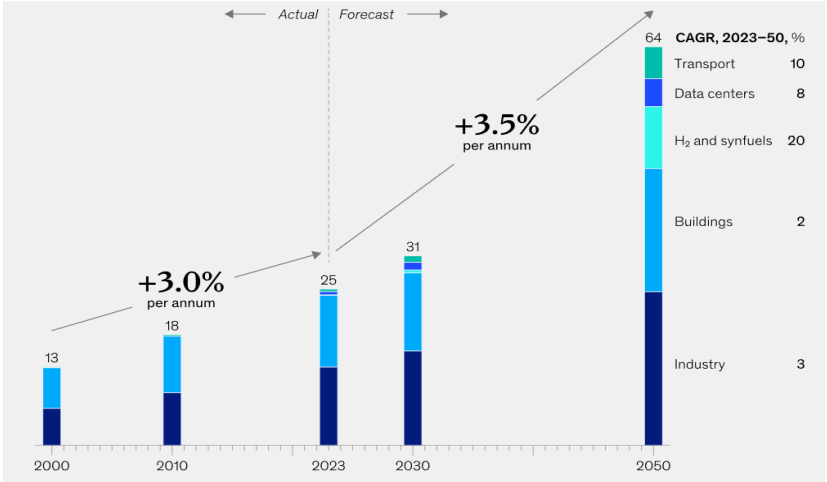
The transition could result in a redistribution of the workforce, with approximately 200 million direct and indirect jobs being created by 2050, while 185 million jobs will be lost.

*By 2050, **electricity demand** will be more than **double** what it is today, and the production of **hydrogen and biofuels** will increase more than **tenfold** [4].*

Although considerable progress has been achieved in the nine years since the landmark Paris Agreement, the global energy transition is now entering a more complex phase, characterized by rising costs, growing technological hurdles, and increased intricacy in implementation.

Between 2023 and 2050, electricity consumption is projected to nearly triple under accelerated transition scenarios, with electricity becoming the dominant energy source across all models by mid-century. This surge will be driven not only by traditional sectors, such as building electrification, but also by emerging industries, including data centers, electric vehicles, and green hydrogen production [5].

One of the most notable drivers of future electricity demand is the rapid expansion of artificial intelligence (AI) and the resulting boom in data center infrastructure. The impact of AI on global energy consumption will depend on the evolution of its applications and related technologies. According to McKinsey & Company, increased adoption of cloud computing, cryptocurrency, and AI-driven innovations could push data centers' electricity consumption to between 2,500 and 4,500 terawatt-hours (TWh) by 2050 – accounting for approximately 5–9% of total global electricity demand (Figure 4.4) [5].



Source: IEA; IRENA

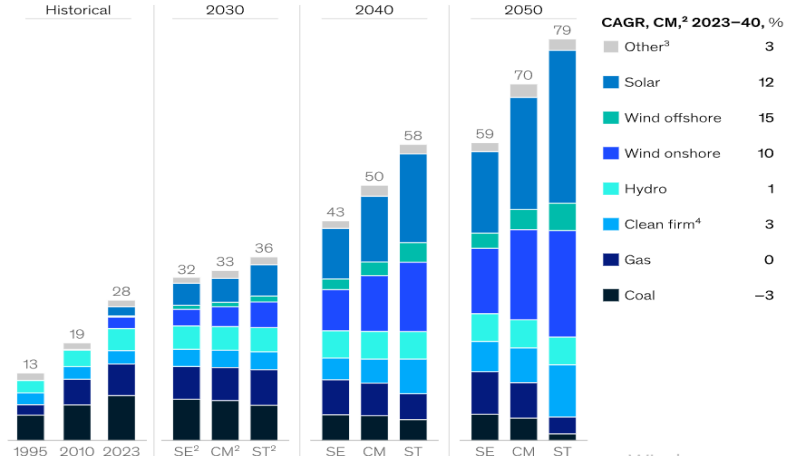
Fig. 4.4. Global Electricity consumption by sector under the continued momentum scenario, thousand twh [5]

According to the Continued Momentum scenario, **global green hydrogen consumption** is expected to reach 179 megatons per year (Mt/year) by 2050, up from less than 1 Mt/year today and 5 Mt/year in 2030. This surge in demand could contribute to an annual 20% **increase in electricity consumption** within the sector [5].

In **transportation, electricity demand** is also projected to grow significantly, driven by the increasing adoption of electric vehicles. By 2050, battery electric vehicles are expected to make up the majority of global passenger car sales, compared to just 13% today, leading to an estimated 10% annual increase in electricity consumption for the sector [5].

***Renewable energy sources** are projected to constitute **the majority of the energy mix in the future** [5].*

Low-carbon energy sources are projected to grow and, by 2050, depending on the scenario, will account for between 65 to 80 percent of global electricity production, compared to 32 percent today (Figure 4.5) [5].



Source: IEA; IRENA

Fig. 4.5. Global Electricity Production, thousand TWh [5]

While **demand for fossil fuels** is expected to **decrease**, they will still play a role in meeting the growing energy demand across all scenarios. Oil, natural gas, and coal are anticipated to remain part of the global energy mix, although their share is projected to decline. By 2050, fossil fuels could account for 40 to 60 percent of global energy demand, depending on the specific scenario.

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The hydrogen economy is set to transform the energy sector. Hydrogen is expected to play a crucial role in the energy transition, particularly in capturing the increasing share of renewable energy. As the world races to meet the targets outlined in the Paris Agreement, hydrogen technologies are gaining significant attention and are now seen as central to achieving these climate goals.

Source: fuelcellchina.com

For example, China has established the global platform Hydrogen Energy & Fuel Cells Expo China (CHEE) to stimulate innovation and collaboration in the hydrogen energy sector. CHEE2025, which will take place at the **China National Convention Center in Beijing from March 26 to 28, 2025**, aims to cultivate a new level of productivity, promote ecological development, and build a sustainable energy future.

Jointly organized by the China Hydrogen Alliance, China Electricity Council, the Construction Branch of CCPIT, and Beijing Tiger Exhibition Co., Ltd., with the support of numerous central and local state-owned enterprises, CHEE2025 has been growing rapidly since its inception in 2021. The exhibition showcases **the entire value chain of hydrogen energy**, **from production and storage to transportation, processing, and utilization.**

China is currently **the world's largest producer of hydrogen,** but not green hydrogen, as the majority of hydrogen produced in the

country comes from coal through gasification (over 67%) [6]. In addition to using hydrogen in conventional forms, such as feedstock for oil refining or ammonia production, the country has also set targets for the application of hydrogen in the transportation sector [7].

According to the 14th Five-Year Plan, published in 2021 [8], hydrogen has been identified as a new and priority industry in China, with the goal of increasing the share of hydrogen produced from renewable energy sources to 50% of total hydrogen production by 2030. This demonstrates China's strong commitment to transitioning to "green" hydrogen, despite currently relying on coal for hydrogen production. Provincial plans already include accelerating the construction of hydrogen refueling stations and continuing subsidies for **hydrogen fuel** cell vehicles.

On August 25, 2024, at the pier of Dalian Maritime University, a launch ceremony was held for China's first hydrogen fuel cell marine vessel, "Lihu Future." This marks another significant step forward for China in the field of **hydrogen fuel cell ships** [9].

Additionally, on May 29, 2024, in Qingdao, China, Landtop Hydrogen, a leading provider of hydrogen production solutions, announced the launch of its revolutionary modular square electrolyzer with a normal pressure output of 1000 Nm^3/h, representing a major breakthrough in the hydrogen production industry [10]. The new electrolyzer is engineered to meet the increasing demand for clean and efficient hydrogen production. Its innovative square design provides multiple benefits over conventional round electrolyzers, including:

1. Enhanced safety: the square shape reduces the risk of leaks and potential safety hazards due to its compact form.

2. Boosted efficiency: optimized fluid flow and improved gas bubble distribution in the square design contribute to more efficient hydrogen production.

3. Smaller footprint: the compact size makes it easier to install and integrate into different systems.

With rising interest in the clean hydrogen sector, European stakeholders are developing large-scale, environmentally sustainable hydrogen projects, commonly referred to as "**Hydrogen Valleys**".

The "**Hydrogen Valley**" concept encompasses the entire hydrogen value chain, from production and distribution to storage and various applications across sectors such as energy, industry, and transportation. These projects are geographically defined – local municipalities and regions, ports, or industrial clusters — and are backed by political support and substantial financial investments. Typically, such projects require funding in the tens of millions of euros.

Source: Edinburgh University Press
The concept of the Northern Adriatic Hydrogen Valley

In Europe, the first Hydrogen Valleys emerged 8–10 years ago under the name "Hydrogen Territories", with pioneering projects like BIG HIT in Scotland, eFarm in Germany, and HyBalance in Denmark. These early projects operated on a smaller geographic scale with limited hydrogen production and consumption [11].

Today, over 60 Hydrogen Valleys are being developed across Europe, with some expanding significantly in scope. Large-scale projects such as Denmark's "Green Hydrogen Hub," Portugal's "Green Hydrogen Valley of Nazaré," and Spain's Basque Hydrogen Corridor aim not only to supply hydrogen to local utilities but also to export it to other regions and countries.

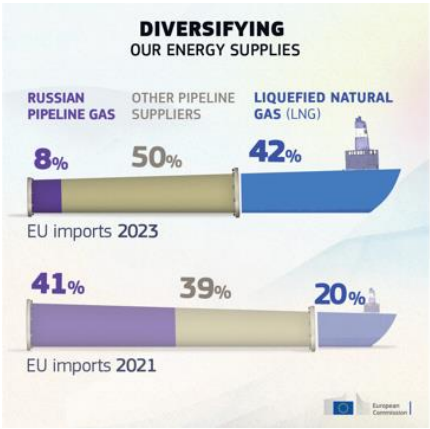
Japan aims to increase its hydrogen consumption twentyfold by 2030, from around 300,000 tons today to 6 million tons [12].

Similar to China, Japan has been utilizing hydrogen in the transportation sector since the 2000s. By 2030, Japan plans to have 800,000 **hydrogen fuel cell vehicles**, which would account for about 1% of all registered vehicles [13].

Additionally, Japan envisions the use of hydrogen in the residential sector. By 2030, it is expected that around 5.3 million hydrogen fuel cell units will provide electricity and heating to local households and energy systems.

Thus, the production of green hydrogen from renewable energy sources is seen as a potential solution for achieving carbon emission reduction targets in industries, promoting the development of renewable energy, and **ensuring energy security for countries.**

4.3. The interconnection between EU and Ukraine energy security



Since the beginning of Russia's war against Ukraine, enhancing energy sovereignty has become a top strategic priority for the European Union, its member states, and numerous other nations. Prior to the conflict, Russia was the EU's primary supplier of crude oil and petroleum products, with "Gazprom" accounting for 41% of the EU gas imports in 2021 [14]. In response to the invasion, the EU and its member states have actively reduced their reliance on Russian energy by diversifying suppliers. By 2023, Gazprom's share of EU gas imports had fallen to just 8% [14, 15]. This shift was primarily achieved through increased liquefied natural gas (LNG) imports from the United States, which supplied 46% of the EU's LNG in 2023,

alongside steady pipeline gas imports from Norway (rising to 49% from 30% in 2021), North Africa (19%), and Azerbaijan (7%) [14].

The United States is becoming an increasingly significant supplier of gas to the European Union. In the coming years, global LNG production and liquefaction capacity are expected to expand, easing pressure on global gas markets. Combined with historically high storage levels and lower demand, this growth is likely to result in reduced gas prices across European markets.

In 2023, the world's top LNG exporters were the United States, Australia, and Qatar. The expansion of liquefaction infrastructure, particularly in the United States and Australia, is set to further boost global LNG supply in the near future [14, 15].

At the same time, the EU remains committed to strengthening the energy resilience of its neighboring countries, especially Ukraine and Moldova. The stability of these nations' energy systems is considered vital to European security. As part of its external energy policy, the European Commission has prioritized long-term international partnerships to support Ukraine and other countries affected by Russian aggression.

All of this reflects the challenges of an evolving global landscape and the transformation of the energy sector. In the coming years and decades, new energy production opportunities will emerge, alongside shifts in trade models and transportation needs. While the exchange of traditional energy resources will gradually decline, emerging commodities such as hydrogen and ammonia will enter international markets, and the demand for low-emission technologies will rise. To foster stable and mutually beneficial partnerships within a rules-based framework, the development of new standards and governance mechanisms will be essential.

To achieve these objectives, the EU stated in its "Joint Communication to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the

Regions" from 2022 that **the EU's external energy policy** will focus on [16]:

- strengthening its energy security, resilience, and open strategic autonomy by diversifying EU energy supply and increasing energy savings and efficiency;
- accelerating the global transition to green and fair energy to ensure sustainable, secure, and affordable energy for the EU and the world;
- supporting Ukraine and other countries directly or indirectly affected by Russian aggression;
- building long-term international partnerships and promoting EU clean energy globally.

Additionally, the EU's document highlights the technical potential for producing green hydrogen at a cost of less than USD 1.5/kg by 2050 (Figure 4.6).

The **REPowerEU** plan envisions that an additional 15 million tonnes (Mt) of renewable hydrogen — in addition to the 5.6 Mt already planned under the **Fit for 55 initiatives** — could replace approximately 27 billion cubic meters of imported Russian gas by 2030. This includes 10 Mt of imported hydrogen [16].

Source: International Renewable Energy Agency (IRENA)

Fig. 4.6. The technical potential for producing green hydrogen at a cost of less than USD 1.5/kg by 2050 [16]

Renewable hydrogen production capacities is distributed far more evenly worldwide than traditional oil and gas reserves, given the widespread availability of wind and solar resources. However, the hydrogen market is still in its infancy and requires substantial global expansion of **renewable energy generation** and sufficient **water resources** to scale effectively.

To support the import of 10 million tonnes of hydrogen into the EU, the European Commission plans to establish **strategic partnerships** with trusted partner countries, ensuring open and fair trade and investment conditions. The EU envisions **three primary import corridors for hydrogen**: from the North Sea region (including *Norway* and the *United Kingdom*), the *Southern Mediterranean*, and, when conditions allow, *Ukraine*.

To build **a global hydrogen market**, Europe has identified the following key actions [16]:

- finalize hydrogen partnerships, particularly with neighboring EU countries and Africa, to facilitate the import of 10 million tonnes of hydrogen by 2030 and develop local hydrogen markets;
- sign a Memorandum of Cooperation on hydrogen with Japan;
- promote a global, transparent hydrogen market based on rules, leveraging the EU's experience;
- launch the first renewable hydrogen trading hubs in Europe and establish it as a benchmark for hydrogen transactions in euros;
- establish a Strategic Partnership with Ukraine on renewable gases;
- create the Global European Hydrogen Fund.

*We are in a critical time for **global energy policy**. Climate change, geopolitical shifts, technological advancements, and the growing global demand for energy are creating a complex and rapidly evolving environment, which requires the adaptation of our energy systems and relationships.*

Energy must become one of the key areas of cooperation **to strengthen Ukraine's sovereignty**, and thus its resistance to Russia's aggressive and destabilizing actions. While the EU continues to provide significant financial assistance to Ukraine, both directly and in collaboration with European financial institutions, the scale of Ukraine's needs requires further efforts in this field**. Investments** by the EU or companies from EU countries in **Ukraine's energy sector**, the hydrogen corridor, or gas infrastructure can **strengthen the EU's energy sovereignty** by ensuring a secure supply of clean electricity or gas, which will still be needed by EU countries for at least the next decade.

To this end, the EU seeks to utilize and provide organizational and expert support through newly established tools such as **AidEnergy** – an electronic platform launched in March 2023. This platform, created by the EBRD in partnership with other donors, international financial institutions, and Ukraine's Ministry of Energy, compiles a centralized list of energy sector needs. The platform is designed not only to identify Ukraine's current energy sector needs but also to address longer-term requirements. Given the long-term investment needs of Ukraine's energy sector, the EU can also offer support through financial guarantees for the most strategic projects.

References

1. EU's competitiveness strategy: from crisis management to long-term vision (2023) Publyon. URL: https://publyon.com/eus-competitiveness-strategy-from-crisis-management-to-long-term-vision/?switch_language=en

2. Dušek M., Gislén M. (2023) How to increase Europe's competitiveness in the new global economy. World Economic Forum. URL: https://www.weforum.org/agenda/2023/11/how-to-increase-europe-s-competitiveness-in-the-new-global-economy/

3. Greenacre M. (2024) Make EU research and innovation a "collective priority", Draghi says. Science Business Publishing Ltd. URL: https://sciencebusiness.net/news/fp10/make-eu-research-and-innovation-collective-priority-draghi-says

4. The net-zero transition: What it would cost, what it could bring. Report. 2022. McKinsey & Company. 224 p.

5. Global Energy Perspective 2024. Report. McKinsey & Company. URL: https://www.mckinsey.com/industries/energy-and-materials/our-insights/global-energy-perspective

6. IEA. Opportunities for Hydrogen Production with CCUS in China. 2022

7. ISPI. 2021. URL: https://www.ispionline.it/en/publication/chinas-emerging-hydrogen-strategy-30431.

8. The 14th Five-Year Plan of the People's Republic of China – Fostering High-Quality Development, 2021.

9. China's First Hydrogen Fuel Cell Maritime Vessel "Lihu Future" Successfully Launched (2024) Tuozhi (Beijing) Information Technology Co., Ltd. URL: https://www.fuelcellchina.com/Industry_information_details/1829892450290778112.html

10. Landtop Hydrogen Unveils Groundbreaking 1000Nm³/h Modular Normal Pressure Square Electrolyzer (2024) Tuozhi (Beijing) Information Technology Co., Ltd. URL: https://www.fuelcellchina.com/Industry_information_details/1796004806276591616.html

11. Cross-border Hydrogen Valleys – A step towards a hydrogen economy (2023) Edinburgh University Press. URL: https://euppublishingblog.com/2023/10/30/hydrogen-valleys/

12. Summary of Japan's Hydrogen Strategy. URL: https://www.env.go.jp/seisaku/list/ondanka_saisei/lowcarbon-h2-sc/PDF/Summary_of_Japan's_Hydrogen_Strategy.pdf.

13. Ceicdata (2021) URL: https://www.ceicdata.com/de/indicator/japan/number-of-registered-vehicles

14. Liquefied natural gas (2024) European Commission. URL: https://energy.ec.europa.eu/topics/carbon-management-and-fossil-fuels/liquefied-natural-gas_en

15. Where does the EU's gas come from? (2024) Members of the European Council. URL: https://www.consilium.europa.eu/en/infographics/eu-gas-supply/

16. JOINT COMMUNICATION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS EU external energy engagement in a changing world. Document 52022JC0023 (2022) EUROPA EUR-Lex. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=JOIN%3A2022%3A23%3AFIN&qid=1653033264976

Chapter 3

PRIVATE CAPITAL AND PUBLIC INVESTMENT

Topic 5. Private European investment and ways of its activation

Questions that reveal the content of the topic

5.1. Volumes, structure and efficiency of European private domestic investments

5.2. Foreign direct investment in the EU: geographical and sectoral structure

5.3. Models of international investment activity of the countries of the European Union

As already mentioned, the European economy has a number of problems with competitiveness. In recent years, it has experienced several significant shocks, first associated with the pandemic, and then with Russian aggression against Ukraine and a significant increase in energy prices. There was a real threat of a prolonged recession.

However, surprisingly, investment activity was growing even during this period. Researchers explain this with several reasons. First, the policy of supporting private investment, which was successfully implemented by the European Union during this period. Secondly, the active investment activity of the state itself to create infrastructure that would meet the requirements of the modern competitive environment. Therefore, despite serious challenges, the European economy continued to transform and acquire new competitive advantages.

This chapter will discuss the importance of private and public investment in achieving competitiveness, their interrelationship, and promising growth paths. And let's start with private investments, their scale, structure and efficiency.

5.1. Volumes, structure and efficiency of European private domestic investments

According to Eurostat, the institutional structure of investment in the European Union has remained more or less stable in recent years. The largest share is occupied by business investments - 58%. Households are also active participants in the investment process - 26%. Public investments make up about 16% of the total volume (Fig. 5.1). In general, the share of investments in the total GDP of the EU varies between 22-23.5%.

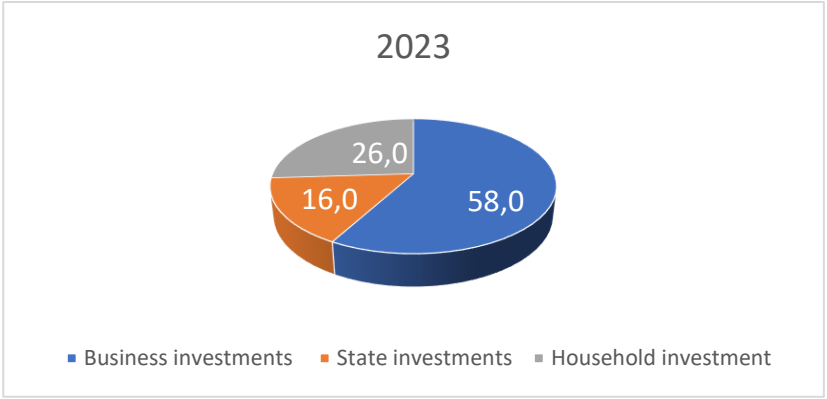


Fig. 5.1. Institutional structure of investments in the EU (compiled according to [1])

Thus, private investments in the EU make up 84% of the total amount of investments. This already determines their importance for the general economic situation. Therefore, when assessing the prospects for restoring a high level of European competitiveness, special attention should be paid to the possibilities and prospects of private investments. It is not surprising that the European Commission placed the issue of access to private capital and investments in second place among the tasks of increasing the competitiveness of the EU [2].

In order to understand what has been happening in recent years with private investments and what prospects can be counted on, it is important to understand the features of the general environment that has developed in the EU economy now and what can be expected in the future.

1. *Volumes of European corporate investments in the long-term period are growing quite quickly*. They reached their largest size in 2020 (Fig. 5.2). during this period, they exceeded the corresponding indicator of 2003 by more than one and a half times. Although there were both ups and downs along the way.

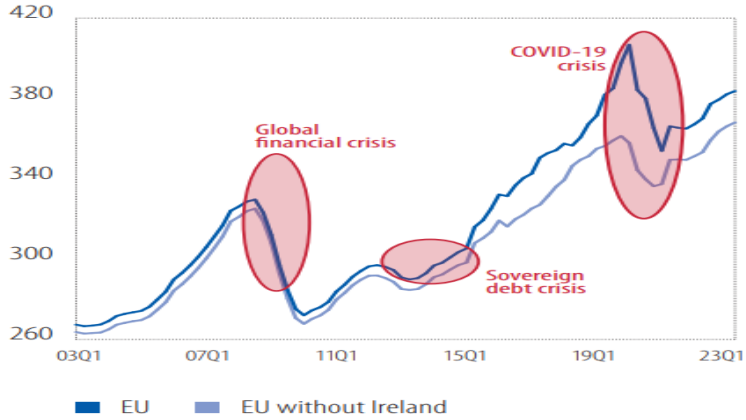


Fig. 5.2. Corporate investments (in constant 2005 prices, billion euros) [3]

During the global financial crisis of 2008-2009, the volume of private investments decreased to the level of the beginning of the century. It took 7-8 years to restore the pre-crisis level. This delay was related, in particular, to the sovereign debt crisis that flared up in 2013-2014. A significant blow to European private investment was dealt by the crisis related to COVID-19. The fall in the total volume of investments amounted to about 15%. However, the economy more or

less withstood this test and already from the following year showed steady growth.

2. *The energy crisis and the rise in energy prices, which was provoked by Russian aggression against Ukraine*, became a special test for the European economy in general and its investment sector.

It should be noted that the increase in energy prices in Europe was more noticeable than in competitor countries. So, if in the USA 83% of enterprises felt the increase in prices in general, then in the EU the share of such enterprises was 93%. There is an even more striking difference in the share of those for whom the cost of energy has increased by more than 25%: in Europe, 62%, and only 25% in the USA (Fig. 5.3). This complicated the position of European goods on world markets.

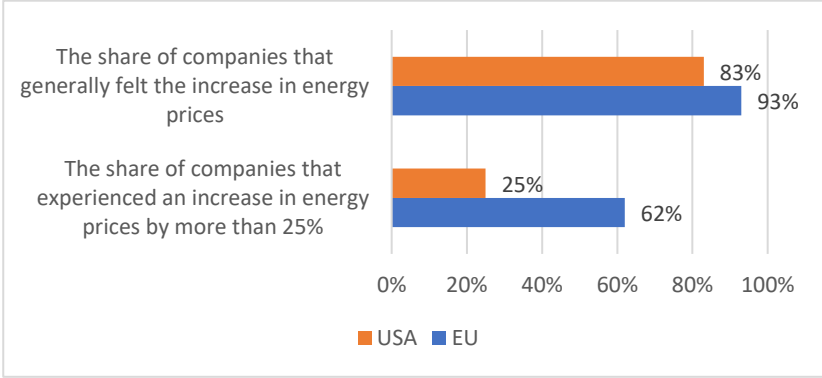


Fig. 5.3. The impact of the energy crisis on EU and US enterprises (compiled according to: [3])

The difference in energy price dynamics in different countries once again confirms the heterogeneity of this association, which negatively affects its competitiveness and makes it difficult to take coordinated actions. Thus, in Sweden, energy prices increased by only 20%, while in Hungary, Romania, and Slovakia, the increase was more than 130% [3]. This is related to the features of the structure of the

energy balance, the ability of national governments to adequately respond to challenges, the features of the national taxation system, etc.

3. *Another challenge faced by corporate investors is the growing inflation, which was provoked, in particular, by the rise in energy prices*. In a number of European countries, it has reached galloping inflation (more than 5% per annum), which primarily restrains investment activity. But, as can be seen from fig. 5.2, in these difficult conditions, corporate investment continued to grow. This is due to a number of circumstances:

- some enterprises increased the price of their products more than the price of resources increased. As a result, they received more profit, which was the main source of new investment;

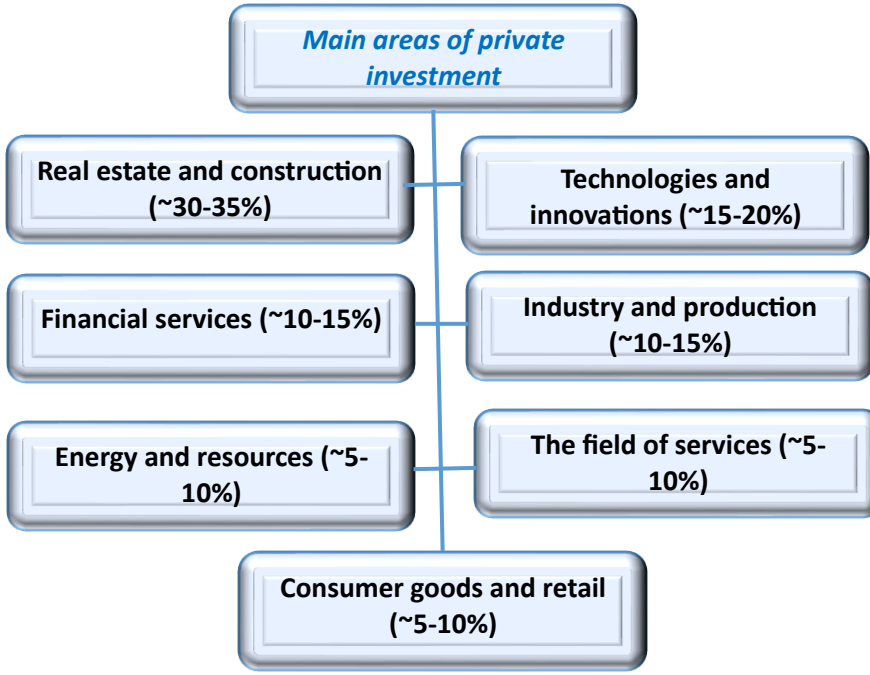
- the implementation of a successful policy of state stimulation of investment activity made it possible to create an atmosphere of trust and confidence in the future in society. Moreover, galloping inflation was curbed and brought down to the level of creeping inflation.

4. *A general idea of the structure of private investments can be obtained by looking at fig. 5.4*. Of course, these are very approximate data, as some average structure of investments in individual countries (they differ significantly from country to country). However, even such consolidated information gives grounds for conclusions:

- ***the main area of investment remains construction and real estate*** (residential, commercial and infrastructure development). It attracts investors by the fact that it brings more or less stable income and insures against large risks. Therefore, cautious investors choose this type of investment. However, it should be understood that this is a sign of an industrial society, not a knowledge society. And it is unlikely to achieve serious competitive advantages by investing mainly in real estate;

- ***the second position is occupied by investments in technologies and innovations***. This includes investments in IT, startups, artificial intelligence, biotechnology and other innovative

industries. As a percentage of GDP, it is 3-4%. According to this indicator, the EU is at the level of the USA and China (3% and 2.4%, respectively), and sometimes even surpasses them. However, to overcome the technological lag, Europe needs to invest not only in development, but also in the implementation of innovations. This was already discussed in topic 1.



Rice. 5.4. Approximate structure of private investments of EU member states

- attention is drawn to the fact that the share of investments in ***financial services*** and in the development of ***industry and production*** are practically the same. On the one hand, the EU needs to develop the financial services sector, as this is one of the ways to transform household savings into real investments (in this indicator, the EU lags significantly behind the US). On the other hand, this is

evidence of the deindustrialization process that has been actively taking place in Europe since the beginning of the 21st century. This led to the fact that a significant part of the industrial production of European companies was transferred abroad (in particular, to the cranes of Southeast Asia). As a result, the external dependence of European countries has increased. And in the critical situation that arose as a result of Russia's war against Ukraine, the EU had real problems with the rapid organization of the production of the necessary weapons due to the lack of industrial capacity;

- the energy crisis of recent years has actualized investments in this area. Investments in ***energy***, particularly renewables such as wind and solar, are likely to increase as a result of efforts to decarbonize the economy.

However, there are many challenges in the scale, structure and efficiency of private investment. Considering them from the point of view of improving the competitiveness of the EU, the European Commission proposes the following measures.

1. Despite the more than thirty-year history of the implementation of the "four freedoms" principle, there is no reason to claim that capital can move freely from one EU country to another. Even more than 10 years ago, the idea to create the Capital Market Union (CMU) arose, which was designed to remove barriers to the movement of capital within the EU and increase its accessibility. The creation of such a union was actualized in the conditions of a shortage of financial resources in connection with Russian aggression.

"If we want to achieve better funding for the defense industry, we will definitely have to complete the Capital Markets Union"

Josep Borrell [5]

In order to remove unnecessary obstacles to the movement of capital within the EU, the European Commission considers it necessary to create:

- more harmonized bankruptcy laws,
- simplified access to capital markets, especially for small companies,
- deeper involvement of retail investors in the capital markets,
- reliable market infrastructure,
- easy access to financial information,
- more comprehensive supervision [2].

There is hope that this will retain capital within the EU (which is really lacking), because today, according to the European Central Bank, the bloc is currently observing a net financial outflow of 250 billion euros per year to the rest of the world, mainly to the USA [5].

2. Another non-governmental organization, the creation of which the European Commission plans to support, is the Banking Union. In contrast to the USA, where the main funds for enterprises come through the stock market, in mainland Europe banks play a decisive role in lending to enterprises (they provide up to 75% of credit funds). Therefore, the creation of the Banking Union will contribute to increasing the availability of investment resources and will have a positive effect on the competitiveness of the EU countries.

3. One of the barriers to the cross-border movement of investments is the tax system. Each EU member state has its own tax system. Therefore, large companies operating in all EU countries are forced to prepare 27 reports that meet national requirements. This increases their costs and puts them at a disadvantage compared to companies doing business in other countries with roughly the same market size. Therefore, in September 2023, the European Commission proposed a draft directive "Business in Europe: Framework for Income Taxation (BEFIT)" [6]. It provides for the following:

- all members of one group ("BEFIT group") calculate their tax base in accordance with a common set of rules that apply to their already prepared financial statements;

- the tax bases of all members of the group are combined into a single tax base;

- a team of representatives of member states ("BEFIT team") evaluates and agrees on the content and processing of BEFIT information reporting;

- each member of the group, where there is a multinational group, is allocated a percentage of the total tax base, calculated on the basis of the average indicator of its taxable results for the previous three financial years;

- each Member State may then adjust the determined tax base of the resident group members for tax purposes in its territory in accordance with its own national rules, and tax the result accordingly at its national corporate income tax rate [7].

According to experts, the new, simpler BEFIT rules can reduce current business costs for compliance with tax legislation by up to 65% and contribute to an increase in the volume of private investment in the domestic European market [7]

These proposals will become binding upon their unanimous approval by the Council of the European Union.

4. Certain state funding can also provide an impetus for attracting private investment. The European Innovation Council (EIC) was created to determine the promising directions of financing, first of all, innovative startups [8]. According to the European Commission, it has already helped 112 "centaurs" and 12 "unicorns" enter the market [2].

Unicorns are startups valued at more than $1 billion. The term was first coined in 2013 by venture capitalist Ailee Lee of Cowboy Ventures to emphasize the rarity of such companies. Unicorns are often fast-growing technology companies with innovative products or services and strong prospects for further growth. In Europe, companies such as Spotify (Sweden), Klarna (Sweden), and Adyen (Netherlands) are examples of unicorns.

Centaurs are companies that are valued at $100 million or more but have not yet reached unicorn status. Centaurs are an important indicator of positive changes in the innovation ecosystem, as they demonstrate sustainable growth and the potential to further develop to the level of a unicorn. This term reflects a smaller price cap compared to unicorns and is used to identify companies that have already achieved significant success but have not yet reached a billion-dollar valuation.

Of course, this is still not enough. The work must be continued. The European Commission is working with the European Investment Bank and other partners to develop such financial products that could help the formation of promising start-ups, which will contribute to increasing competitiveness.

Thus, the European Union has a fairly clear and complex program for attracting private investments and improving their efficiency. Its successful implementation will largely depend on the unanimity of the EU member states and the coordination of their efforts to implement joint decisions.

5.2. Foreign direct investment in the EU: geographical and sectoral structure

Solving the problem of strengthening Europe's competitiveness requires greater investments than domestic investors can provide. Therefore, one of the key tasks for the EU today is the development of measures that would allow to significantly increase the inflow of foreign direct investments.

The situation with direct foreign investments both in the world as a whole and in the EU in particular is quite dynamic. It is impossible to single out some fixed trend that will constantly be confirmed by actual capital flows. Thus, according to the Third Annual Report on the screening of foreign direct investment in the Union, in 2022 the net global inflow of FDI decreased compared to last year and amounted to 1.2 trillion euros, which is on 14.3% less than in 2021, but on 34% higher than the level of 2020 [9]. Such dynamics were caused, first of all, by the action of global factors. After the pandemic crisis of 2020, in 2021, global investment flows began to recover and showed significant growth. 2022 is characterized by a new upheaval - an energy crisis provoked by Russian aggression. Uncertainty of the future served as a deterrent for a significant part of investors.

The dynamics of direct foreign investment in the European Union was similar. In 2022, the investment inflow decreased by 140 billion euros and turned out to be smaller not only in 2021, but also in 2020. The disinvestment process in the Netherlands, which began in 2018 and continues to this day, played a decisive role in this. In 2023, foreign direct investment in the Netherlands has decreased compared to 2017, from $6,381 billion to $5,305 billion, or more than $1 trillion! [10]. We will talk about the special role of the Netherlands in global financial flows later.

Information on the geographic structure of direct foreign investors is interesting. Let's consider it in two aspects: the rating of investor countries by the volume of purchased shares of existing enterprises and by the volume of investments in new businesses (greenfields).

Undoubted leaders in terms of the volume of the purchased stock packages have been the USA and the United Kingdom for a long time. In 2022, 57.3% of investments in the purchase of shares came to the European Union from these two countries alone (Table 5.1). This is a consequence of long-term close economic relations with these countries. Moreover, the high share of the UK is explained by its long

stay in the EU. Therefore, the acquisition of new shares is a continuation of the former cooperation.

Switzerland should also be considered a significant investor. Not being a member of the EU, Switzerland is quite closely integrated into this association. As not only a European, but also a world financial center, it has enough funds to invest in the European Union.

These three countries showed a significant increase in investment volumes in 2021 compared to 2020, and their reduction in 2022 compared to the previous year. But if for the USA and Switzerland, investments in 2022 remained higher than in 2020, then for the UK they decreased.

Table 5.1

TOP-10 countries of direct foreign investors in the EU in 2022 (by the volume of purchased shares) **

No	Country	Share in total value (%)	Increase (decrease) in the volume of purchased shares compared to the previous year	
			2022/2021	2021/2020
1	USA	32,2	-14,2	27,9
2	UK	25,1	-17,1	8,2
3	Switzerland	8,9	-4,2	25,2
4	OFCs *	5,4	-43,2	-12,7
5	Norway	4,3	-22,2	37,5
6	Canada	4,1	-41,6	15,9
7	Japen	3,2	23,9	-10,9
8	China	2,3	-2,4	-14,6
9	India	1,6	107,1	16,0
10	Australia	1,6	-6,7	64,7
11	Rest of the World	11,3	-3,8	49,6

***** *Offshore financial centre*

*** Compiled by: [9].*

Special mention should be made of investments from offshore financial centers (OFCs). Their share will remain quite high (more than

5%), although it is gradually decreasing due to significant reductions in recent years

> The top offshore financial centers by number of M&As or new businesses are (in alphabetical order) Bermuda, British Virgin Islands, Cayman Islands, Mauritius and the Channel Islands of the United Kingdom.
> ***Communication from the Commission "Welcoming foreign direct investment while protecting core interests" – SWD (2019) 108 final - March 13, 2019.***

India simply "broke" into the TOP-10 investors. This is the only country that has increased the volume of investments in the acquisition of European shares in the last two years. Even with the overall trend towards a reduction in investment in 2022, India, on the contrary, more than doubled its investment compared to the previous year.

A similar picture is observed in investing in creating a business "from scratch" (Table 5.2). At the same time, there are certain differences, among which we can highlight the following:

1. Investment in new businesses is less sensitive to changes in the global situation. If for investments in stock packages over the past two years, the ratio of the number of facts of investment cuts was 9 to 11, then for investments in new businesses it is less and is 7 to 13. This indicates that investors believe more in the success of their own new projects than in development of existing ones.

2. The USA's gap in terms of the share of investments in the creation of new businesses in the EU is even more striking. If the trend continues (and for the past two years, American business has increased investment in creating new enterprises in Europe, despite the deterioration of the situation in 2022 due to the energy crisis), then in the near future half of the newly created businesses will belong to the USA.

3. The positions of Switzerland and offshore centers have changed places. This is due to the fact that offshores increased their

investments during the last two years, while Switzerland, on the contrary, decreased.

Table 5.2

TOP-10 countries of direct foreign investors in the EU in 2022 (for investments in the creation of new businesses) **

No	Country	Share in total value (%)	Increase (decrease) in the volume of purchased shares compared to the previous year	
			2022/2021	2021/2020
1	USA	46,5	13,7	38,1
2	UK	19,0	-8,9	10,1
3	OFCs *	5,6	8,5	44,3
4	Switzerland	4,8	-15,5	-12,1
5	China	3,9	-34,1	-36,1
6	Japen	3,3	-11,8	-1,1
7	Norway	2,3	6,9	40,9
8	Canada	1,7	-2,0	17,1
9	India	1,3	9,1	9,1
10	South Africa	1,3	118,8	150
11	Rest of the World	10,4	-20,3	44,2

* *Offshore financial centre*

*** Compiled by [9].*

4. China is losing its position as a leading investor in the European economy. Although in 2022 it occupied the fifth place in the rating, the overall trend was negative. Chinese investment in the creation of new businesses has been declining for the past two years and in 2022 was only 42% of the 2020 level. The answer to the question of whether this is the result of a decrease in the interest of Chinese businesses to invest in Europe, or is it possible that this is the result of EU protection against excessive penetration China, needs a special study.

5. South Africa became a new member of the TOP-10 group, which displaced Australia from the ranking. This became possible due

to the increase of this country's investments in the creation of new businesses over the past two years by 1.8 times.

In order to assess the potential impact of direct foreign investments on the growth of the competitiveness of the European Union, it is advisable to analyze their industry structure in more detail.

The leaders in attracting foreign investments through the purchase of shares are information and communication technologies (ICT} and production. Their share in the total amount of investments in 2022 was 28.0 and 24.7%, respectively (Table 5.3).

Table 5.3

TOP-10 directions of direct foreign investment in the EU in 2022 (by the volume of purchased shares) **

No	Country	Share in total value (%)	Increase (decrease) in the volume of purchased shares compared to the previous year	
			2022/2021	2021/2020
1	Information and communication technologies	28,0	-18,6	13,4
2	Production	24,7	-17,9	18,6
3	PST*	8,9	-7,6	33,6
4	Finance, insurance	7,3	-5,8	10,2
5	Retail trade	7,0	-15,1	-0,8
6	Electricity	4,3	-10,5	8,5
7	Transport	3,5	24,0	40,9
8	Administrative support	2,9	18,6	82,1
9	Construction	2,5	-32,3	83,1
10	Real estate	2,4	-34,3	83,3

** PST = Professional, Scientific and Technical activities*

*** Compiled by [9].*

Such a situation should be evaluated as positive. After all, on the one hand, investments in ICT contribute to increasing the innovativeness of the economy and its digitalization, and on the other hand, investments in production somewhat mitigate the problem of deindustrialization, which has faced the EU quite acutely in recent

years. At the same time, it is easy to see that in 2022, in absolute terms, investment in ICT decreased by 7.5% compared to 2020, and investment in production practically remained at the previous level.

The growth of investments in professional, scientific and technical activities (PST) should also be evaluated as a positive trend, which can also affect the increase in the level of innovativeness of the European economy. Over two years, the total volume of these investments increased by 23%.

As evidenced by the data in the table. 5.3 only two areas of investment proved to be resistant to external challenges: transport and administrative support - investments in these areas increased both in favorable 2021 and in unfavorable 2022. In particular, in 2022 compared to 2020, investments in transport increased by 74%, and in administrative support – by 116%.

Investments in construction and real estate turned out to be the most sensitive to changes in global conditions: they grew at almost the same rate in the favorable 2021 and decreased at the same rate in the unfavorable 2022.

A somewhat different picture emerges when analyzing the industry structure of investments in new business creation. If in terms of the volume of shares purchased, retail trade took only fifth place (7.0%), then in terms of the volume of investment in new enterprises it is the undisputed leader (29.9%) (Table 5.4).

Investors can be understood. After all, investing in construction or real estate, where the payback period can be long, is quite risky in conditions of uncertainty. That is why they prefer to create new enterprises in the field of trade, where the payback period is much shorter, and therefore the risks are lower.

It should be noted that the sectoral structure of foreign investments as a whole corresponds to the tasks set by the European Commission regarding the creation of conditions for increasing competitiveness based on the expansion of private investments. Thus, the fairly high position of the finance and insurance spheres (fourth

and third, respectively) will correspond to the solution of the task of creating such a market infrastructure that would allow for the effective transformation of household savings into real investments.

Table 5.4

TOP-10 directions of direct foreign investment in the EU in 2022 (by investments in the creation of new businesses) *

No	Country	Share in total value (%)	Increase (decrease) in the volume of purchased shares compared to the previous year	
			2022/2021	2021/2020
1	Retail trade	29,9	2,0	26,3
2	Information and communication technologies	19,4	17,6	53,9
3	Finance, insurance	10,8	33,2	56,3
4	PST	10,5	26,6	35,5
5	Production	10,4	-13,1	4,0
6	Accommodation	6,5	-29,4	-11,8
7	Transport	5,1	-44,0	-26,2
8	Administrative support	2,7	5,8	43,1
9	Real estate	1,2	-10,8	0,0
10	Electricity	0,9	-33,3	50,0

** PST = Professional, Scientific and Technical activities*

*** Compiled by: [9].*

Stimulation of the development of small and medium-sized businesses is considered an important source of growth in international competitiveness in the EU. If we evaluate direct foreign investments by this indicator, it turns out that the lion's share of investments is invested in SMEs. If we take the data as a whole for 2022, the structure of foreign direct investments looks like this: micro-enterprises 26.5%, small enterprises 30.0%, medium-sized enterprises 25.4% and large enterprises 18.1% [9]. In other words, only less than 20% of foreign direct investment goes to large enterprises.

The largest share of foreign investments directed to large enterprises is in the electric power industry (31.8%), which can be explained by the technological features of this industry. In the same sectors as ICT, retail trade and professional, scientific and technological activities, about 70% of foreign funds are invested in enterprises with less than 50 employees (mini and small enterprises).

According to the European classification, enterprises are divided into four groups by size:
Micro: enterprises with fewer than 10 employees;
Small: enterprises with 10-49 employees;
Medium: enterprises with 50-249 employees;
Large: enterprises with 250 or more employees.

Thus, foreign direct investment can increase productivity, promote innovation and increase the competitiveness of the countries of the European Union. Therefore, state regulation both at the level of national economies and the EU as a whole should create appropriate conditions that would stimulate the inflow of foreign investments and direct them in a direction beneficial for the EU.

5.3. Models of international investment activity of the countries of the European Union

The countries of the European Union not only attract foreign investments, but are themselves important global investors. However, in terms of the level of activity and the ratio of attracted foreign investments and those invested abroad, EU countries differ quite significantly from each other. Therefore, depending on the goals, opportunities and national specifics, countries use their models of international investment activity. They can be investigated and classified by analyzing the ***international investment position (IIP)*** of EU member states.

The international investment position is a statistical report reflecting the value and structure of a country's external financial assets and liabilities at a certain point in time.

First of all, it is possible to distinguish and classify models of international investment activity according to the degree of openness of the country. The ratio of the country's foreign assets (which is reflected in its international investment position) to the country's GDP is often used as an indicator of openness. Among the members of the European Union, the leading positions according to this indicator are occupied by the countries that have chosen the ***intermediary model of the international investment position***. These include Luxembourg (MIP assets exceed GDP by 150 times!), Cyprus (18 times), Malta (17 times), Ireland (15.5 times) and the Netherlands (10.6 times) [10, 11].

Eight countries (Belgium, Austria, Denmark, Finland, France, Sweden, Germany, Hungary) form a group of ***highly open economies***, where the openness coefficient exceeds 3. This mainly includes countries with a GDP per capita higher than the average EU. The only exception is Hungary. Its inclusion in this group can be explained by the fact that this country also chose the intermediary model of international investment activity, but is still in the early stages of its formation.

The second group with an ***open economy*** (openness ratio from 1 to 2) also includes eight countries (Spain, Italy, Estonia, Greece, Portugal, Czech Republic, Latvia, Slovenia). This included developed EU countries that had serious economic problems in the last decade (Greece, Portugal, Spain) and a number of countries of the "last mass wave of accession to the EU". And here there is not a single country that has a GDP per capita higher than the EU average.

The third group of countries with ***moderate openness*** (the coefficient of openness is about 1 and below) was formed from the

countries of Central and Southern Europe, which have some of the lowest indicators of GDP per capita (Bulgaria, Lithuania, Croatia, Slovakia, Poland, Romania).

Of course, this division is quite arbitrary. And the general trend that can be observed when analyzing this relationship in dynamics indicates an increase in the degree of openness. And therefore, a transition is possible, as a rule, to groups with a higher level of openness. For example, Bulgaria may overcome the limit of moderate openness and move to the group of open economies already in the near future.

Another indicator used to classify patterns of international investment activity is the ***net international investment position***, as the ***difference between the foreign assets of the international investment position and the international liabilities***.

If the net international investment position has a positive value (foreign assets are greater than the country's liabilities), such a faucet is called a ***net investor***. When the net investment position is negative, the country is a ***net recipient***.

According to this criterion, the EU countries were divided as follows: 9 countries (one third) are net investor countries, and 18 are net recipient countries. However, each of these groups is not homogeneous. Therefore, it is possible to carry out an additional grouping based on the criterion of the ratio of the net international investment position to GDP. In this case, it is advisable to distinguish the following groups:

- hyperactive recipients (< -100%);
- active recipients (-60% - -100%);
- moderate recipients (-20% - -60%);
- balanced position (-20% -+20%);
- moderate investors (20% - 60%);
- active investors (60% - 100%);
- hyperactive investors >100%.

Table 5.5 contains the grouping of EU countries according to the specified criteria. As you can see, today there are no hyperactive investors among the EU countries at all. Germany and the Netherlands are active investors. And although these taps have roughly the same share of the net international investment position in GDP (71.3 and 77.6%, respectively), they differ significantly in the pattern of international investment. Yes, Germany actually uses the country's domestic resources to form foreign assets, and liabilities are also used for domestic needs. Foreign assets are approximately three times larger than the country's GDP. The model of international investment in the Netherlands is essentially a model of investment intermediation: the funds raised through external commitments are subsequently used to form foreign assets. As a result, foreign assets exceed the country's GDP by more than ten times. The most typical such model of international investment was formed in Luxembourg. This country has a GDP 50 times smaller than Germany, while the foreign assets of these countries are comparable.

Table 5.5

Grouping of EU countries according to the share of the net international investment position in the GDP of cranes [12]

Hyperactive recipients (< -100%)	***Active recipients (-60% - -100%)***	***Moderate recipients (-20% - -60%)***
Greece, Ireland, Cyprus	Portugal, Slovakia, Spain	Croatia, France, Latvia, Poland, Romania, Hungary
	Balanced position (-20% -+20%)	
	Bulgaria, the Czech Republic, Estonia, Finland, Lithuania, Slovenia, Italy	
Moderate investors (20% - 60%)	***Active investors (60% - 100%)***	***Hyperactive investors >100%***
Austria, Belgium, Denmark, Luxembourg, Malta, Sweden	Germany, the Netherlands	

Most net investor countries belong to the group of moderate investors. These are mainly countries with a high level of development

(in terms of GDP per capita), which are self-sufficient participants in the international investment process. For them, the ratio of foreign assets to GDP varies in the range of 3-5. These countries have sufficient internal resources to make international investments. Exceptions are Luxembourg (already discussed) and Malta, which, like the Netherlands, have established intermediary models of international investment activity.

The largest group in this classification is the group with a balanced net international investment position. It includes 7 EU countries. This group was mainly formed by the countries that joined the EU in one of the last waves of enlargement. These are countries that conduct a cautious international investment policy and refrain from excessive differences between foreign assets and foreign liabilities. As in the previous group, there are two exceptions - Finland and Italy. For a long time, Finland has had one of the most balanced international investment positions (the share of net IIP in GDP fluctuates around zero). The ratio between foreign assets and GDP is traditional for developed European countries - 3.4 in 2022. Therefore, this positioning of the country can be considered not forced, but targeted, which corresponds to its conscious policy. Regarding Italy, it is necessary to pay attention to two circumstances. First, the Italian international investment policy is quite passive. Foreign assets of this country are only 1.8 times more than GDP, which is not characteristic of developed countries. Secondly, Italy has one of the lowest indicators of GDP per capita among net investor countries, which somewhat limits its possibilities in choosing the IIP model, which was discussed above.

The composition of the group of hyperactive recipient countries is the most interesting. The presence of Greece in this group is quite expected. After all, it is well known that one of the reasons for the deep crisis in this country was excessive borrowing, which was reflected in the net international investment position. But Ireland was unexpectedly in this group. In fact, Ireland chose the same model of international

investment activity as the Netherlands or Luxembourg - mediation. After all, its foreign assets are 15.5 times larger than GDP. And in terms of GDP per capita, Ireland is among the 10 most developed countries in the world. On the other hand, it is also among the 10 largest debtors in the world: its foreign debt is 4 times higher than the country's GDP [12]. The country has chosen a too risky model of international investment activity, which under unfavorable conditions can lead to financial collapse.

Thus, private investments, both from domestic sources and attracted from abroad, play an important role in improving the EU's competitive position on world markets. However, there are numerous problems that prevent the full realization of this potential. A significant part of these problems can be solved by successfully maneuvering public investments, which will be discussed in the next topic.

References

1. Investment share of GDP by institutional sectors. Eurostat. URL: https://ec.europa.eu/eurostat/databrowser/view/sdg_08_11/default/table

2.Communication from the Commission to the European parliament, the council, the European economic and social committee and the Committee of the regions (2023). Long-term competitiveness of the EU: looking beyond 2030. URL: https://commission.europa.eu/system/files/2023-03/Communication_Long-term-competitiveness.pdf

3. European Investment Bank. Investment Report 2023/2024: Transforming for competitiveness. URL : https://www.eib.org/attachments/lucalli/20230323_economic_investment_report_2023_2024_en.pdf

4. Global Innovation Index 2023. Innovation in the face of uncertainty. URL: https://www.wipo.int/edocs/pubdocs/en/wipo-pub-

2000-2023-en-main-report-global-innovation-index-2023-16th-edition.pdf

5. Прасад А. (2024). Лідери ЄС планують створити Союз ринків капіталу для фінансування оборони – FT. URL: https://forbes.ua/news/lideri-es-mayut-namir-stvoriti-soyuz-rinkiv-kapitalu-dlya-finansuvannya-oboroni-ft-16042024-20571

6. Proposal COM (2023) 532 for a Council Directve on Business in Europe: Framework for Income Taxation (BEFIT) URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0532&amp%3Bqid=1700565513879

7. Business in Europe: Framework for Income Taxation (BEFIT). URL: https://taxation-customs.ec.europa.eu/taxation/business-taxation/business-europe-framework-income-taxation-befit_en

8. Європейська інноваційна рада. URL: https://horizon-europe.org.ua/uk/structure/pillars/p-3/eic/

9. Third Annual Report on the screening of foreign direct investments into the Union. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023SC0329

10. External sector selected indicators. URL: https://data.imf.org/regular.aspx?key=61545851

11. The World Bank. URL: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD

12. Zadoia A. (2024). Ukraine's international investment position: old trends and new challenges. *In* Transformation and Post-War Economic Recovery of Ukraine. Edited by Leonid Kistersky and Anatolii Zadoia. Cambridge Scholars Publishing.

Topic 6. The impact of public investments on strengthening the competitiveness of the EU

Questions that reveal the content of the topic

6.1. Scales and main directions of public investments
6.2. European Structural and Investment Funds (ESI Funds)
6.3. Newest European investment funds

Among the key tasks that the European Commission intends to implement in order to increase the competitiveness of the EU, the key place will be restored to the increase of volumes and the improvement of the efficiency of the use of public investments [1]. Even in such difficult times as the COVID-19 pandemic, Russian aggression against Ukraine, state investments in Europe are growing not only in absolute terms, but also relative to GDP. Most often, the positive effects of public investment include its ability to accelerate economic growth, improve infrastructure, expand innovation, and ensure social stability. One should not forget about the wide opportunities to use public investment to stimulate private investment and inflow of private capital. The main directions of public investments in the European Union are determined in accordance with pan-European strategies, such as the "European Green Deal", "Digital Transition" and the recovery mechanism after the COVID-19 pandemic.

The task of this topic is to analyze the scope and directions of public investment in the EU countries and assess its potential impact on increasing the competitiveness of the European Union as a whole and its individual members, in particular.

6.1. Scales and main directions of public investments

Recent years can hardly be considered simple for the budgets of European countries. First, the pandemic, which led to a decrease not only in real, but also in nominal GDP. Then the energy crisis provoked by Russia's war against Ukraine. All this led to the acceleration of inflationary processes and an increase in payments from the budgets. On the other hand, inflation led to a greater filling of budgets than previously expected.

Under these conditions and taking into account the needs, nominal state investments continued to grow even in the most difficult years (Table 6.1). This led to the fact that the share of public investments in GDP also increased somewhat. In the EU as a whole, this indicator is about 3%.

Table 6.1

Nominal public investment and GDP (percentage increase over the previous year) *

	2019	2020	2021	2022	2023**
Public investment					
European Union	6,6	4,7	6,5	7,4	9,9
Western and Northern Europe	6,4	3,3	3,8	7,6	6,0
Southern Europe	5,4	6,9	18,9	4,5	13,9
Central and Eastern Europe	8,9	6,8	2,9	10,8	23,5
GDP					
European Union	3,6	-3,9	8,7	8,7	7,2
Western and Northern Europe	3,5	-2,4	8,2	7,6	6,1
Southern Europe	2,4	-8,5	9,5	8,8	7,6
Central and Eastern Europe	7,1	-2,4	10,5	14,6	13,9

** Calculated on: [2]*

*** The first half of 2023 to the corresponding period of 2022.*

As already mentioned, the composition of the European Union is not homogeneous. And this affects the dynamics of almost all

indicators. The dynamics of state investments and GDP are no exception. The countries of Central and Eastern Europe (Austria, Czech Republic, Slovakia, Poland, Slovenia, Hungary, Romania, Bulgaria) demonstrate the highest dynamics. These countries also have the largest share of public investment in GDP (almost 4%).

The dynamics of real public investments are somewhat more complicated. Compared to 2020, they decreased somewhat in almost all EU countries. Although already in 2023 there were signs of improvement in the situation.

An analysis of the dynamics of real public investments over a longer period can be more indicative. In Figure 6.1 shows the dynamics of real investments since 2000, both for the EU as a whole and for individual groups of countries.

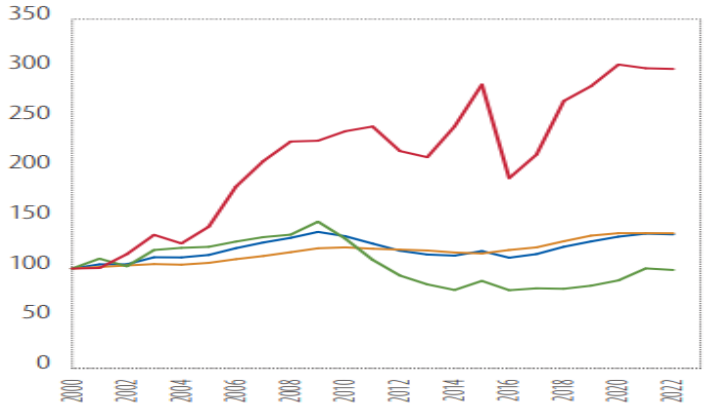


Fig. 6.1. Dynamics of real investments in the EU (2000 = 100) [2]

EU;
Western and Northern Europe;
Southern Europe;
Central and Eastern Europe.

Real public investments have increased by approximately 20% over the years of the 21st century. There is every reason to believe that this was one of the key reasons for the deterioration of the

situation with European competitiveness. Such volumes of state investments could not fully perform the functions that are entrusted to them in modern conditions.

The dynamics of real public investments in the countries of Western and Northern Europe practically coincided with the European one. But for the countries of Southern Europe (Italy, Spain, Portugal, Greece, Malta, Cyprus), real public investments were growing until the crisis of 2008-2009. Then a sharp decline was observed. And although slow growth resumed after 2018, it did not manage to reach the level of 2000.

It should be said especially about the countries of Central and Eastern Europe. They are more sensitive to various shocks, and therefore there is no consistency in the dynamics of real public investments: significant fluctuations are observed. At the same time, there is a clear trend towards general growth. Only in this group of countries, real public investments in 2022 were almost 3 times higher than in 2000.

6.2. European Structural and Investment Funds (ESI Funds)

Central investment at the EU level took the form of the creation and operation of various funds. They are united by the general concept of ***European Structural and Investment Funds (ESI Funds).*** According to a report published in 2022, for the period of activity from 2014 to 2020, the total amount of investments made through these funds amounted to 731 billion euros, of which 535 billion euros were financed by the EU, contributing to lasting socio-economic convergence, territorial unity and socialization of Europe, encouraging the transition to "green technologies" and digitalization.

The report presents the achievements of ESI Funds until the end of 2021:

- more than 4 million small and medium-sized enterprises (SMEs) were supported;

- 55.2 million people were supported through employment, social integration or skills and education actions;

- energy production capacity has been increased by more than 3,600 megawatt-hours per year thanks to renewable energy sources, while the annual primary energy consumption of public buildings has decreased by 2.6 terawatt-hours per year (equivalent to the amount of electricity consumed by approximately 720,000 households in total per year);

- 2.3 million projects supported increasing the competitiveness of the agricultural sector and rural SMEs, and helped create jobs in rural areas;

- In the fisheries and aquaculture sector, 44,000 jobs were saved and more than 6,000 new jobs were created [3].

For the new planning period (2021-2027), ESI Funds includes five funds:

- European Regional Development Fund;
- European Social Fund;
- Cohesion Fund;
- European Agricultural Fund for Rural Development;
- European Maritime and Fisheries Fund (Fig. 6.2).

In 2013, a special regulatory document of the EU was adopted (REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (EU) No. 1303/2013 of December 17, 2013), which approved the provisions necessary to ensure the effectiveness of EUI Funds, their coordination among themselves and with others instruments of the Union.

Let's analyze the activity of each of them in more detail.

No plan without money,
No money without plan!

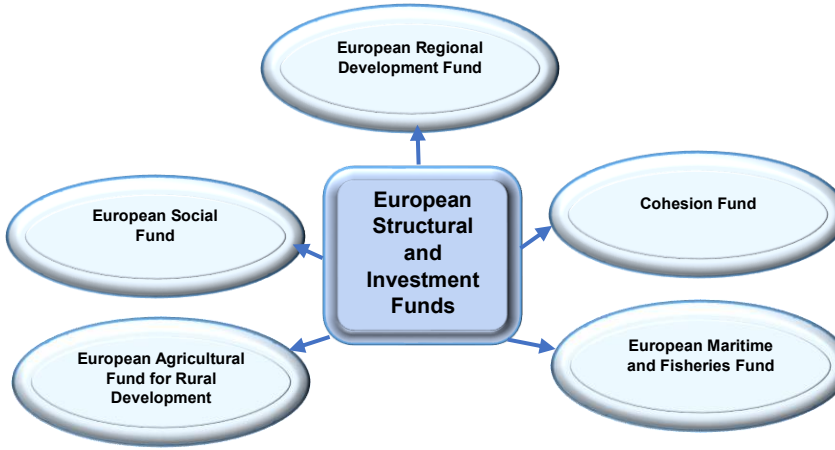


Fig. 6.2. European Structural and Investment Funds

1. ***European Regional Development Fund (ERDF)***

The ERDF is aimed at reducing economic and social inequality between EU regions. It finances projects aimed at supporting small and medium-sized businesses, innovation, research, infrastructure, and environmentally friendly technologies.

In 2021-2027, ERDF intends to invest in Europe and its regions to achieve:

- more competitive thanks to innovation and support of small and medium-sized businesses, as well as digitization and digital communication;

- greater environmental friendliness of the economy, first of all by reducing carbon emissions;

- greater connectivity of citizens and regions thanks to increased mobility;

- greater social orientation by supporting employment, education, skills, social integration and equal access to health care, as well as by increasing the role of culture and sustainable tourism;

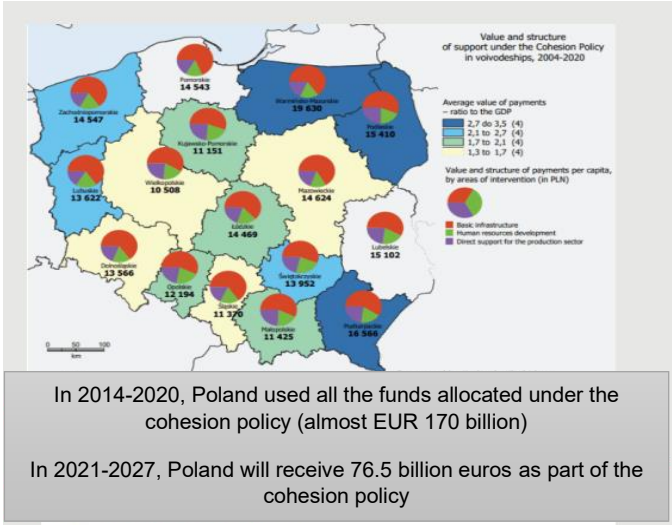
- getting closer to citizens, supporting local development and sustainable development of cities throughout the EU [4].

According to the ERDF policy, a differentiated approach is observed in the ratio of the share of funding assumed by the fund and the share financed from national sources. Thus, when financing projects in less developed regions, the Fund covers 80 or 85% of costs, in transition regions - 60 or 70%, in more developed regions - 40 or 50%.

One of the largest recipients of funds from the fund is Poland. For the period 2021-2027, this country should receive 76.5 billion euros as part of the implementation of the cohesion policy (Fig. 6.3).

The current ERDF program has four directions:

- Innovation and research;
- Digital agenda;
- SME support;
- Achieving a low-carbon economy.



In 2014-2020, Poland used all the funds allocated under the cohesion policy (almost EUR 170 billion)

In 2021-2027, Poland will receive 76.5 billion euros as part of the cohesion policy

Fig.6.3. Poland's participation in cohesion programs [5]

2. ***European Social Fund (ESF)***

The ESF supports social initiatives, in particular, increasing employment, education, retraining workers, reducing poverty, and developing human resources. The ESF plays an important role in strengthening social integration and combating unemployment.

This fund is one of the oldest in the EU: it was created in 1960. The ESF is the European Union's main instrument for investing in people. In 2014-2022, the fund helped member states to progress towards achieving the EU's main 2030 targets for employment, training and poverty reduction (Figure 6.4).

As a result of financing from the ESF for the previous reporting period (2014-2022):

- 7.2 million people found work;
- 32% of unemployed or inactive people were employed after participating in ESF activities;
- 10.3 million people qualified through ESF-funded measures;
- 3 million people participated in ESF-funded education and training;

By 2030, at least 78% of the population aged 20 to 64 should be employed

At least 60% of all adults should participate in education every year by 2030

At least 15 million fewer people at risk of poverty or social exclusion by 2030

Fig.6.4. Social goals of the EU until 2030 [6]

- Almost 15 million participants in social inclusion activities were financed by the ESF;
- 6.9 million participants were representatives of vulnerable population groups;

- Almost 600,000 participants who suffered from homelessness or housing deprivation received support [6].

3. ***Cohesion Fund (CF)***

This fund was created in 2013 and is intended to finance large infrastructure projects in the less developed regions of the EU (where the gross national income per capita is less than 90% of the EU average). The main directions are transport infrastructure and environmental protection, especially in the field of water resources and waste management.

The fund's recipients are 15 EU countries. The total budget of the fund for 2021-2017 is 48.03 billion euros [7]. It is expected that 37% of the total financial allocation of the Cohesion Fund will be directed towards the achievement of climate goals.

The Cohesion Fund finances programs for which the European Commission and the national and regional authorities of the Member States are jointly responsible. Member State administrations choose which projects to fund and take responsibility for day-to-day management.

The Cohesion Fund works closely with the European Regional Development Fund.

4. ***European Agricultural Fund for Rural Development (EAFRD)***

The EAFRD funds rural development by supporting farmers, agriculture and rural communities. The main goal of the fund is to strengthen sustainable agriculture, preserve natural resources and support the competitiveness of the agricultural sector.

This fund was established in 2007. In accordance with EU regulations, the goals of the fund are:

1. *Increasing the competitiveness of agriculture*:

- support for innovations in agriculture;

- improving market orientation and increasing the added value of agricultural products;

- modernization of farms, especially small and medium ones.

2. *Sustainable development of rural areas*:

- creation of jobs in rural regions;

- small business and entrepreneurship support;

- improvement of infrastructure and services in rural areas.

3. *Environmental protection*:

- promoting the preservation of biodiversity;

- water resources management and the fight against climate change;

- preservation of landscapes and traditional rural way of life.

The budget of EAFRD for the period 2021-2027 is about 87 billion euros. Attention should be paid to the use of the principle of joint investment: the fund supplements the financing of national programs of the participating countries with its funds. In particular, programs on organic agriculture, development of rural tourism, and energy efficiency are currently being implemented.

5. ***European Maritime and Fisheries Fund (EMFF)***

The EMFF aims to support sustainable fisheries and aquaculture, as well as the conservation of marine resources. It finances the modernization of fishing fleets, environmental protection and the creation of new jobs in coastal regions.

The main objectives of the EMFF, which are defined for 2021-2027, can be summarized as follows:

1. *Sustainable fishing*. To this end, the fund supports the development of environmentally friendly fishing methods, the elimination of overfishing and the renewal of fishing fleets using energy-saving technologies.

2. *Development of aquaculture*. This includes, in particular, promoting the cultivation of fish and seafood with minimal impact on the environment, as well as the introduction of innovations in production to ensure the competitiveness of the industry.

3. *Economic support of coastal communities*. For this, the fund supports small and medium-sized businesses related to marine resources, creates additional jobs, and develops infrastructure in fishing ports.

4. *Protection of marine resources*. The main thing here is the support of projects aimed at restoring marine ecosystems.

The EMFF budget for the period 2021-2027 is about 6.1 billion euros. Although compared to other funds, the amount is not so large, but it is used for quite specialized purposes, and therefore plays an important role in this area.

6.3. Newest European investment funds

In addition to the European Structural and Investment Funds, there are quite a few other funds in the European Union, through which both centralized investment is carried out and private local financing of investment activities is encouraged. They were created relatively recently and are an appropriate response to new challenges. The most significant and influential of them are:

1. ***Investment Plan for Europe (European Fund for Strategic Investments, EFSI)***

The Investment Plan for Europe, also known as the European Fund for Strategic Investments (EFSI), was created in 2015 to boost economic growth and create new jobs in the European Union after the financial crisis. Its main objective is to mobilize private investment in strategically important sectors of the economy where traditional sources of financing, such as banks or private investors, may not be sufficient.

EFSI seeks to attract private capital to finance major infrastructure projects in sectors such as energy, transport, digital technology, innovation, education and health. One of the key elements of the plan is the support of small and medium-sized businesses, which are the basis of the European economy.

The EFSI budget was €33.5 billion between 2015 and 2020, but around €500 billion of investment was mobilized through the Private Investment Facility.

The Fund guarantees the financial support of the European Investment Bank (EIB) to reduce risks in the provision of loans and investments in projects that may be risky for traditional investors.

EFSI-financed projects are implemented through the European Investment Bank (EIB) and the European Investment Fund (EIF), which provide guarantees and loans for projects that meet the fund's objectives.

The Fund continues to impact the economy through the InvestEU Program 2021-2027, which continues the work of EFSI and aims to increase investment for sustainable economic development.

To receive funding from the fund, the project must meet the following requirements:

- must have high social and economic value, contributing to the achievement of the goal of EU policy;
- it is necessary to attract private capital by eliminating market deficiencies;
- should complement the existing funding opportunities of the EIB and the EU;
- must be economically and technically viable;
- must comply with EU state aid rules.

Below are some examples of key areas targeted by EFSI:

- infrastructure (transport, energy, digital technologies, ecology, urban and social sectors);
- education and training, health care, research and development, ICT, innovations;
- renewable energy sources and energy efficiency;
- support of small and medium-sized businesses and companies with medium capitalization [9].

2. ***"Next Generation EU" Fund***

It is an ambitious temporary financial instrument designed to support the economic recovery of the European Union following the crisis caused by the COVID-19 pandemic. The NGEU has a total budget of €750 billion and aims to ensure sustainable recovery, modernize the economies of member countries and prepare them for future challenges.

When the foundation was created, the main goals and directions of its activity were formulated (Fig. 6.5).

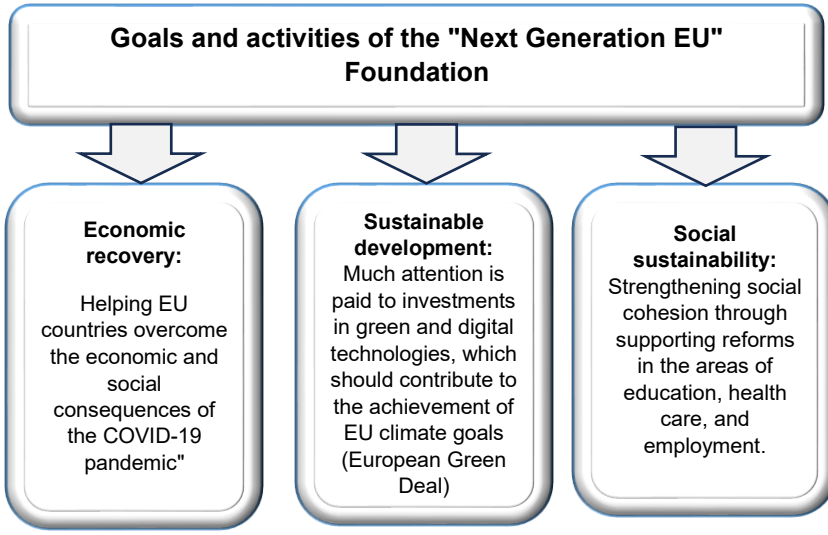


Fig. 6.5. Goals and activities of the "Next Generation EU" Foundation

Funding is provided through a number of programs:

Recovery and Resilience Fund (RRF). This is the largest part of the financing, which is directed to projects of recovery and modernization of the economies of the EU countries. Countries must submit national plans with specific projects that will meet the priorities of the NGEU.

React-EU. Additional resources for structural funds to help regions most affected by the pandemic.

Other programs include ***InvestEU, Horizon Europe, Just Transition Fund, and Rural Development***.

About 390 billion euros are provided in the form of grants, and another 360 billion euros in the form of loans to member countries.

The main priorities of the fund are green transformation, for which at least 37% of funds are allocated, and digital transformation (20% of funding should go to the development of digital technologies, infrastructure and skills) [10].

EU member states that wish to receive funding from the NGEU fund must submit national recovery and resilience plans that outline how they will use the funds from the fund. The European Commission evaluates these plans according to established criteria, in particular regarding the effectiveness of the use of funds to achieve "green" and digital goals, and decides on the provision of financial assistance.

The European Commission provides annual reports on the use of the fund's funds. In particular, a report published in September 2023 states that the Recovery and Resilience Fund (RRF), which is the centerpiece of Next Generation EU, has a total budget of €723 billion. For two and a half years since the creation of the fund, the total amount of financing has already amounted to 153.4 billion euros (Fig. 6.6). A little more than a third of this amount went to the pre-financing of 21 EU member states (€56.5 billion). The second position is occupied by the financing of smart, stable and inclusive growth (25.2 billion euros). In the third city - financing of health, economic, social and institutional sustainability.

An example of successful financing of "green transformations" can be the energy-efficient reconstruction of 20,000 social buildings, as well as historical student housing, carried out in France at the expense of RRF funds. The RRF supports investments in data centers to increase Italy's cloud capabilities for the digital economy. Thanks to the RRF, Spain has supported more than 60 large companies and

small and medium-sized enterprises in research and innovation for sustainable mobility.

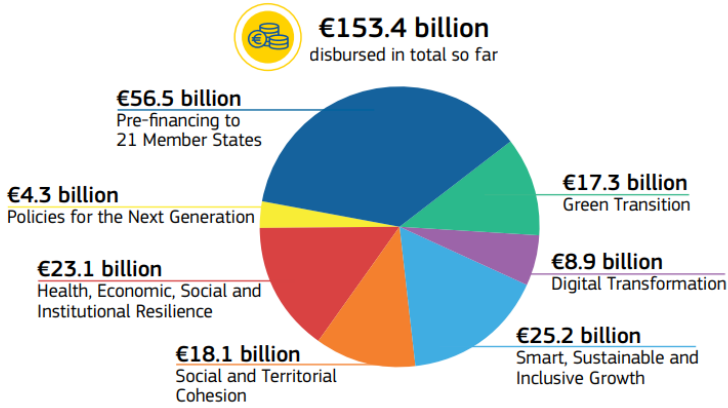


Fig.6.6. The structure of investments at the expense of funds of the Recovery and Resilience Fund [11]

A total of 247 million users who benefit from new or improved public digital services, products and processes [11].

Thus, the European Union has a fairly extensive system of centralized funds, which, in combination with national resources, are used to solve the problem of increasing competitiveness and adequately respond to the challenges created by modern geostrategic realities.

References

1. Communication from the Commission to the European parliament, the council, the European economic and social committee and the Committee of the regions (2023). Long-term competitiveness of the EU: looking beyond 2030. URL: https://commission.europa.eu/system/files/2023-03/Communication_Long-term-competitiveness.pdf

2. European Investment Bank. Investment Report 2023/2024: Transforming for competitiveness. URL:

https://www.eib.org/attachments/lucalli/20230323_economic_investment_report_2023_2024_en.pdf

3. EU Cohesion Policy: European Structural and Investment Funds supported SMEs, employment of millions of people and clean energy production. URL: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_389

4. European Regional Development Fund. URL: https://ec.europa.eu/regional_policy/funding/erdf_en

5. Федюк В. (2024). Система планування і фінансування політики згуртованості в ЄС. URL: https://www.csi.org.ua/wp-content/uploads/2024/02/prezentacziya-ks.pdf

6. European Social Fund invests in quality jobs, training and social inclusion. URL: https://european-social-fund-plus.ec.europa.eu/en/news/european-social-fund-invests-quality-jobs-training-and-social-inclusion

7. Cohesion Fund (CF). URL: https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/cohesion-fund-cf_en#:~:text=The%20Cohesion%20Fund%20provides%20support,dedicated%20national%20or%20regional%20programmes

8. European Maritime and Fisheries Fund (EMFF). URL: https://oceans-and-fisheries.ec.europa.eu/funding/european-maritime-and-fisheries-fund-emff_en

9. The European Fund for Strategic Investments. URL: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/economy-works-people/european-fund-strategic-investments_en

10. NextGenerationEU. URL: https://next-generation-eu.europa.eu/index_en

11. Recovery and resilience facility - Annual report. URL: https://commission.europa.eu/system/files/2023-09/RRF_Annual_Report_2023_v8.pdf

Chapter 4
STIMULATING EUROPE'S DIGITAL TRANSFORMATION

Topic 7. Foundations of Europe's Digital Transformation

Questions that reveal the content of the topic

7.1. Defining and measuring the digital economy
7.2. The stages of digitalization in Europe
7.3. Digitalization as a driver for the EU's sustainability

Digital technologies have transformed society on an unprecedented scale over the last two decades. They have changed the ways we live, work, play, commute, and interact. And today, it's digital technology that has the potential to bring in widespread social changes and economic advancement. Accordingly, to prosper in the digital age, it has become crucial for nations to understand and cater to the digitally-based economic construct that's also known as the digital economy.

Digitalisation plays a key role in the European Union's strategy for the next decade, promoting sustainable economic growth, technological excellence and improving the living standards of citizens. This chapter will delve into key aspects of the digital transformation in the EU. It will address the definition and measurement of the digital economy, the stages of digitalization across Europe, and how digitalization contributes to the EU's broader goals of sustainability.

7.1. Defining and measuring the digital economy

The term ***digital economy*** is complex and multifaceted, making it challenging to define, agree upon, and measure. It encompasses

various perspectives, reflecting the different analytical and policy questions that arise from its impact on society. The digital economy cuts across multiple institutional sectors and industries, influencing both production and consumption. This influence extends to what is produced, how it is produced, and who is involved in the process. It operates on both tangible and abstract levels, adding to the difficulty in achieving a consensus on its definition. Measuring the digital economy presents its own set of challenges. Given its diverse nature, multiple sources and measurement approaches are required to capture its full scope. Digital systems generate vast amounts of information, but accessing and interpreting this data can be difficult. This complexity requires a thorough approach to fully understand the digital economy's role and influence in the modern world.

There is no clear official definition of the digital economy. The European Commission notes that digitalization covers all types of businesses, albeit to varying degrees. It includes companies that trade goods and services online, as well as digital platforms that connect supply and demand. However, there is no single universal characteristic for new ways of doing business in the digital space, and many aspects are often combined within a single enterprise. Also, in a study published in May 2018, Eurofound describes digitalization as follows: *«When applied to social systems or organizations, digitalization refers in a broad way to the transformation brought about by the widespread adoption of digital technologies (robotics, machine learning, sensors, virtual reality and so on). When applied to specific pieces of information, digitization refers to the process of converting them into a digital form that can be processed by a computer (or vice versa): it can be seen as a driver of digitalization and encompasses actions performed through technologies, such as sensors, 3D printing or augmented reality and virtual reality*» [1].

The digital economy is also linked to the concept of Industry 4.0, which is seen as the fourth and next stage of digitalization in the

manufacturing sector. This term describes manufacturing processes where fully integrated automated systems interact with each other.
Since drawing definitive boundaries for the concept of digital economy is challenging, it is worthy to consider tiered definition of the digital economy developed for G20 Digital Economy Task Force (OECD, 2020) and adopted in UNCTAD Manual for the Production of Statistics on the Digital Economy 2020.

When it comes to defining the digital economy by sector, there isn't a universally accepted definition yet. However, the G20 Roadmap suggests an initial approach by distinguishing three levels (tiers) of measurement:

- core measure (includes only the economic activities of producers of ICT goods and digital services);

- narrow measure (encompasses the core sector, along with the economic activities of firms that rely heavily on digital inputs;

- broad measure (includes both the core and narrow measures, as well as the economic activities of firms that are significantly enhanced through the use of digital inputs. These inputs encompass digital infrastructure, equipment, and software, as well as data and complementary skills) (Fig. 7.1).

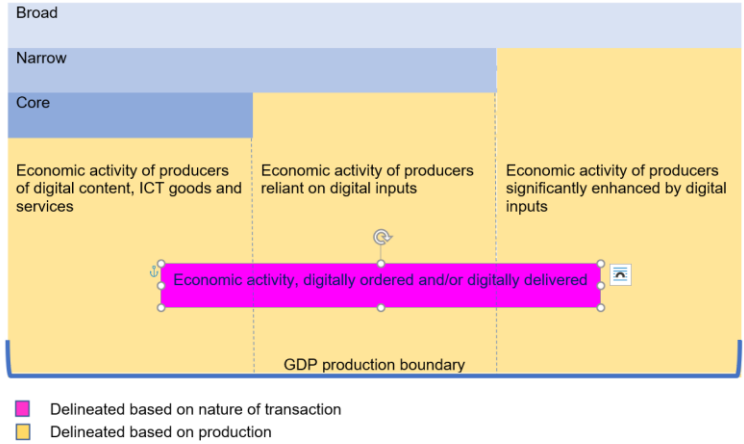


Fig. 7.1. A proposed definition of the digital economy [2]

The tired definition of the digital economy emphasizes the nature of products (ICT goods and services, digital content, digitally delivered services), production (extent of reliance on “digital inputs”) and transactions (digitally ordered or/and digitally delivered), making it possible to explore digital economy through the lens of each component of the traditional economy (as illustrated in Figure 7.1).

The concept of ***economy*** has been fundamental to human society for centuries. Traditionally, it refers to the process or system through which goods and services ***(products)***, are produced ***(production)***, sold and bought ***(transactions)*** both domestically and internationally. This definition encompasses the entire cycle of economic activity, from value creation through production to the exchange of this value in transactions.

As the world has evolved, so too has the economy. The emergence of digital technologies has brought about a transformation that goes far beyond the mere use of electronic tools. It has redefined how goods and services are produced, sold, and bought, leading to what we now refer to as the ***digital economy***. But what exactly makes an aspect of the economy "***digital***"? How "digital" do the processes of production, sale, and purchase need to be to be considered part of this new economy?

Consequently, through the lens of the traditional economy, the digital economy might include the following components (Table 7.1).

Digital products

The digital economy includes various types of products and services, each with its own unique function in this interconnected system. At the core are products that exist purely in digital form, such as software, digital content (such as e-books and streaming media), cryptocurrencies, and online services including cloud computing and SaaS platforms. These products are entirely virtual and have no physical form.

The next type are products that can exist in both digital and physical form. They include books, music, movies, games, and tickets,

which can be presented in either tangible or digital form, depending on the user's preference.

Table 7.1

The components of the digital economy through the lens of the traditional economy *

<table>
<tr><th>Products</th><th>Production</th><th>Transactions</th></tr>
<tr><td>Products purely digital in form
- Streaming services
- CAD designs
- Software (ICT product)
- Virtual reality</td><td>Producers of ICT products
- Computer makers
- Software makers</td><td>Transactions that are agreed “digitally”
- Buying online
- Booking services online</td></tr>
<tr><td>Products that can be digital or physical – when delivered digitally
- (e-) books
- Training (e - learning)
- Banking services (online banking)
- Music, movies, etc.</td><td>Producers of products “digital in form”
- Cloud services providers
- Designs for 3d printing
- Cybersecurity product developers
- Data Center and IT Services Providers</td><td>Trans actions where the payment takes place “digitally”
- Paying in a physical store by card, QR code, mobile money, etc.</td></tr>
<tr><td>Enabling (ICT) services
- Telecommunications
- Data processing, hosting
- Repair of ICT equipment
- Cloud service</td><td>Producers reliant on digital technology
- QR code, mobile money, etc.
- Online platforms</td><td rowspan="5">Transactions where digital technology plays any role:
- Digital marketing leading to in-person sales (a customer learns about a product or service through online ads but makes the purchase in a brick-and-mortar store and pay cash)
- Digital contracts (signing contracts electronically using platforms like DocuSign or Adobe Sign)
- Crowdfunding campaigns (pledging money through platforms like Kickstarter or GoFundMe, where the actual product or service is delivered later through traditional means)
- Digital coupons and promotions (receiving and redeeming digital coupons via email or apps, which are used for in-person purchases)</td></tr>
<tr><td>Enabling (ICT) goods
- Computers, smartphones
- Servers, Network switches</td><td>Producers whose production is significantly altered or enhanced by using digital technology
- Publishing
- Car makers
- Airlines
- Taxis</td></tr>
<tr><td>Components
- Processors
- Sensors
- Glass</td><td rowspan="3">Producers that make any use of digital technology
- Hairdresser uses WeChat to schedule customer appointments through apps
- Health and fitness centers (implement online booking systems, virtual fitness classes, and apps for tracking workouts and memberships)
- Hotels and hospitality
- Businesses (employ online booking systems, digital room keys, and customer service chatbots)</td></tr>
<tr><td>Connected versions of products (IoT)
- “Smart” TV/light bulb/fridge</td></tr>
<tr><td>Data as an asset</td></tr>
</table>

* *Source: Adapted and modified based on [3]*

These digital products are supported by information and communication technology (ICT) services. They include Internet service providers (ISPs), cloud storage, telecommunications services, cybersecurity solutions, and IT consulting, which are necessary for the operation, distribution, and protection of digital products. These services rely on ICT goods, which form the physical infrastructure of the digital economy.

Enabling (ICT) goods refer to hardware, software, and infrastructure that facilitate the development, deployment, and use of digital technologies e.g., servers, networking equipment, computers, mobile devices and peripherals, as well as Internet of Things (IoT) devices. These goods are essential for enabling various digital activities, including data processing, communication, automation, and connectivity. Essentially, they form the backbone of the digital economy by providing the necessary tools and platforms for digital interactions.

At the component level, the digital economy depends on the key elements required to produce ICT products. These include semiconductors, processors, memory devices, sensors and batteries, which play a vital role in the development and operation of digital technologies.

In addition, many traditional products have been upgraded by introducing digital features, leading to the creation of connected versions of these products. Examples include smart home appliances, connected cars, wearables and smart home systems that use internet connectivity to expand functionality and improve usability.

Finally, data has become an important asset in the digital economy. Information collected through digital products and services – be it customer data, operational metrics, big data analytics or personal data – is increasingly used for business intelligence, new product development and strategic decision-making. This data-driven approach is the foundation for the growth and development of the digital economy, driving innovation and efficiency across all sectors.

Digital Production

In the context of production, the digital economy refers to the integration of digital technologies into the creation of goods and services. This can range from the use of advanced software for design and manufacturing (such as CAD and automated production lines) to the development of entirely new digital products, such as software, digital media, and online services.

For production to be considered part of the digital economy, the product itself does not necessarily have to be digital (e.g., software or digital media). Instead, the production process must significantly rely on digital technologies. For instance, a traditional automotive plant that integrates robotics, IoT devices for predictive maintenance, and AI for quality control is part of the digital economy, even if the final product is a physical car.

Digital Transactions

Finally, transactions in the digital economy involve the exchange of value in a digital format. This encompasses a wide range of activities, from using digital payment systems like credit cards, PayPal, or cryptocurrencies to smart contracts powered by blockchain technology.

A transaction is considered digital when it is conducted using digital tools or platforms, whether it's a consumer purchasing goods online or companies engaging in complex B2B transactions using digital invoices and payment systems. It's important to note that digital transactions often effortlessly cross borders, contributing to the globalization of the digital economy.

As such, the sales component of the economy has perhaps undergone the most noticeable changes in the digital age. Traditional brick-and-mortar stores are increasingly being supplemented – or even replaced – by e-commerce platforms where transactions are conducted entirely online.

For sales to be considered digital, the key factor is the medium through which the transaction occurs. This could be an online

marketplace like Amazon, a subscription service for digital content, or even peer-to-peer transactions facilitated by apps like eBay or Etsy. The entire customer journey – rom browsing to purchasing – must take place in the digital realm, often supported by digital marketing, data analytics, and customer relationship management (CRM) systems.

All things considered, to be part of the "digital economy," the processes of production, sales, and transactions must be significantly driven by digital technologies. It's not just about what is produced or sold, but also how these activities are carried out. A physical product, a brick-and-mortar store, or a traditional currency exchange can all be part of the digital economy if digital tools and technologies are an integral part of their operation. In essence, the digital economy is not a separate entity from the traditional economy but rather its evolution. As more and more aspects of economic activity become digital, the line between the "traditional" and "digital" economy continues to blur, leading us to a future where the economy as a whole will be digital.

Measuring digital economy

The collection of statistics on the digital economy and society is an increasingly important part of the work of national statistical offices. The demand for such data is constantly growing as more countries seek to develop, monitor and review national policies and strategies on the use of information and communications technologies (ICT). Businesses also need information on access to ICT, its users and the impact of these technologies on various aspects of their activities. This is a particular challenge for developing countries, many of which are still developing statistical programmes that take into account various aspects of their digital economies and societies. Internationally comparable ICT indicators are key to ensuring cross-country comparisons, bridging the digital divide and providing data relevant for policymaking.

UNCTAD is a founding member of the Partnership on Measuring ICT for Development, an international multi-stakeholder initiative aimed at improving the availability and quality of ICT data and

indicators. One of the significant achievements of the Partnership has been the creation of a core set of ICT indicators for consistent statistical collection at the global level. The list was first published by the UN Statistical Commission, which endorsed it at its 38th session in March 2007, and has been regularly updated since then. The Commission encourages countries to use the list in their data collection programmes. The first version of the Manual on Statistics of Production and the Information Economy was published in late 2007, and an updated version was released in 2009.

The 2020 edition has been prepared to take into account the significant changes that have occurred in the last decade in the field of access to and use of ICTs. Compared with previous versions, it covers a wider range of issues related to e-commerce, trade in ICT services and services delivered through ICTs (or in digital format). The manual includes more model questionnaires and reflects recent changes in the list of core ICT indicators adopted by the Partnership [4].

The following core indicators developed through the Partnership on Measuring ICT for Development and endorsed by countries through the UN Statistical Commission:

Products:

- ICT goods trade;
- ICT services trade;
- ICT-enabled (digitally delivered) services trade.

Production:

- ICT sector (employment and value added);
- ICT usage in business.

Transactions:

- E-commerce.

The diagram below illustrates the key components of the digital economy, categorized by products, production, and transactions, with indicators describing each segment (Fig. 7.2).

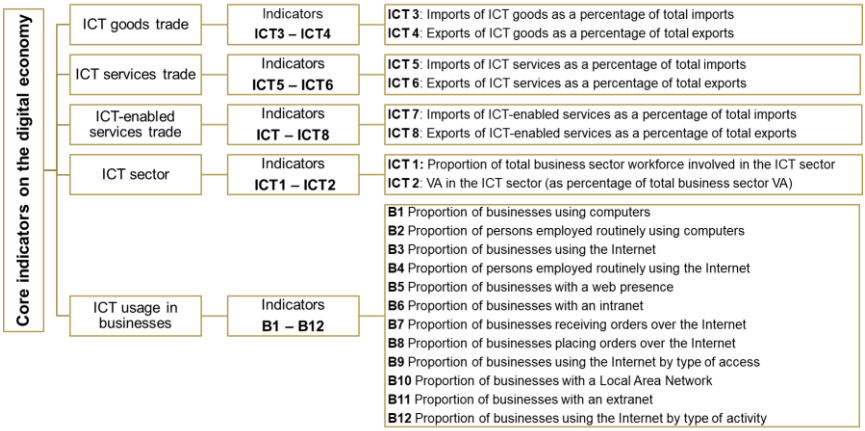


Fig. 7.2. Core indicators on the digital economy

Measuring digital products

According to definition of OECD (2011), *"ICT products must primarily be intended to fulfil or enable the function of information processing and communication by electronic means, including transmission and display" [5].*

Trade in goods (Core indicators: ICT 3 - ICT 4)

UNCTAD + UNSD maintain a list of ICT goods based on HS for compilers to use to identify and aggregate ICT goods within merchandise trade data. This list includes:

- computers and peripheral equipment;
- communication equipment;
- consumer electronic equipment;
- electronic components;
- miscellaneous.

Trade in ICT services and ICT-enabled services (Core indicators: ICT 5 - ICT 8)

ICT cervices/digitally deliverable include:

- telecommunications services;
- computer services – software;

- other computer services;
- licenses to reproduce and/or distribute computer software.

ICT-enabled services lack an internationally agreed upon definition. Conceptually, ICT-enabled services include activities that can be specified, performed, delivered, evaluated and consumed electronically. It is proposed that ITES be defined as "services products delivered remotely over ICT networks" (i.e., over voice or data networks, including the Internet) [6].

They include:

- ICT services;
- sales and marketing services (excl. trade and leasing services);
- information services;
- insurance and financial services;
- management, administration, and back-office services;
- licensing services;
- engineering, related technical services, R&D;
- education and training services.

Measuring the share of services actually digitally delivered entails collecting additional information. It can be collected through the collaboration of UNCTAD with different countries to develop a pilot survey on digitally delivered services

Measuring digital production: ICT sector (Core indicators: ICT 1 - ICT 2)

The ICT sector covers economic activities aimed at producing goods and providing services in the field of information and communications technology. International statistical classifications play an important role in defining this sector, as they allow the selection of economic activities and products related to ICT. However, the implementation of the ICT sector definition at the national level may be difficult if the national classification of industries does not comply with international standards. To improve the international comparability of

statistics, the adoption of international statistical classifications should be a priority for national statistical systems.

Measuring digital production: ICT use in business (Core indicators: B1- B12)

ICT business surveys are widely used to analyze which digital technologies businesses are using and how intensively they are adopting them. These surveys are important for understanding how businesses are adapting to the digital age and what policy support this process may require. Countries are encouraged to conduct such surveys, which include key indicators and questions. Data collected through surveys can be complemented by information from other sources to produce indicators on various aspects of the digital economy, such as the value added by firms selling through e-commerce. UNCTAD actively supports the sharing of experiences and provides tailored technical assistance and capacity-building resources to help countries conduct and improve ICT business surveys.

Digitally deliverable trade accounts for almost two-thirds of services trade at this stage and there is a need to further develop sources to identify how much is actually digitally delivered. Data sources need enhancement to move beyond an ICT-focused perspective on the digital economy. This can be done through business ICT surveys providing insight into which businesses are using what technologies in different countries. They offer indicators directly and can provide a basis for measures of the different scopes of the digital economy. Also, it is important to ensure international comparability introducing core indictors on the digital economy.

The above analysis focuses on businesses as key actors in the digital economy, but there are other relevant perspectives. This wider set of core indicators on measuring ICT for development may cover the following topics: ICT infrastructure, ICT access and use by households and individuals and by enterprises, ICT in education, ICT in government, etc.

7.2. The stages of digitalization in Europe

Digitalization in Europe began to develop at the end of the 20th century, and its development can be viewed through several key stages and events that had a significant impact on this process (Fig. 7.3). The roots of digitalization in Europe can be traced back to the 1970s and 1980s when the first personal computers, mainframes, and early networks began to appear. During this period, European governments and businesses started exploring the potential of these new technologies for improving productivity and efficiency. The development of the European Academic and Research Network (EARN) in 1984, which linked research institutions across Europe, was one of the early milestones in fostering digital connectivity and collaboration.

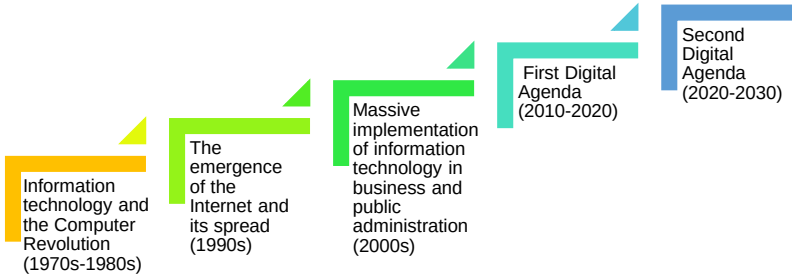


Fig. 7.3. The stages of digitalization in Europe in the 21st century

Information Technology and the Computer Revolution (1970s-1980s)

The 1970s saw the widespread adoption of computers in business and government. Personal computers, such as the IBM PC (1981), played a major role in the mass adoption of digital technologies. The development of telecommunications, in particular the emergence and spread of digital telephone networks, helped strengthen the infrastructure for data transmission.

The Emergence of the Internet and Its Spread (1990s)

The Internet emerged in the United States in the 1960s, but its mass adoption in Europe began in the 1990s. An important role in this was played by the World Wide Web, created by Tim Berners-Lee at CERN (Geneva, Switzerland) in 1989. In the early 1990s, the Internet began to be widely used in scientific and educational institutions, and then in private homes. Email, and later instant messengers, began to replace traditional forms of communication, which accelerated the digitalization process.

Massive implementation of information technology in business and public administration (2000s)

In the early 2000s, European governments began to actively implement electronic services for citizens. This included electronic tax returns, online voting and other digital government services. Companies began to switch to digital platforms for managing resources, customer relationships and operations. ERP systems, CRM and other software solutions have become the standard.

First Digital Agenda (2010-2020s)

With the rise of smartphones and tablets in the 2010s, access to digital technologies has become ubiquitous. This has facilitated the development of mobile applications, including banking, social media and e-commerce. Facebook, Twitter, Instagram and other social platforms have changed the way we communicate and share information, with a significant impact on culture and public life in Europe.

Thus, the creation of the First Digital Agenda for Europe was driven by a recognition of the transformative power of digital technologies and the urgent need for the European Union to harness this potential in order to remain competitive on the global stage. The early 21st century was marked by rapid advancements in information and communication technologies (ICT), which were reshaping economies, industries, and societies worldwide. The EU saw the need

to adapt to these changes to ensure economic growth, job creation, and social inclusion across its member states.

In 2010, the European Commission adopted the First Digital Agenda for Europe as part of its Europe 2020 strategy. The aim of the agenda was to accelerate economic growth and job creation through the use of digital technologies across all sectors of the economy and society.

The key objectives of the First Digital Agenda were: to ensure high-speed internet access for all EU citizens by 2020, with a focus on accessibility and coverage in remote areas; to raise the level of digital literacy among the population, including developing educational programmes and initiatives to improve IT skills; to create a digital single market, removing barriers and strengthening trust in digital technologies, including data and consumer protection; to promote innovation and investment in digital technologies by supporting research and implementing cutting-edge solutions.

Following on from the first Digital Agenda, the European Commission further developed its digital strategy in 2015, focusing on more ambitious objectives. This agenda was an important step towards the creation of the Digital Single Market, with its main purpose to remove barriers to cross-border trade through simplifying e-commerce rules and removing unnecessary barriers to purchasing goods and services from other EU countries.

2020-2030: Shaping Europe's digital future and the 2030 Digital Compass

The Second Digital Agenda for Europe, spanning from 2020 to 2030, represents a transformative phase in the European Union's approach to digitalization. Building on the successes of the first digital agenda, this new phase focuses on shaping Europe's digital future with a comprehensive and ambitious strategy that aims to position Europe as a global leader in the digital age.

The Second Digital Agenda for Europe is a bold and forward-looking strategy designed to ensure that Europe remains at the

forefront of the global digital revolution. By focusing on people, the economy, and society, and by setting ambitious targets for the Digital Decade, the EU is not only preparing for the future but actively shaping it. The Digital Compass 2030 serves as the guiding framework for this journey, ensuring that Europe navigates the challenges and opportunities of the digital age with confidence and foresight.

Digitalization in Europe has thus developed in stages, starting with the introduction of computer technology and telecommunications, continuing with the Internet revolution and the introduction of digital technologies in business and public administration, and reaching new heights with the development of mobile technologies and digital transformation.

7.3. Digitalization as a driver for the EU's sustainability

Often perceived as virtual and intangible, the digital economy creates the illusion of a world free of material waste. However, the State of the Digital Economy 2024 report clearly demonstrates this is not the case. In 2020, the ICT sector's carbon footprint was between 0.69 and 1.6 gigatonnes of carbon dioxide (CO2) equivalent, equivalent to 1.5 to 3.2 per cent of global greenhouse gas emissions – at the higher end, only slightly less than the shipping industry. A whopping 800 kg of raw materials need to be extracted to produce a single 2 kg computer [7].

These figures are set to increase as mining of minerals such as graphite, lithium and cobalt, essential for the digital transition, is projected to increase by 500 per cent by 2050 to meet the growing demand for digital and low-carbon technologies. Data centres, the backbone of the digital world, consumed around 460 TWh of electricity in 2022, a figure expected to double by 2026. The number of semiconductor devices has quadrupled from 2001 to 2022 and continues to grow. 5G mobile broadband coverage is expected to increase from 25 per cent of the population in 2021 to 85 per cent by

2028, and the number of Internet of Things devices could increase from 16 billion in 2023 to 39 billion in 2029. This expansion, along with the rise of e-commerce, with sales in 43 countries growing from $17 trillion in 2016 to $27 trillion in 2022, highlights the complex impact of the digital economy on the environment.

The ICT industry, one of the largest in the world, reached a volume of €6 trillion in 2023. In 2021, the added value of the ICT sector in the EU exceeded €604 billion, representing 4.9% of the EU GDP [8].

Despite the key role of the ICT industry in ensuring the competitiveness of many sectors, the EU's share of the global ICT market has decreased from 21.8% in 2013 to 11.3% in 2022. In 2022, only 69% of SMEs have reached a basic level of digital intensity, and only 8% of companies have used artificial intelligence technologies (Data from Eurostat).

Digitalization is recognized as the 7th factor contributing to Europe's sustainable competitiveness [9]. It plays a key role in increasing the efficiency and productivity of various industries, stimulating innovation and supporting the transition to a more sustainable economy. By adopting digital technologies, European industries can optimize their use of resources, reduce their ecological footprint and increase their flexibility in a rapidly changing global market. This digital transformation not only contributes to economic development, but also helps achieve sustainable development goals, making it a key element in maintaining and strengthening Europe's competitiveness on the global stage.

Digital technologies have a significant impact on the competitiveness of the EU economy, increasing its efficiency and stimulating innovation. Their implementation and integration into economic processes will be critical for maintaining overall competitiveness and productivity. At the same time, to maintain industrial leadership, the EU needs to take a leading position in key areas of digital technologies such as artificial intelligence, quantum computing, microelectronics and virtual reality, as well as in the

development of digital infrastructure, including cyber security, 5G, cloud computing and data management.

Safe, secure and sustainable ***digital infrastructures*** are being set up across borders, in areas such as 5G networks, satellite connectivity and cloud computing. The future connectivity network will be a blend of transmission and computer data storage linked across all corners of the planet thanks to submarine cables and to our satellite networks. The EU needs to start planning and developing future connectivity. By 2030, the EU aims to have 80% of its citizens with digital skills, ensure 5G coverage across all EU areas, and promote the deployment of sustainable digital infrastructure to meet climate goals

The European Union (EU) is actively pursuing the development of sustainable digital infrastructures as part of its broader goals under the European Green Deal and its digital transformation strategy. The objective is to create a robust, resilient, and sustainable digital economy that reduces carbon footprints while enabling innovation and digital sovereignty. Below are some key elements of the EU's efforts in building sustainable digital infrastructures:

Green Digital Transformation. The EU aims to make data centres climate neutral by 2030. These facilities are a key element of digital infrastructure, but they also consume significant amounts of energy. In this regard, the EU actively promotes the implementation of energy-efficient cooling systems, the use of renewable energy sources and heat recovery methods. In addition, the EU promotes energy efficiency in digital infrastructure, especially in network and cloud services, in order to reduce emissions. Initiatives such as the Energy Efficient Cloud Computing Standard aim to establish guidelines for the sustainable development of cloud services.

The circular economy for digital devices is also seen as an important part of the Green Digital Transformation. The EU places particular emphasis on developing digital devices with a longer service life, improved repairability and recyclability. Policies such as the

Ecodesign Directive aim to reduce e-waste and increase the reuse of materials. Legislation promoting the right to repair of digital devices such as smartphones and laptops helps to extend their service life and reduce waste.

***5G and Next-Generation Networks*.** As 5G and future wireless technologies become the backbone of digital infrastructure, the EU emphasizes energy-efficient deployment. This includes promoting the use of renewable energy in powering 5G towers and reducing the power consumption of network equipment.

In addition to these efforts, the EU is also focusing on the development of ***smart grids and the Internet of Things (IoT)*** to improve energy efficiency across sectors. These sustainable digital infrastructures are designed to support smart energy networks, enabling energy use to be optimised through smart systems that manage resources efficiently. By integrating IoT technologies, the EU aims to create a future where digital infrastructure not only facilitates technological progress but also ensures responsible and efficient use of energy resources.

Cloud and Edge Computing. The European Union is actively promoting the development of decentralized and energy-efficient technologies as part of its commitment to environmental sustainability. By encouraging the adoption of edge computing, the EU aims to reduce the need for long-distance data transmission, which helps reduce energy costs and latency. Together with cloud services powered by renewable energy, this approach helps the EU achieve its environmental goals by significantly reducing the carbon footprint associated with data processing.

As part of these efforts, the EU launched ***the GAIA-X project***, a pioneering initiative to build a federated and sustainable European cloud infrastructure. GAIA-X aims to foster innovation and ensure data sovereignty, with a particular focus on the energy efficiency of cloud services in the EU. The initiative underlines the EU's commitment to

creating a digital future that is not only technologically advanced but also environmentally responsible.

***Digital for Sustainability*.** The European Union is launching an ambitious project called Digital Twin of the Earth (DestinE), which aims to create a highly detailed digital twin of our planet. This cutting-edge digital tool will use powerful computing resources and data analysis to model the impacts of climate change, providing valuable insights to support global efforts to improve resilience. With DestinE, the EU aims to better understand environmental change and develop effective mitigation strategies, reaffirming its commitment to a sustainable future.

At the same time, the EU is actively promoting the ***development of smart cities***, where digital infrastructure is built with a focus on sustainability. Such cities will implement innovative solutions, including efficient urban mobility systems, advanced waste management practices, and optimized energy networks. By integrating these technologies, the EU aims to create urban environments that are not only smart but also green, supporting the overall goal of building a sustainable digital society.

***Artificial intelligence (AI)*,** another key driver of the EU's competitiveness, is rapidly transforming the European Union (EU) into a more competitive and innovative player on the global stage. The EU's strategic investments in AI are driving economic growth, enhancing industry efficiency, and positioning Europe as a leader in ethical technology.

Across various sectors, AI is revolutionizing how businesses operate. In manufacturing, for instance, AI optimizes supply chains, improves quality control, and facilitates predictive maintenance, embodying the principles of Industry 4.0. Similarly, in healthcare, AI is making significant strides by refining diagnostics, personalizing treatments, and streamlining hospital operations, which not only improves patient outcomes but also reduces costs. Agriculture is also

benefiting, with precision farming techniques powered by AI boosting crop yields and minimizing environmental impact.

The EU's approach to AI goes beyond immediate economic benefits. By setting rigorous standards and regulations through initiatives like the AI Act, the EU is ensuring that AI development aligns with ethical norms, potentially giving European companies a competitive edge in global markets where trust and compliance are paramount. This focus on responsible AI use is part of a broader ambition to establish the EU as a leader in global AI governance.

The dawn of ***Web 4.0***, often called the "Intelligent Web," marks a transformative era where digital and physical systems seamlessly converge, driven by AI, IoT, and immersive technologies. For the European Union, this evolution offers a powerful boost to competitiveness on the global stage. Small and medium-sized enterprises (SMEs) stand to gain significantly from Web 4.0, as it democratizes access to advanced technologies. AI-driven platforms and cloud services enable these businesses to innovate and scale, while tailored consumer experiences foster customer loyalty.

Web 4.0 supports the development of a Digital Single Market by removing barriers and harmonizing regulations across the EU. This creates a larger, more accessible market for businesses, while data sovereignty initiatives ensure compliance and trust, giving European companies a unique competitive advantage.

One more an increasingly important issue for the European Union is ***Cybersecurity***. As digitalization and technological innovation continue to transform society, cyber threats are becoming more complex and sophisticated. These threats range from cybercrime targeting both individuals and companies to espionage, cyberterrorism and malicious attacks on critical infrastructure and sensitive data. According to the Cyber Attack Trends reports published by Check Point Software, the number of cyberattacks in Europe has been steadily increasing over the past years. In addition, the Europol threat assessment of serious and organized crime periodically notes a

significant increase in ransomware attacks targeting government institutions and large companies. In response to this trend, protecting Europe's digital economy, critical infrastructure and the privacy of citizens has become a strategic priority for the EU. As part of this strategy, various cybersecurity initiatives have been developed and funded through programs such as Digital Europe, the European Defence Fund and Horizon Europe.

In Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions "Long-term competitiveness of the EU: looking beyond 2030", the following KPIs are proposed to monitor the driver Digitalization (Table 7.2).

Table 7.2

The key performance indicators (KPI) offered by the European Commission to monitor driver digitalization

	KPI	Source	Target	Latest available data
11	Digital intensity of Union SMEs	Eurostat	90% by 2030	69% (2022)
12	Digital technologies adoption by companies	Eurostat	75% by 2030	Cloud computing services 41% (2021) Big data 14.2% (2020) Artificial Intelligence) 7.9% (2021)

Source [9]

In summary, the European Union is at the forefront of fostering a sustainable and competitive digital future by addressing the complex interplay between digitalization, environmental sustainability, and cybersecurity. Through ambitious projects and strategic investments, the EU is driving innovation in areas such as AI, green digital infrastructures, and cybersecurity, while simultaneously working to reduce the environmental impact of the digital economy. By prioritizing ethical technology standards, data sovereignty, and sustainable practices, the EU not only enhances its global competitiveness but also reinforces its commitment to a responsible and resilient digital

transformation, ensuring a robust and secure digital economy for the future.

References

1. Eurofound, 2018. Digital economy, European Industrial Relations Dictionar ποy. Dublin: Eurofound. URL: https://www.eurofound.europa.eu/en/european-industrial-relations-dictionary/digital-economy.

2. United Nations Economic Commission for Latin America and the Caribbean (ECLAC), 2020. Definitions of and core statistics on the digital economy. URL: https://www.cepal.org/sites/default/files/events/files/l2_definitions_of_and_core_statistics_on_the_digital_economy_eng.pdf.

3. United Nations Statistics Division, 2024. What is the digital economy. URL: https://unstats.un.org/bigdata/events/2024/measuring-digital-economy/presentations/day1/1.%20What%20is%20the%20digital%20economy.pdf.

4. United Nations Conference on Trade and Development (UNCTAD), 2020. Manual on the Production of Statistics on the Digital Economy. URL: https://unctad.org/es/isar/publication/manual-production-statistics-digital-economy-2020

5. OECD, 2014. Measuring the Digital Economy: A New Perspective. Paris: OECD Publishing.
URL: https://www.oecd-ilibrary.org/docserver/9789264113541-en.pdf?expires=1724431500&id=id&accname=guest&checksum=66D77528B8837929FBDA5B3B9689F36B.

6. United Nations Conference on Trade and Development (UNCTAD), 2017. Economy on Trade and Development.
URL: https://unctad.org/system/files/official-document/tn_unctad_ict4d03_en.pdf.

7. United Nations Conference on Trade and Development (UNCTAD), 2024. Digital Economy Report 2024. URL: https://unctad.org/publication/digital-economy-report-2024.

8. Statista, 2023. Global market share held by selected countries in the ICT market from 2013 to 2023. URL: https://www.statista.com/statistics/263801/global-market-share-held-by-selected-countries-in-the-ict-market.

9. European Commission, 2023. Communication on the Long-term Competitiveness of the EU: Looking beyond 2030. URL: https://commission.europa.eu/system/files/2023-03/Communication_Long-term-competitiveness.pdf.

Topic 8. The EU strategy for shaping the digital transformation in Europe

Questions that reveal the content of the topic

8.1. Key pillars of the EU's digital strategy
8.2. Roadmap and targets for the Europe's Digital Decade
8.3. Challenges and opportunities in implementing the EU digital strategy

The digital transformation of societies and economies in the member states of the European Union is crucial for maintaining their competitiveness in the 21st century global economy. In this context, the EU has implemented several policy initiatives aimed at enhancing digital connectivity among citizens, businesses, and public authorities.

The objectives of these initiatives include ensuring near-universal Internet access and developing digital skills both among the general population and IT professionals. An additional incentive for the digitalization of Europe's economy is the perception that the EU lags behind the United States and China in the development of digital and high technologies.

8.1. Key pillars of the EU's digital strategy

The policy guidelines (2019) set out by Ursula von der Leyen, the current President of the European Commission, identified one of the six key objectives as creating a "Europe fit for the digital age" [1]. The document addresses current topics such as 5G, the Internet of Things and artificial intelligence. To understand the basis on which current policy initiatives are built, it is important to look at the history of the EU's digital strategy. This section provides a chronological

assessment of the main stages and achievements in the digital development of the European Union.

In 2010, the European Commission published the first Digital Agenda for Europe, presenting it as one of seven flagship initiatives within the overall “Europe 2020 strategy” [2]. This document outlined the key areas on which the Commission intended to focus over the next ten years, with a particular focus on the Digital Single Market (DSM). In 2015, a separate strategy was developed for the DSM [3]. In 2020, the Commission presented a common digital strategy to develop digital policies in the EU [4] In 2021, the EU also presented a Digital Compass 2030, containing indicators outlining its ambitious plans for the next ten years [5].

Pillars and objectives of the EU digital strategy

The following section highlights the EU digitalization strategies, including a set of key objectives or directions, each accompanied by its own set of planned legislative measures.

The First Digital Agenda for Europe (2010-2020)**,** was developed to prepare Europe for a digital future in the post-crisis era [2]. As part of this agenda, the EU identified six key areas of “legislative action” to be implemented:

1. Creating a vibrant digital single market.
2. Improving interoperability and promoting standards.
3. Strengthening trust and security in the digital sphere.
4. Ensuring fast and ultra-fast internet access.
5. Improving digital literacy, skills and inclusion.
6. Bringing the benefits of information and communications technology (ICT) to EU society.

The European Union’s first Digital Agenda has indeed made significant progress in a number of key areas [6]:

1) Reduction of electronic communications price. Regulation (EU) 2022/612 contributed to reducing the cost of electronic communications services, including the abolition of roaming charges from 14 June 2017 under Roam Like At Home initiative. This allowed

EU citizens to use their mobile devices when travelling within the EU without incurring additional roaming costs.

2) Better Internet connectivity. The Agenda ensured universal access to basic broadband using modern mobile and satellite technologies. This contributed to the development of infrastructure and increased internet access for all citizens, including remote and rural areas.

3) Strengthening consumer protection. The agenda also strengthened consumer protection in the telecommunications sector by strengthening privacy measures (Directive 2009/136/EC) and introducing general data protection measures (Regulation (EU) 2016/679, known as GDPR, and Directive (EU) 2016/680. These regulations provide stricter standards for the protection of personal data and user privacy.

The First Digital Agenda focused on digital growth, promoting the development of digital skills, high-performance computing, the digitalization of industry, the development of artificial intelligence and the modernization of public services. In addition, the EU introduced rules on geo-blocking (Regulation (EU) 2018/302) and the portability of digital services (Regulation (EU) 2017/1128), which allow consumers to access online content across the EU.

In addition to the new data protection framework, the European Union has adopted a number of laws aimed at developing a data-agile economy, such as:

- The Regulation on the free flow of non-personal data (Regulation (EU) 2018/1807), which allows companies and public authorities to store and process non-personal data in any location they choose;

- The Cybersecurity Act (Regulation (EU) 2019/881), which strengthens the role of the EU Cybersecurity Agency and establishes a cybersecurity certification framework for products and services;

- The Open Data Directive (Directive (EU) 2019/1024), which sets out common rules for the European market for data held by public authorities.

The EU Digital Single Market Strategy laid the foundation for closer digital integration between Member States. Launched in 2015, it aimed to promote economic growth, job creation, competition, investment and innovation in the EU. The strategy was based on three main pillars [3]:

Access: improving access for consumers and businesses to digital goods and services across Europe.

Environment: creating an enabling environment and level playing field for the development of digital networks and innovative services.

Economy and Society: unlocking the growth potential of the digital economy (Fig. 8.1).

Fig. 8.1. Three main pillars of the EU Digital Single Market Strategy [3]

The Second Digital Agenda for Europe (2020-2030)

The current EU digital agenda [4] includes several key pillars that the EU plans to focus on in the five years following the publication of the agenda:

1. Technologies that work for people.
2. A fair and competitive economy.

3. An open, democratic and sustainable society.

Each of these pillars includes a number of key actions that the EU intends to implement. These include important topics such as artificial intelligence, digital education, a data management strategy and making the use of digital services more sustainable. About a year after the publication of this strategy, the "Digital Compass 2030: The European Path to the Digital Decade" [5] was released, setting out clear key objectives for 2030:

1. A digitally skilled population and highly skilled digital professionals.
2. Secure, productive and resilient digital infrastructures.
3. Digital transformation of businesses.
4. Digitalization of public services.

Notably, these four core objectives resonate with the four pillars of the Digital Economy and Society Index (DESI): the first pillar corresponds to human capital development, the second to improved connectivity, the third to the integration of digital technologies, and the fourth to the digitalization of public services.

8.2. Roadmap and targets for the Europe's Digital Decade

The Second Digital Agenda focused on the changes brought about by digital technologies and the critical importance of digital services and markets, highlighting the EU's technological and geopolitical objectives. In its communications on Shaping Europe's digital future and the European Digital Decade, the Commission set out in detail measures to ensure the security of digital services and markets. Particular priority was given to quantum computing, blockchain strategies, artificial intelligence, semiconductors (European Chip Act), digital sovereignty, cybersecurity, 5G/6G technologies, European data spaces and global technology standards.

Shaping Europe's Digital Future

The communications on shaping Europe's digital future, released in February 2020, laid the foundation for the EU's digital policy over the coming decade. This vision is centered on three main pillars:

Technology that Works for People: The EU emphasized the importance of digital technologies that improve the lives of citizens, create new opportunities for businesses, and ensure a fair and inclusive digital economy. This includes investments in digital skills, ensuring that all Europeans have access to the necessary training and education to thrive in a digital world.

A Fair and Competitive Digital Economy: The EU sought to foster innovation while ensuring that digital markets remain fair and open. This involves creating a level playing field for businesses of all sizes and sectors, promoting competition, and preventing monopolistic practices. The strategy also focused on supporting small and medium-sized enterprises (SMEs) and encouraging the adoption of digital tools across various industries.

An Open, Democratic, and Sustainable Digital Society: The EU committed to promoting digital policies that respect European values, including privacy, democracy, and sustainability. This involves ensuring that digital technologies are used responsibly and ethically, with a strong focus on data protection, cybersecurity, and reducing the environmental footprint of digital technologies.

Europe's Digital Decade: 2020-2030

Building on the foundation laid in 2020, Europe's Digital Decade was formally introduced in March 2021 as a comprehensive plan to achieve the EU's digital ambitions by 2030. This initiative set out concrete targets and milestones, structured around four key areas:

1. Digital Skills: The EU aimed to equip at least 80% of Europeans with basic digital skills by 2030. Additionally, the goal was to double the number of ICT specialists in the EU and to ensure gender balance in this field.

2. Secure and Sustainable Digital Infrastructures: By 2030, the EU planned to deploy secure, performant, and sustainable digital infrastructures. This included achieving full 5G coverage across the EU, ensuring widespread access to gigabit connectivity, and building quantum computing capabilities.

3. Digital Transformation of Businesses: The Digital Decade strategy emphasized the need for all businesses, especially SMEs, to embrace digital technologies. The goal was for 75% of EU companies to use cloud services, big data, and artificial intelligence by 2030.

4. Digitalization of Public Services: The EU committed to making all key public services available online by 2030, with a focus on ensuring accessibility and usability for all citizens. Additionally, the aim was for all EU citizens to have access to their electronic health records.

The diagram below provides an overview of Europe's Digital Decade roadmap, outlining the key steps and initiatives planned from 2020 to 2030 to drive digital transformation across the continent. It is divided into four phases, starting with laying the foundation in 2020-2021, followed by the implementation of crucial policies and initiatives from 2022-2024 (Fig. 8.2). Midway through the decade, from 2025-2027, the focus will shift to achieving important milestones such as advancements in digital education, 5G, and quantum computing. The final phase, from 2028-2030, aims to achieve Europe's digital sovereignty, with the completion of digital public services and the development of digital infrastructure and working conditions. This timeline highlights Europe's commitment to becoming a global leader in digital innovation and technology.

The roadmap outlined in the diagram is closely aligned with the objectives of the ***Digital Compass 2030***, which serves as Europe's strategic guide to digital transformation. Each phase builds towards the overarching goals set by the Digital Compass, including enhancing digital infrastructure, developing skills, and promoting digital services. As Europe approaches 2030, the completion of the initiatives in the

roadmap will help ensure that the EU meets its targets of digital sovereignty, resilience, and innovation, as envisioned by the Digital Compass 2030.

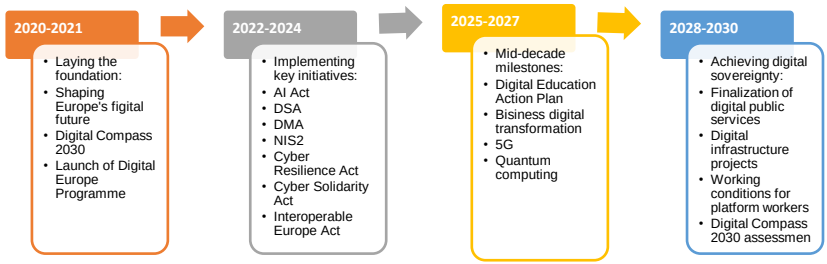


Fig. 8.2. Europe's Digital Decade (2020-2030) Roadmap

The Digital Compass 2030, introduced in March 2021, serves as the EU's roadmap for navigating the digital transition over the next decade. The compass outlines specific targets and benchmarks that guide the EU's efforts in achieving its digital goals by 2030. It is structured around the four cardinal points of the Digital Decade: skills, infrastructures, business and government.

The Digital Compass also emphasizes the importance of international cooperation and partnerships in achieving these goals. The EU seeks to work with like-minded partners globally to shape international standards and norms for digital technologies, ensuring that they are aligned with European values.

To support the goals set out in the Digital Compass 2030, a financial instrument was developed - The Digital Europe Programme. This Programme, introduced by Regulation (EU) 2021/694, is an EU initiative to allocate €7.5 billion for digital technology projects between 2021 and 2027. It covers key areas such as supercomputing, artificial intelligence, cybersecurity, advanced digital skills and digital integration, with support for digital innovation hubs.

There are key areas of the European Union's digital strategy and regulatory framework introduced by the European parliament:

1. The EU Data strategy. The EU emphasizes the importance of data sharing while ensuring privacy, security, and ethical use. This is facilitated through common European data spaces and governed by regulations like the GDPR, the Data Governance Act, and the Data Act.

2. ***Artificial Intelligence (AI).*** The February 2020 White Paper on Artificial Intelligence highlights the key role of artificial intelligence (AI) in modern society. The document predicts significant social and economic benefits that AI can bring across various sectors of the economy. The document lays the foundation for the further development and implementation of AI in various fields, with an emphasis on the need to balance technological innovation with issues of safety, ethics and the protection of citizens' rights. The AI Act and other related proposals aim to regulate AI use, protect individuals from harm caused by AI, and ensure consumer rights.

3. The Digital Services Act (DSA) and Digital Markets Act (DMA) are central to creating a safer and more competitive digital market, focusing on user rights and fair business practices, particularly for large platforms with "gatekeeper" status.

4. ***E-government and Digital Identity***. The EU promotes e-government and cross-border public sector collaboration through initiatives like the Interoperable Europe Act and the European Digital Identity framework, aiming to increase secure access to public services.

5. ***Cybersecurity.*** The EU has strengthened its cybersecurity framework in response to increasing threats, particularly with the NIS2 Directive, the Cyber Resilience Act, and the Cyber Solidarity Act, which aim to improve cyber defence, crisis management, and technological security.

6. ***Media and Democracy.*** In December 2020, the European Commission presented an action plan to support the recovery and transformation of the European media sector in a communication. The document stressed the importance of strengthening national support

through the approved recovery plans from the COVID-19 pandemic. Particular attention was paid to the disruptive impact of global online platforms on the media sector, in particular their dominant role in data and advertising markets. The European Democracy Action Plan complements this media plan and focuses on strengthening the digital adaptation of the media sector, ensuring media freedom and pluralism, and countering disinformation. The document also addresses the decline in media freedom due to increasing threats and pressure on journalists.

7. ***Education and Skills***. The Digital Education Action Plan supports Member States in adapting education systems for the digital era, prioritizing digital skills and a strong educational ecosystem.

8. ***Working Conditions in Platform Work***. New rules proposed by the EU aim to improve working conditions for platform workers, ensuring proper employment status determination and regulating algorithmic management.

9. ***Digital Infrastructure***. The EU is actively working on enhancing its digital infrastructure through initiatives that promote innovation, security, and resilience, with a focus on fostering future developments in digital technologies. On 21 February 2024, the Commission presented new initiatives for the digital infrastructure in Europe.

These areas represent the EU's broad and ambitious approach to shaping the digital future of Europe, balancing innovation with regulation to ensure a secure, fair, and inclusive digital environment.

8.3. Challenges and opportunities in implementing the EU digital strategy

Digitalisation is one of nine key drivers of Europe's competitiveness by 2030. Within the framework of the European Union's strategy for the next decade, digitalisation plays a key role in

ensuring sustainable economic development, technological leadership and improving the quality of life of citizens.

The European Union's digital strategy is a comprehensive plan designed to position Europe as a global leader in the digital economy while fostering innovation, ensuring fairness, and promoting sustainability. As the world becomes increasingly interconnected and dependent on digital services, the EU has recognized the need to enhance its digital infrastructure, improve cybersecurity, and address the digital skills gap to maintain its competitive edge. However, implementing this strategy is not without its challenges. Regulatory complexities, infrastructure disparities, and the need for significant investment present obstacles that must be overcome. At the same time, the opportunities to lead in digital regulation, foster technological innovation, and boost economic growth are immense. The below analysis explores the key challenges and opportunities in implementing the EU's digital strategy, examining how the region can navigate these hurdles to achieve its ambitious goals and secure a leading position in the global digital landscape. To begin, it is important to explore the key trends and enablers of digital transformation (Fig. 8.3).

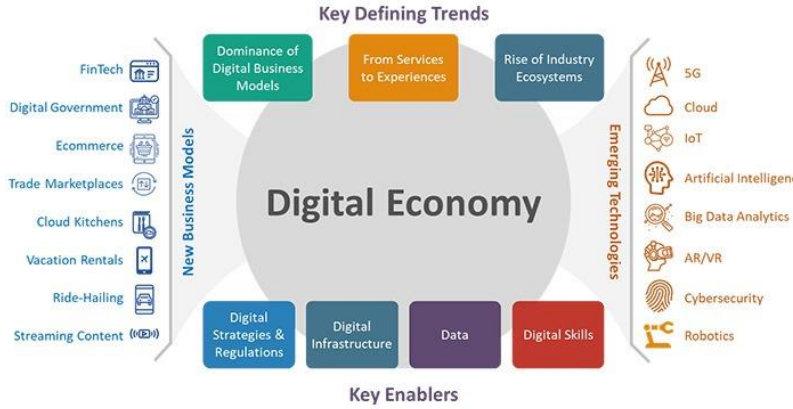


Fig. 8.3. Key trends and enablers of digital transformation [7]

The digital economy is shaped by three key trends driven by technological innovations such as social media, smartphones, IoT, AI, and Big Data Analytics. First, digital business models dominate, with platforms like Uber and Airbnb disrupting industries, and sectors like banking shifting to primarily digital services. Second, businesses now focus on creating experiences rather than just providing services, using AI-driven personalization and immersive technologies like AR and VR to enhance customer engagement. Lastly, industry ecosystems are replacing traditional value chains, with sectors like finance leveraging digital platforms and collaborations to drive innovation and resilience.

The ***Four Key Enablers of the Digital Economy*** are: Digital Strategies and Regulations, Digital Infrastructure, Data and Digital Skills. The digital economy relies on resilient, secure, and scalable infrastructure, including telecommunications networks, data centers, cloud computing, and edge computing, which are rapidly evolving to support distributed communication systems. Technologies such as 5G and Wi-Fi 6 are key to this process, enabling the development of healthcare, energy, and manufacturing. Data is the foundation of the digital economy, but most companies struggle to use it effectively, analyzing less than 3%. With accelerated digitalization, the demands for both specialized ICT skills (programming, data analysis) and general digital competencies are increasing, but the skills shortage remains a challenge. Governments must promote digital competencies and create an open data economy, while ensuring data security and privacy.

As the digital economy rapidly evolves, the implementation of comprehensive digital strategies becomes crucial for harnessing its full potential. The EU's digital strategy aims to capitalize on these trends and enablers, yet it faces several challenges and opportunities. Addressing the gaps in digital infrastructure, data usage, and ICT skills, while ensuring robust data security and privacy, will be key to realizing the benefits of digital transformation across sectors. This

context sets the stage for a closer examination of the challenges and opportunities that arise in executing the EU digital strategy.

Here is a diagram illustrating the challenges and opportunities in implementing the EU digital strategy. Each challenge at the bottom is paired with an opportunity at the top, highlighting how addressing specific issues can lead to significant advancements within the EU's digital framework (Fig. 8.4).

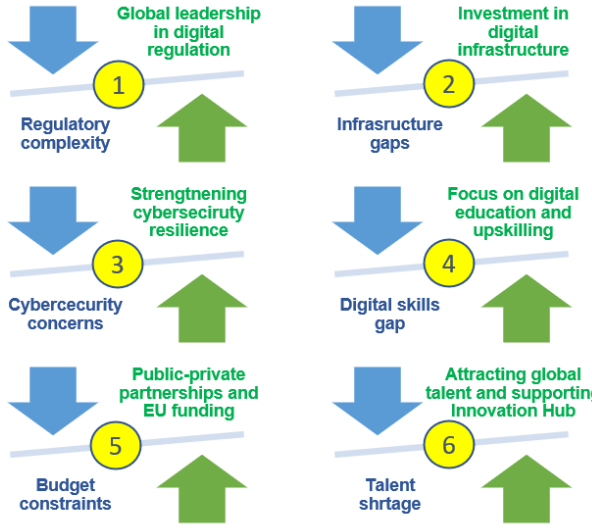


Fig. 8.4. Challenges and opportunities in implementing the EU digital strategy

1. Regulatory complexity → Global leadership in digital regulation. Despite the challenge of regulatory complexity, the EU has the opportunity to lead the world in digital governance by setting global standards for emerging technologies and digital markets. The Digital Services Act (DSA), Digital Markets Act (DMA), and AI Act can serve as benchmarks for other regions, enhancing the EU's influence on international policy. Harmonizing regulations across member states

may be complex, but doing so will create a more competitive, transparent, and safer digital environment.

2. Infrastructure gaps → Investment in digital infrastructure. Addressing infrastructure gaps, especially in underserved regions like rural areas, is a significant challenge. However, the EU's emphasis on boosting public and private investments for 5G, broadband, and advanced digital networks open up opportunities for economic growth and improved connectivity. By strategically allocating funds from programs like the Digital Europe Programme, the EU can promote inclusive access to digital services, fostering both technological advancement and social equity.

3. Cybersecurity concerns → strengthening cybersecurity resilience. While digitization brings heightened cybersecurity concerns, the EU can turn this challenge into an opportunity by becoming a global leader in cybersecurity resilience. The implementation of the Cyber Resilience Act and related policies can enhance trust in digital services and create a safer digital environment for citizens, businesses, and governments. By focusing on innovation in cybersecurity, the EU can secure its digital infrastructure, enabling a more secure digital transformation.

4. Digital skills gap → Focus on digital education and upskilling. The digital skills gap can be addressed by leveraging the EU's focus on digital education and workforce upskilling. Through the Digital Education Action Plan and similar initiatives, the EU can develop a skilled workforce capable of navigating and contributing to the digital economy. Educational reforms, lifelong learning programs, and partnerships between industries and academic institutions can fill the talent pipeline, ensuring businesses and public services have access to the expertise needed to adopt new technologies.

5. Budget constraints → Public-private partnerships and EU funding. Budget constraints may limit the scope of digital transformation projects, but opportunities lie in fostering strong public-private partnerships. Collaborations between governments,

businesses, and technology providers can help attract investment and share the financial burden. Moreover, the EU can tap into funding mechanisms like Horizon Europe and the Recovery and Resilience Facility to secure additional resources for large-scale digital infrastructure projects and innovation hubs, ensuring that key initiatives move forward despite financial challenges.

6. Talent shortage → Attracting global talent and supporting Innovation Hubs. The shortage of tech talent offers the EU the opportunity to create an attractive ecosystem for global talent. By offering incentives such as visa programs for skilled professionals and investing in innovation hubs, the EU can attract top-tier talent from around the world. Additionally, nurturing local talent through educational reforms and investment in science and technology programs will help fill key roles in areas such as AI, cybersecurity, and cloud computing, enabling the successful implementation of digital strategies.

In summary, by strategically leveraging these opportunities, the EU can address and balance the challenges posed by its ambitious digital strategy. The alignment of investments, policy reforms, and educational initiatives will be critical to achieving the goals outlined in the Digital Compass 2030 while ensuring Europe's competitive edge in the global digital landscape.

References

1. European Commission, Directorate-General for Communication, von der Leyen, U., 2019. A Union that strives for more: my agenda for Europe: political guidelines for the next European Commission 2019-2024. URL: https://doi.org/10.2775/018127

2. European Commission, 2010. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Digital Agenda for Europe. URL: https://eur-lex-europa-

eu.ezproxy2.utwente.nl/legalcontent/en/ALL/?uri=CELEX%3A52010DC0245

3. European Commission, 2015. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Digital Single Market Strategy for Europe. URL: https://eur-lex-europa-eu.ezproxy2.utwente.nl/legal-content/EN/TXT/?uri=celex%3A52015DC0192

4. European Commission, 2020. Communication from the Commission to the European Parliament and the Council: Data protection as a pillar of citizens' empowerment and the EU's approach to the digital transition - two years of application of the General Data Protection Regulation COM/2020/264 final. URL: https://eur.lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0264

5. European Commission, 2021. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: 2030 Digital Compass: the European way for the Digital Decade [online]. Available at: https://commission.europa.eu/system/files/2023-01/cellar_12e835e2-81af-11eb-9ac9-01aa75ed71a1.0001.02_DOC_1.pdf [Accessed 23 August 2024].

6. European Parliament, 2023. Digital Agenda for Europe. URL: https://www.europarl.europa.eu/factsheets/en/sheet/64/digital-agenda-for-europe

7. Nazeer S. (2021). Accelerating the digital economy: four key factors. URL: https://e.huawei.com/ua/blogs/industries/insights/2021/accelerating-digital-economy

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Chapter 5

JOBS RISING: UKRAINE CRISIS

Topic 9. The labour market in Europe: the main problems and the impact of Russia's full-scale military invasion of Ukraine

Questions that reveal the content of the topic

9.1. Analysis of labour demand dynamics

9.2. Employers' requirements for jobseekers' competences in Europe: changes and trends

9.3. The influence of migration flows from Ukraine on the development of the European labour market

In European countries, there is a serious imbalance in the labour market: in many industries there is a widespread shortage of labour, in others there is a surplus of qualified personnel and an insufficient number of jobs. The lack of efficiency in the European labour market is affected by certain achievements of the XXI century:

Digitization. Almost all sectors of the European economy are undergoing digital transformation. New technologies are being introduced to increase productivity, reduce the number of errors, and make processes more efficient. However, these technologies require certain skills, and therefore employers need to retrain staff.

Aging population. According to the European Commission, in 2022, about 21% of the EU population will be over 65 and half of the population will be over 44. In other words, the working age population is shrinking. It is expected to fall from 265 million in 2022 to 258 million in 2030 [1].

Transition to a climate neutral economy. The development of clean energy technologies and the shift away from fossil fuels both

create and destroy jobs. SolarPower Europe, the premier association for the European solar PV sector, found that by the end of 2023, the number of employees in the solar energy sector will increase by 39% to 648,000 people, compared to 466,000 people in 2021 [2].

Therefore, the problem of the formation of vacancies on the European labour market, the requirements of employers in the modern economy for the skills of job seekers, the influence of migrants, including those from Ukraine, on meeting the demand for labour remains relevant.

9.1. Analysis of labour demand dynamics

Since 2020, the European labour market is recovering from the COVID pandemic, but today it is still far from meeting all the needs of the population. The latest statistical data for 2023 indicate a reduction in the number of vacancies in the labour market, especially in the second quarter of 2023. Thus, the share of vacant positions decreased from 2.8% in the first quarter to 2.7%. At the same time, the employment rate of the population aged 20-64 was 75.4%, which is 0.1 percent more than in the previous quarter [3].

However, this is inferior to a more general trend: in the long term, the share of unfilled vacancies in the EU continues to increase annually, not ensuring the balance between supply and demand.

The number of unfilled vacancies in the EU continues to grow since 2020, when many people were laid off or made redundant due to the pandemic in order to reduce costs (Fig. 9.1).

Despite the growth of the employment rate in 2023, there is a labour shortage and a shortage of qualified personnel in the European labour market.

The creation of new jobs and the need to replace retiring workers cause shortages in the labour market. And in our opinion, this deficit is likely to increase, as the population of working age is predicted to

decrease from 265 million people in 2022 to 258 million people by 2030 [3].

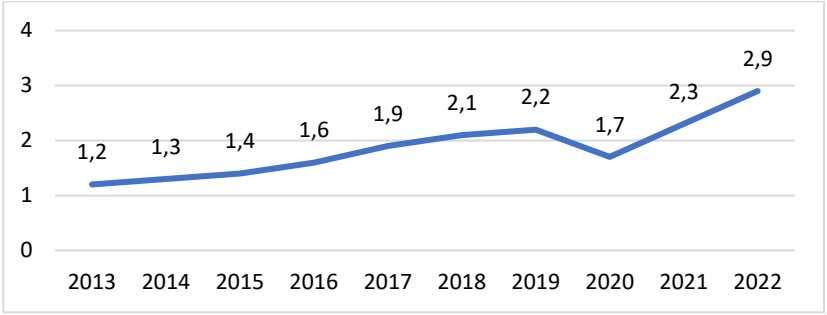


Fig. 9.1. Annual growth of vacant jobs in the EU, %

Created by the authors based on [3]

An interesting question is which country of the European Union has the most vacancies. Among the EU member states, the Netherlands has the most open vacancies: 4.7% of the total number of jobs still need to be filled (Fig. 9.2).

Belgium (4.6%), Austria (4.4%), and Germany (4.4%) are leading in the number of vacancies. In Bulgaria and Romania, on the contrary, the share of vacancies in the same time was only 0.8%.

Among the vacancies posted on the Internet in the same period, software developers and sales consultants had the highest demand. There were also significant number of vacancies in advertising, marketing and manufacturing, as well as in engineering and research. But the requirements for job seekers, the desired competencies of workers in the European labour market will be considered in the next topic.

If we consider the dynamics of changes in the number of vacancies from 2021 to 2023, it can be noted that after the opening of large markets after the COVID-19 pandemic, the level of vacancies in the EU was 2.2% (Fig. 9.3).

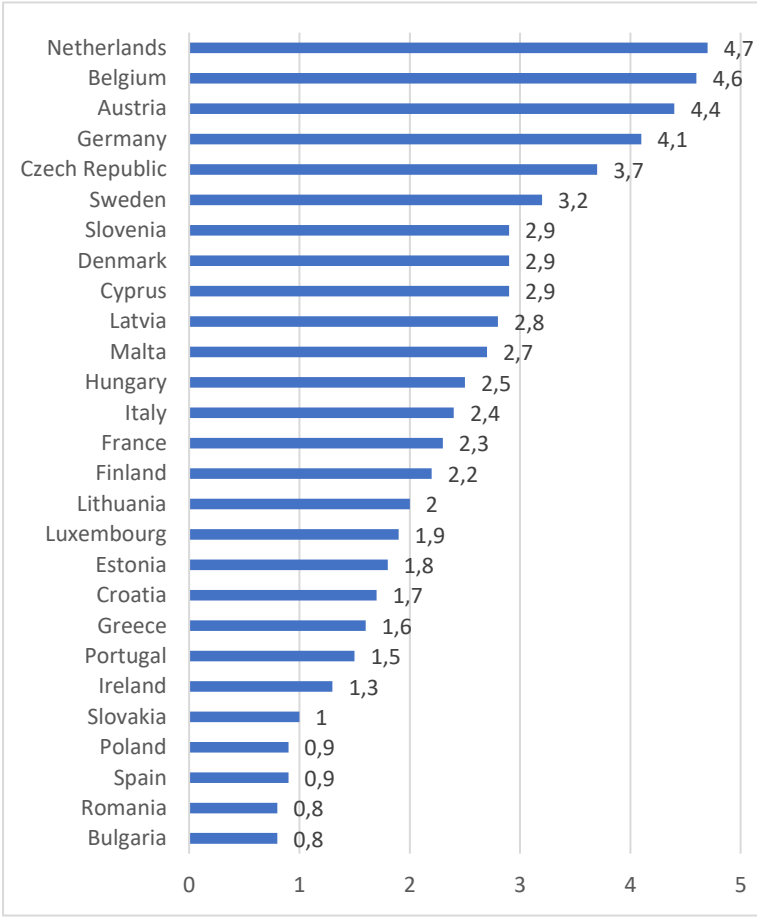


Fig. 9.2. Vacancy rate without seasonal adjustments, 2023 (%)

Created by the authors based on [3]

In 2022, there was a surge of the level of vacancies in the labour market in Europe. Indicators of it have increased sharply in almost all countries. In general, this indicator was equal to 3% in the EU. But since the beginning of 2023, the level of vacancies on the labour market of the European Union has started to decrease. And in 2023 it was already 2.7%.

The same dynamics is observed across the EU members. In connection with the development of scientific progress, the structure of demand for goods and services, political and economic instability, and in general the challenges of today, there have been structural changes in employment in the countries of the European Union (Fig. 9.4).

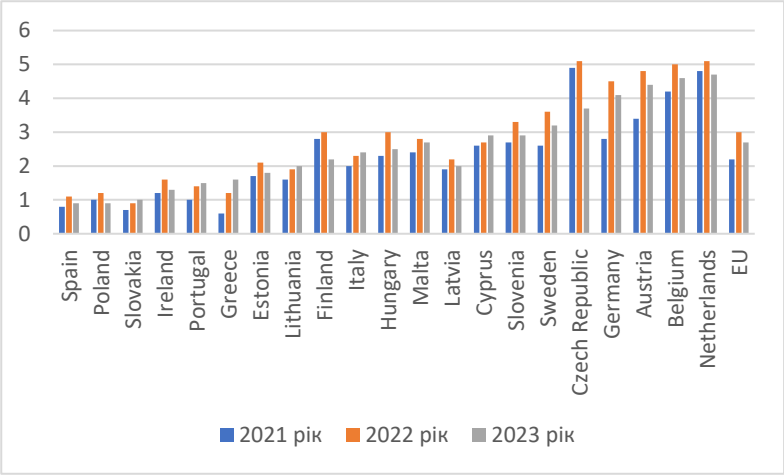
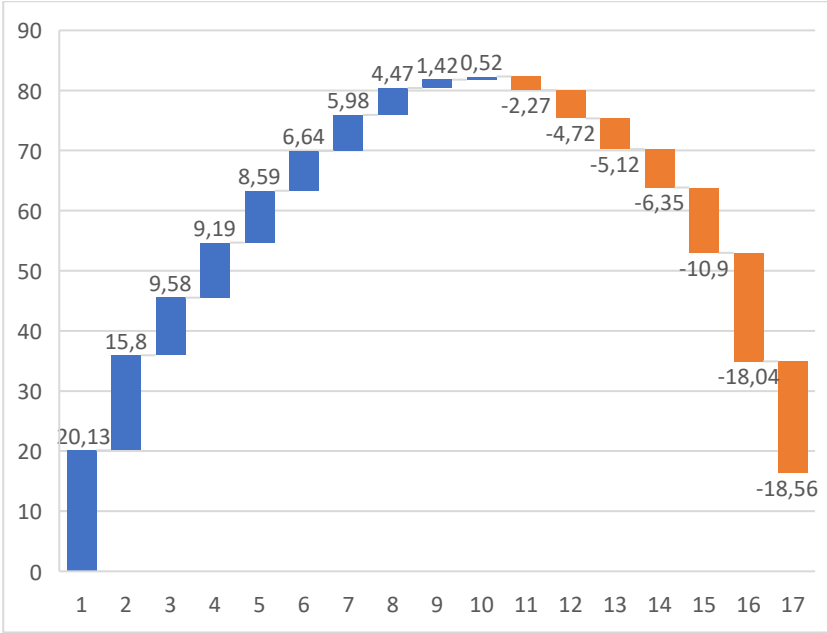


Fig. 9.3. The level of vacancies by year, in %

Created by the authors based on [3]

Thus, population employment in the field of real estate, science and technology increased by almost 20% for the period from 2014 to 2024. The second place for the rapid increase in vacancies was in the field of administrative activities and support services (15.8%). While employment in agriculture, fishing, forestry and coal mining and quarrying decreased significantly by 18.04% and 18.56%, respectively. The number of jobs in the service sector is increasing, while the number of jobs in the production sector is decreasing.



1	Real estate, science and technology	10	Transportation and storage
2	Administrative activities, support services	11	Construction
3	Education	12	Art, recreation
4	Information and communication	13	Industry
5	Health care and social work	14	Water supply, sewage, waste management
6	Finance and insurance	15	Electricity, gas, air conditioning
7	Provision of housing and food	16	Agriculture, forestry and fishing
8	Trade	17	Coal mining and quarrying
9	Public administration and security		

Fig. 9.4. Changes in the structure of employment in the EU, 2014-2024, in % [4]

9.2. Employers' requirements for jobseekers' competences in Europe: changes and trends

In order to consider the requirements of employers for job seekers, it is necessary to analyze the information about the vacancies and the skills requested in the online job advertisements. With the help of data from the Cedefop project [5], conducted by the European Union, this information now covers 27 European countries (EU-27).

Experts have collected and analyzed more than 100 million online job advertisements covering the period from January 2018 to December 2023. The analysis provides information on the most needed occupations and skills in European countries and regions based on established international classifications: ISCO-08 for occupations, NUTS-2 for regions, ESCO for skills and NACE-2 for sectors.

During 5 years, skills and competencies have been constantly changing and improving. Therefore, in our opinion, we can talk about the formation of the policy of European countries regarding skills and competencies in the labour market.

Let's start the analysis with the most popular professions in European countries (Fig. 9.5.).

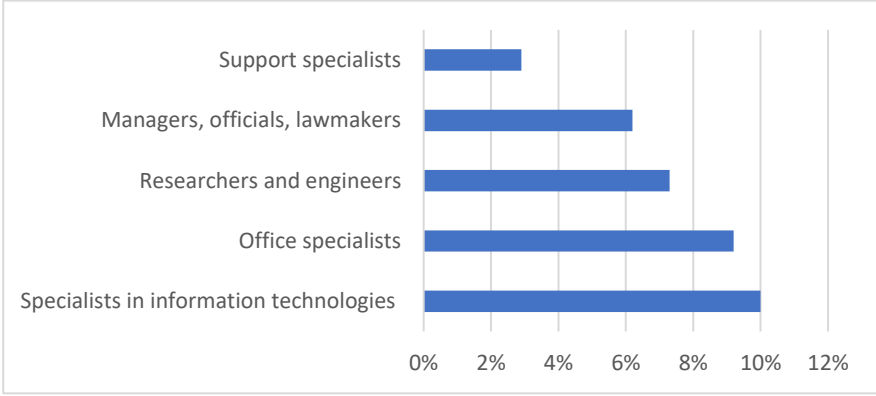


Fig. 9.5. The value of the most popular occupations in online job advertisements in the EU-27 in 2023

Created by the authors based on [5]

According to the analysis of online job advertisements collected in the EU-27 countries in 2023, ICT (information and communication technologies) specialists have the highest value at 10%, and support service specialists have the lowest value at 2.9%.

But it will be interesting to learn about the professions, the announcements of which are sent to job seekers of migrants (refugees), including forced migrants from Ukraine (Fig. 9.6).

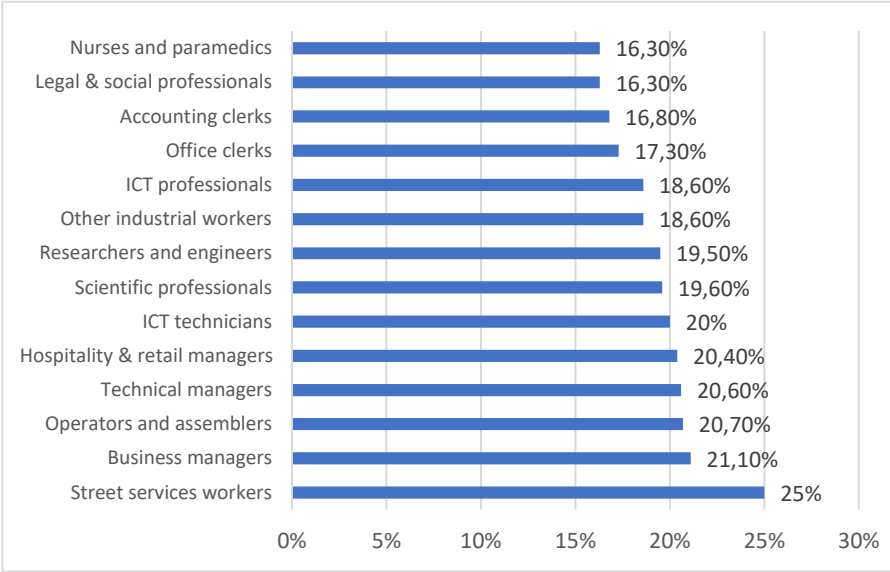


Fig. 9.6. The value of the best occupations in EU-27 online job ads in 2023 addressed to migrant jobseekers

Created by the authors based on [5]

Analyzing online job advertisements collected from the EU-27 countries in 2023, it can be said that street service workers have the highest value (25%), and medical personnel have the lowest value (16.3%) [3].

Employers are also concerned about the difficulty of finding employees for vacancies that require high qualifications. According to Eurostat, more than 75% of companies in the EU have similar difficulties and this phenomenon has a negative impact on economic growth.

Let us consider the most in-demand skills in online job advertisements in the EU-27 in 2023 (ESCO level 0) (Fig. 9.7). We remember that ESCO (European Skills, Competences, Qualifications and Occupations) is a European multilingual classifier of skills, competences, qualifications and occupations. ESCO level 0 is the basic level [6].

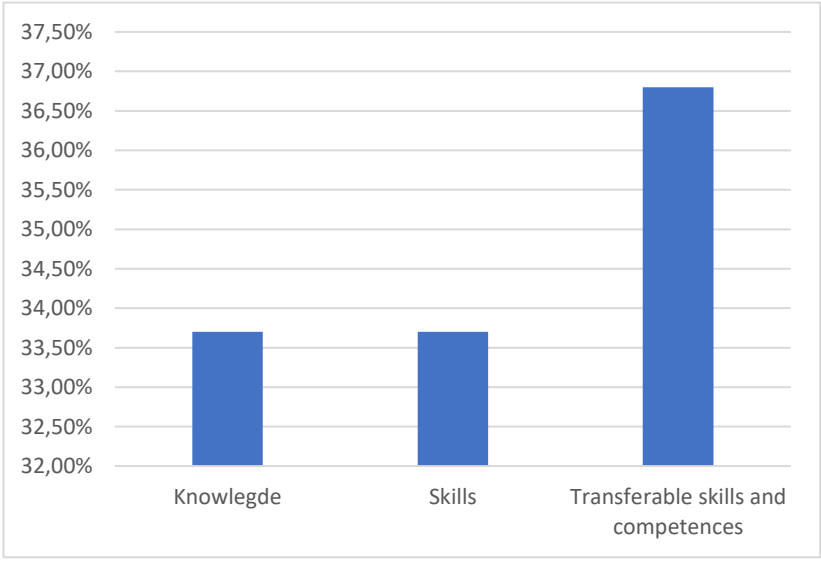


Fig. 9.7. The value of the most in-demand skills and abilities in online job advertisements in EU-27 countries in 2023 (ESCO level 0)

Created by the authors based on [6]

In job advertisements, employers pay attention to three important skills and abilities of workers, such as knowledge and professional skills (their value is 33.75%, respectively) and transversal skills and competencies with a value of 36.8%.

As for the most in-demand skills in online job advertisements in the EU-27 in transversal skills and competencies in 2023 (ESCO level

2), we can highlight eight main ones that employers pay attention to (Fig. 9.8).

The most popular skills in online job ads for transversal skills and competences collected from the EU-27 in 2023 is demonstrating a willingness to learn (has the highest value of 26.2% and processing information, ideas and concepts has the lowest value of 3%.

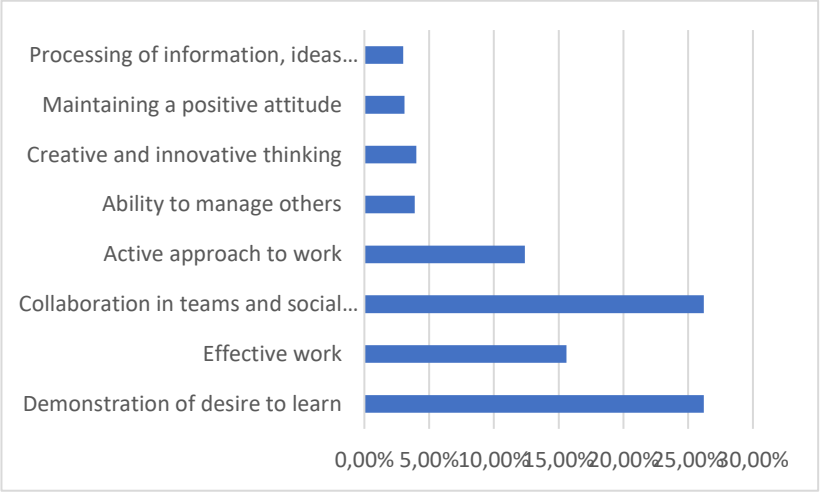


Fig. 9.8. The value of the most in-demand skills in EU-27 online job advertisements in transversal skills and competences in 2023 (ESCO 2)

Created by the authors based on [7]

The requirements of employers regarding skills and competencies directly affect the change in requirements for graduates of higher educational institutions (tab. 9.1.).

In 2020, at the World Economic Forum in Davos, the TOP-10 skills that will be relevant in 2025 were considered [8]. Accordingly, European educational institutions are already changing the list of skills, abilities and competencies for applicants.

Analytical thinking and problem solving are the top skills employers predict will grow in popularity over the next five years. But for the first time, such skills as active learning, endurance, stress resistance and innovation appear.

Table 9.1

The most requested skills of university graduates in Europe (2015 – 2025) [8]

2015	2020	2025
Complex problem solving	Complex problem solving	Analytical thinking and innovation
Coordination with others	Critical thinking	Active learning and learning strategies
People management	Creativity	Complex problem solving
Critical thinking	People management	Critical thinking and analysis
Negotiation	Coordination with others	Creativity, originality and initiative
Quality control	Emotional intelligence	Leadership and social influence
Service orientation	Judgment and decision making	Technology use, monitoring and control
Judgment and decision making	Service orientation	Technology design and programming
Active listening	Negotiation	Resilience, stress tolerance and flexibility
Creativity	Cognitive flexibility	Reasoning, problem solving and ideation

According to the Forum's forecasts, by the end of 2025, 50% of all employees on the European labour market will need retraining due to the increase in the introduction of technologies, changes in the

structure of labour demand, and approximately 40% of employees will need to undergo long-term retraining (lasting at least six months).

Thus, the number of vacancies is increasing, but about 27.5 million Europeans declared that they are either unemployed or working part-time [9]. A little more than one in eight EU residents is exposed to labour market slack, defined as "the difference between the desired amount of work and the available amount of paid work".

9.3. The influence of migration flows from Ukraine on the development of the European labour market

Migration processes have been known to humankind for a long time, but they have never been as relevant and discussed as they are today. The first quarter of the 21st century can undoubtedly be called the era of migration. Indeed, migration is indeterminate and does not belong to just one nation or religion. Migration today is a socio-economic process that covers all spheres and takes place in all regions.

Total number of migrants: according to Eurostat, in 2022 there were about 87 million people born outside the EU in EU countries. This represents approximately 17% of the total population of the EU [3].

Regarding the regional distribution, in Western Europe, a large number of migrants are located in countries such as Germany, France, the Netherlands, and Great Britain, in the southern part of Europe in Spain and Italy, and in northern Europe in Sweden and Denmark.

Countries with a high level of migration face a large number of problems, which can be divided into 4 groups (Fig. 9.9).

1. ***Economic problems:***

- burden on social systems: migrants can create an additional burden on social services, including health care and education;

- labour market problems: migrants can compete for jobs with the local population, especially in conditions of economic difficulties (Fig. 9.10).

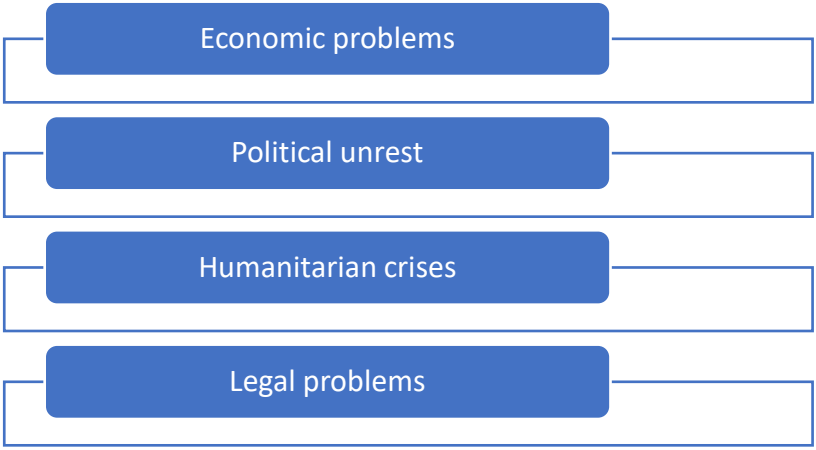


Fig. 9.9. Problems of countries with a high level of migration

The analysis shows that starting from 2021, the number of working migrants and their descendants is increasing and by the end of 2023 it has reached 42,780 thousand people.

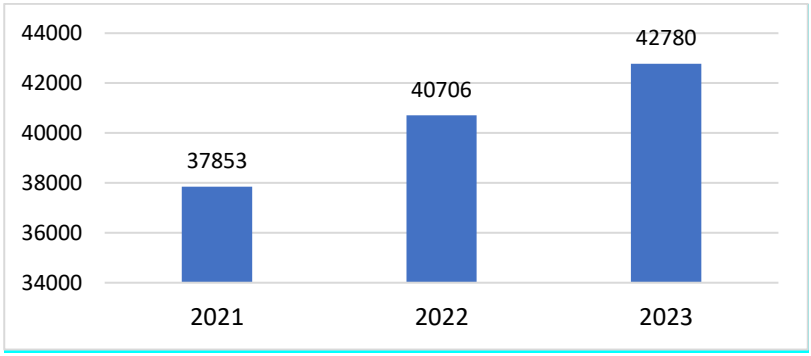


Fig. 9.10. The number of working migrants and their descendants in EU countries, thousands of people

Created by the authors based on [9]

***2. Political instability and conflicts*:** migration crises: periods of large migration flows, such as the refugee crisis in 2015 and in 2022, can cause political instability and tension between EU countries;

3. Humanitarian crises: Migrants often face difficult conditions on their way to Europe, including dangers associated with illegal migration routes.

4. Legal problems:

- uncertainty of status: many migrants face problems related to legal status and obtaining the right to stay;

- return: some EU countries have a policy of deporting illegal migrants, which can cause humanitarian problems.

European countries continue to work on solving these problems by developing different policies and strategies for managing migration and integrating migrants

It is important to analyze the impact of Ukrainian temporary refugees on the European labour market. As of November 1, 2023, more than 4.2 million citizens of Ukraine [10] use the mechanism of temporary protection in the countries of the European Union (Table 9.2).

The main EU countries accepting beneficiaries of temporary protection from Ukraine were: Germany, Poland, Czech Republic. Members of the European Union implemented the Temporary Protection Directive, which guaranteed refugees from Ukraine access to housing, social security and medical care. Those fleeing the war had the access to a residence permit in the EU, to the labour market, and to the education of their children.

The impact on the European labour market depends on a number of factors, such as the country of asylum of refugees, the level of integration of refugees and the specifics of local labour markets. Positive influence can include:

- Filling vacancies. As we found out, in some European countries there is a labour shortage in certain sectors, such as

agriculture, construction and the service sector. Ukrainian refugees can help fill these vacancies.

- The quality of labour resources. Among the temporary refugees there are many people with a high level of qualifications who can occupy certain specialized positions in the labour market.

Table 9.2

The number of refugees from Ukraine who benefit from temporary protection in the EU

EU Country	Number of persons
Germany	1194900
Poland	958655
Czech Republic	357960
Spain	187205
Bulgaria	166535
Italy	161220
Romania	140585
Netherlands	135625
Ireland	94085
Austria	79790
Lithiania	72810
Belgium	71350
France	64775
Portugal	57230
Finland	61165
Latvia	43035
Sweden	41915
Denmark	37440
Estonia	35820
Greece	26095
Croatia	22485
Cyprus	18360
Slovenia	8465
Malta	1885

Created by the authors based on [11,12,13]

- Support of local businesses. Ukrainian refugees are consumers of goods and services, that is, they can influence aggregate demand and stimulate the growth of local businesses.

- Creation of new enterprises. Some refugees create their own businesses, which can contribute to economic development and the creation of new jobs.

- A new perspective. The diversity of the workforce can bring new ideas and approaches to work, which can positively affect the innovativeness and competitiveness of companies.

But an analysis of the labour market in Europe shows that Ukrainians who have temporary protection also have ***a negative impact:***

- Tension in the labour market: In conditions of high unemployment, Ukrainian refugees can compete with local residents for jobs, which can lead to social tension.

- Language barrier. Without knowledge of the local language, refugees may face difficulties in finding work.

- Recognition of qualifications. Problems with the recognition of professional qualifications and diplomas can complicate access to professional positions on the labour market.

- Instability. Many refugees may be employed on temporary or part-time jobs, which does not provide stable income and career growth.

Many European countries implement special programs for the integration of refugees into the labour market, providing them with opportunities for internships and training, helping them to adapt, learn the language and acquire the necessary skills for work.

References

1. European Union. Official website. URL: https://european-union.europa.eu/index_en?prefLang=uk.

2. SolarPower Europe. URL: https://www.solarpowereurope.org/.

3. Eurostat. URL: https://ec.europa.eu/eurostat/databrowser/explore/all/all_themes.

4. Іляш О.І., Блохін П.В. Майбутнє HR менеджменту: тенденції, ризики, мотивація. Електронний журнал «Ефективна економіка». 2018. №10. URL: http://www.economy.nayka.com.ua/pdf/10_2018/5.pdf.

5. Cedefop. URL: https://www.cedefop.europa.eu/en/tools/skills-intelligence/trend-focus/skills-online-job-advertisements?country=EU27_2020&year=2023#1.

6. Що таке ESCO і як він використовується в «Europass»? URL: https://europass.europa.eu/uk/what-esco-and-how-it-used-europass.

7. European Skills, Competences, Qualifications and Occupations (ESCO). URL: https://esco.ec.europa.eu/en.

8. These are the top 10 job skills of tomorrow – and how long it takes to learn them. URL: https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-tomorrow-how-long-it-takes-to-learn-them/?fbclid=IwAR3h_yMNY73A-WrEH7Fjap-WqRNCoqMTaqlngJeIhHZXdyGMmO4ppJCZgAk&utm_content=21%2F10%2F2020+21%3A30&utm_medium=social_scheduler&utm_source=facebook&utm_term=Education+and+Skills.

9. Eurostat. URL: https://ec.europa.eu/eurostat/databrowser/view/lfsa_egaftsm__custom_14847231/default/table?lang=en&page=time:2023

10. Working in Europe: Which countries have the most job vacancies? What roles are in high demand? URL: https://www.euronews.com/business/2023/09/26/working-in-europe-which-countries-have-the-most-job-vacancies-and-what-roles-are-in-high-d.

11. Number of Ukrainian refugees 2024, by country. Statista. URL: https://www.statista.com/statistics/1312584/ukrainian-refugees-by-country/#:~:text=Ukrainian%20refugees%20in%20Germany,officially%20counted%20by%20the%20authorities.

12. Refugees from Ukraine in the EU. European Council. URL: https://www.consilium.europa.eu/en/infographics/ukraine-refugees-eu/#0.
13. Єврокомісія підрахувала кількість біженців з України. URL: https://www.ukrinform.ua/rubric-society/3801701-evrokomisia-porahuvala-kilkist-bizenciv-z-ukraini.html.
14. Кількість українців та їх міграція за кордон через війну – дослідження Громадянської мережі ОПОРА. URL: https://www.oporaua.org/viyna/kilkist-ukrayintsiv-ta-yikh-migratsiia-za-kordon-cherez-viinu-doslidzhennia-gromadianskoyi-merezhi-opora-24791.

Topic 10. Features of modern labour market development in Ukraine

Questions that reveal the content of the topic

10.1. Regional aspects of labour market recovery in Ukraine during the war

10.2. Analysis of the labour market in Ukraine: supply and demand imbalance

10.3. Post-war recovery of the labour market in Ukraine: influencing factors and opportunities

Russia's full-scale war against Ukraine affected the functioning of the labour market both in the country as a whole and at the regional levels. Today, the imbalance between the demand and the supply of labour resources is affected by a number of factors, such as the distance of enterprises and people looking for work from the front line, relocation of businesses from one region to another, migration of the population, mobilization to the ranks of the Ukrainian army, stimulation of creating jobs by the state, changes in the state employment policies. A separate problem of the labour market in Ukraine is unemployment among the population aged 18-35. Such a problem must be solved not only at the level of the state, but also at the level of enterprises, in particular educational institutions, and at the level of the individual.

The recovery of the labour market can be considered from the three sides: demand, supply and the efficiency of functioning. Each market instrument of the labour market is affected by different factors, which we will consider in this section.

10.1. Regional aspects of labour market recovery in Ukraine during the war

Today, significant fluctuations in the labour market are observed in Ukraine. According to statistics, the number of unemployed registered with the State Employment Service as of January 1, 2004 is 96,100, and 40% are unemployed with higher education [1]. At the same time, 40.2 thousand vacancies were registered. The question arises: why is the demand for labour resources not met?

We can single out several factors that directly affect supply and demand on the labour market in Ukraine:

1. Protracted war and uncertainty.
2. Structural and qualitative changes.
3. Large flows of internal migrants.
4. Large-scale migration of Ukrainians to European and other countries.
5. Mobilization processes.

According to analysts, the unemployment rate in Ukraine as of January 1, 2024 reaches 17% [1]. But in 2023, seasonal fluctuations were observed in the labour market, and in addition, the number of vacancies increased during the year. Thus, the number of vacancies in the front-line regions of Ukraine increased significantly: by 77.5% in Mykolayiv region; by 57.2% in Chernihiv region; by 53% in Sumy region; by 25.9% in Zaporizhzhia region [2]. Employers from Kyiv, Dnipropetrovsk, Lviv, Odesa and Kharkiv regions significantly influenced the change in demand in the labour market.

Russia's full-scale war against Ukraine significantly affects the national economy as a whole and the labour market in particular. In such difficult conditions, the state conducts and constantly adjusts the economic policy in the field of employment. Since 2003, programs have been operating in Ukraine to help employers who employ unemployed people from the category of "internally displaced persons" for their vacancies. Almost 14,000 such people got a job during the

year. And 5,000 entrepreneurs received assistance under the program of compensation for the employment of the unemployed for new jobs.

In addition, there are various micro-grants for entrepreneurs that create additional jobs in Ukraine. Such grants were awarded to 10,000 legal entities and individuals, who should create 20,600 new jobs within three years.

The "eRobota" project continues to develop. In April 2023, grants were announced for the creation of small businesses for combatants, war disabled and their family members. As of January 1, 2004, 226 grants were approved. It is assumed that thanks to this, almost 460 new vacancies will be opened [3].

It is very interesting that the structure of labour demand has changed a lot in comparison with the pre-war period. It is known that the number of vacancies from February 2022 to January 2024 increased in Western Ukraine, namely in Zakarpattia (155%), Ivano-Frankivsk (146%), Khmelnytskyi (125%), Lviv (123%), Vinnytsia (120%), Rivne (118%) and Chernivtsi (116%) regions (Fig. 10.1).

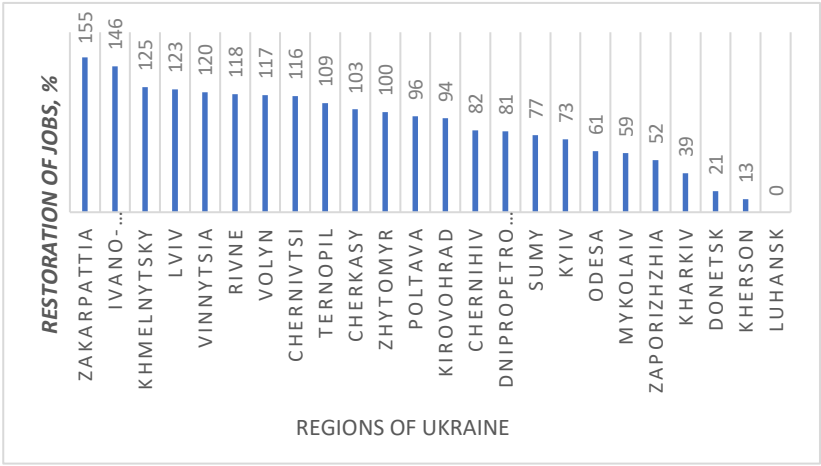


Fig. 10.1. Restoration of jobs in the regions of Ukraine from February 2022 to January 1, 2024

Created by the authors based on [4]

Recovery took place at a significant and rapid pace. But, if we consider the total number of vacancies, the leaders are Kyiv (30,913 vacancies), Lviv (8,473), Dnipropetrovsk (8,452), Odesa (5,752) and Kharkiv (3,347) regions [4]. In general, 60% of vacant jobs are located in these leading regions of Ukraine. 63% of all vacancies are concentrated in these areas.

Another lever of influence on the labour market in Ukraine is the expansion of self-employment. In 2023, more than 300,000 sole proprietors started their businesses. In comparison with the pre-war period, this is 7% more, but the creation of legal entities, on the contrary, decreased during the same period by approximately 30% [5]. The spread of new businesses (specifically sole proprietors) nevertheless contributed to the increase of vacancies. Dnipropetrovsk, Lviv oblasts and the city of Kyiv are leading in terms of the number of businesses created. In general, wartime in Ukraine showed that business has a certain reserve of stability and strength, and this is what affects its survival, development, preservation of jobs and creation of new ones.

Entrepreneurs constantly adapt their business to the challenges of war. Protracted war events, destruction, threats and risks complicate the functioning of business, but new labour recruitment strategies are being created, which are quickly oriented to changes in the situation both at the front line and in the economy. The United States Chamber of Commerce conducted a survey in Ukraine regarding the problems of business management and development. The following results were obtained: the most urgent problem is the safety and protection of employees (91%); in second place are Russian missile attacks on critical infrastructure and business assets (66%); then the health and mental state of employees (65%); decrease in demand for consumer goods and services (45%); and finally the limited access to electricity, water supply, mobile communication, heat supply (44%). In addition, a survey of businessmen showed an increase in pressure from the state and changes in the state regulatory

policy [6]. These problems concern all regions of Ukraine without exception.

The regions of Ukraine can be divided according to their location into frontline, recovery, auxiliary and remote regions. Accordingly, the dominant problems in these regions are different. Thus, in the front-line regions, the main problem is the physical destruction of enterprises, infrastructure facilities, housing stock, and population decline. As for the recovery regions, they are suffering from the destruction and loss of business, declining population and consumer demand. The main reason for the loss of supporting regions is access to sea transport, which affects the decrease in exports and the deterioration of logistics. The problems of remote regions are the shortage of qualified personnel, the impossibility of retraining for the unemployed [7].

Another factor in the uneven distribution of labour resources between the regions of the country is the relocation of business. It is known that from the beginning of Russia's full-scale war against Ukraine until the beginning of 2024, almost 8,000 Ukrainian enterprises were displaced: 27% of them left Kyiv, 11% moved from the Dnipropetrovsk region, 8% each moved from Donetsk and Odesa regions, 6% moved from Kharkiv region. But 22% of companies moved to Kyiv from the frontline regions and 20% moved to Kharkiv and Odesa regions [8]. Most of such enterprises were located in the Western regions, which greatly affected the employment of internally displaced persons.

10.2. Analysis of the labour market in Ukraine: supply and demand imbalance

Forced resettlement of the population, migration of people of working age, mobilization of men to the ranks of the Armed Forces of Ukraine and problems in education led to an imbalance of supply and demand in the labour market in Ukraine. The main problem is the lack

of qualified workers who would meet the requirements of employers. Before the full-scale invasion in the Transcarpathian and Ivano-Frankivsk regions, the supply of labour exceeded the demand. As of January 1, 2024, the labour market in these regions has recovered by 155% and 146% of jobs, respectively, due to enterprises that moved from other regions and the creation of new factories. In other words, there are many more vacant jobs, but there are still not enough candidates for these positions. Such unsatisfied demand is also observed in other Western regions. There is a significant shortage of workers in the frontline regions, where the lag between supply and demand for labour is associated with the outflow of potential workers from these areas.

In which regions of Ukraine is there the hardest competition among job seekers? According to "Work.ua" statistics, the highest competition level for a workplace was observed in Kyiv, Kharkiv and Vinnytsia regions. And among these regions, only Vinnytsia region saw an increase in the number of vacancies compared to the pre-war period. The lowest competition level was in Zakarpattia, Chernivtsi and Kherson regions [9].

If you turn to the statistics of the State Employment Service, you should pay attention to the presence of a discrepancy between the quantitative and qualitative characteristics of supply and demand on the labour market in the regions and the difference in the depth of such disparities (Fig. 10.2).

According to the data in Figure 10.2. the highest level of unemployment was registered in the Zaporizhzhia, Dnipropetrovsk, Sumy and Kharkiv regions. On the other hand, the largest number of vacancies was observed in Lviv, Dnipropetrovsk, Kyiv and Odesa regions. It should be noted that Dnipropetrovsk region is the leader both in terms of demand and supply in the labour market in Ukraine.

In addition, the policy aimed at reducing the gap between demand and supply in the labour market was carried out. In those areas, where the most vacancies were created, there were vocational training and

retraining of the unemployed. Such measures were effective and the effectiveness is confirmed by the relevant statistics for some regions (Fig. 10.3).

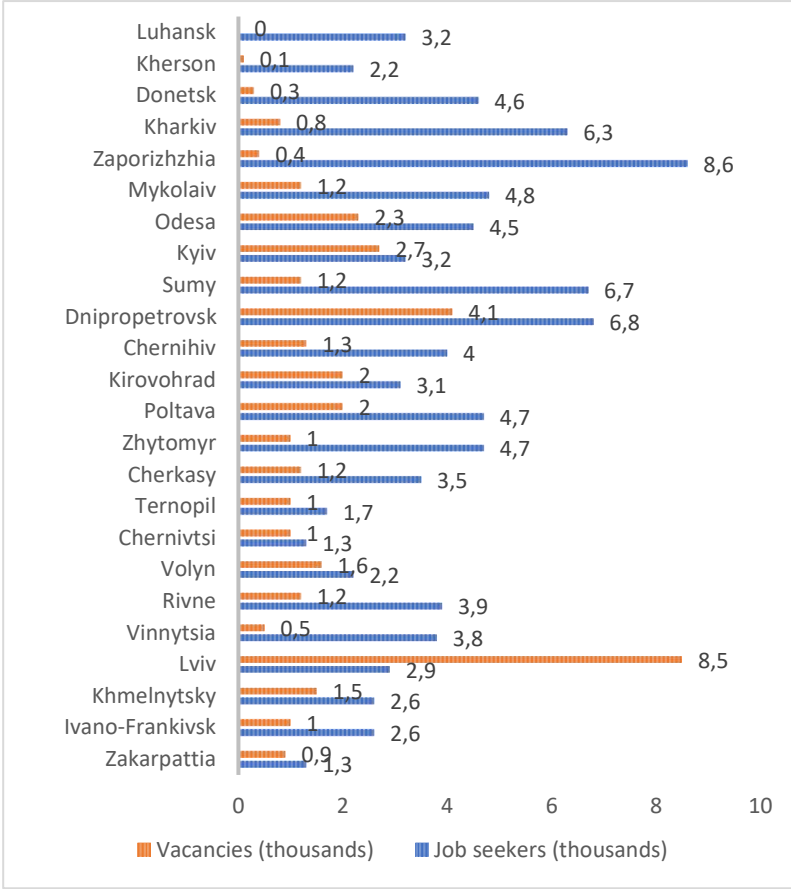


Fig. 10.2. The number of vacancies and job seekers on January 1, 2024

Created by the authors based on [1]

The regions with a high share of employment include Dnipropetrovsk, Rivne and, surprisingly, Donetsk regions. The largest number of unemployed people were trained and retrained in Donetsk and Rivne regions.

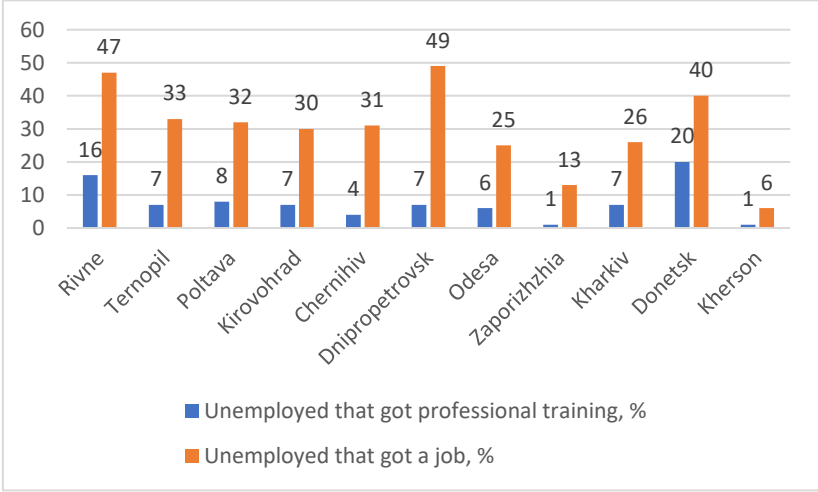


Fig. 10.3. The percentage of employment and professional training of the unemployed in 2023

Created by the authors based on [1]

Data on youth unemployment are interesting for study (Fig. 10.4). It should be noted that among forced migrants, approximately 80% are aged 18 to 40, which is the most productive age. Even greater losses among the able-bodied population occurred due to mobilization to the Armed Forces of Ukraine.

The largest number of unemployed people aged 18-35 in 2003 was registered in Dnipropetrovsk (12,193), Lviv (7,537), Kyiv (7,414) and Kharkiv (7,120) regions. Dnipropetrovsk (5,919 people), Lviv (4,670 people), Rivne (3,534 people) and Volyn (3,342 people) can be attributed to the regions with the most significant employment among the mentioned persons. We understand that many unemployed people

were not registered with the employment services at all. In addition, the number of unemployed people decreased due to deregistration because of the forced migration. There are no data on the level of unemployment in the occupied territories.

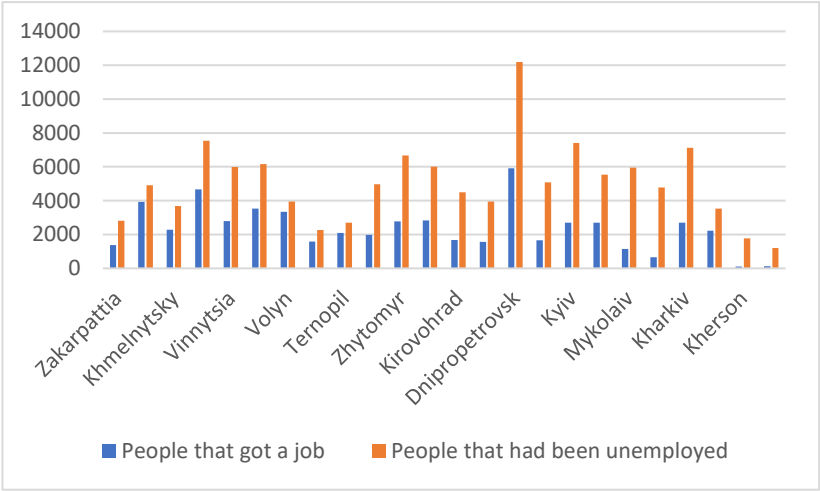


Fig. 10.4. The number of people aged 18-35 who got a job and who had the status of unemployed in 2023

Created by the authors based on [1]

The high level of unemployment among young people indicates the presence of certain problems:

- lack of experience;
- social insecurity;
- inconsistency of the competences obtained in educational institutions with the requirements of employers;
- inconsistency of working conditions with the expectations of job seekers.

All these problems affect the labour potential of the country, because young people aged 18-35 make up a third of all the available labour resources of our country.

One more problem that affects the imbalance of demand and supply in the labour market can be singled out. This is motivation. In other words, permanent stable income of the employee matters. According to official statistics, the average salary for vacancies in 2023 is UAH 11,559. This is 14.6% more compared to the previous year [1]. But such wages do not meet the interests of young job seekers. Today, wages are influenced by various factors: the scientific and technical state of enterprises, economic and organizational problems of society and business, regional differences, etc. All this is connected with the deterioration of the economic and social infrastructure, the high differentiation of salaries according to the branches of the economy. Another important factor influencing the wage rate is the competition among potential applicants for vacancies and the growth in demand for some professions and specialties. The demand for builders, drivers, working professions (mainly physical labour), electricians and mechanics is higher now.

Let's analyze the average salary level for vacancies by region of Ukraine (Fig. 10.5).

The differentiation of average salaries for vacancies by region is UAH 5,083. The vacancies with the highest salaries are offered in Kherson region (average salary 13,970 UAH), and the lowest in Vinnytsia region (8,887 UAH, respectively).

In order to stabilize the labour market and achieve a balance between the demand and supply of labour services in the conditions of a full-scale war between Russia and Ukraine, it is necessary to implement certain measures: adaptation of the economically active population to the challenges of the war; training in some professions; implementation of the experience of European countries, state support of small and medium-sized businesses, war risk insurance.

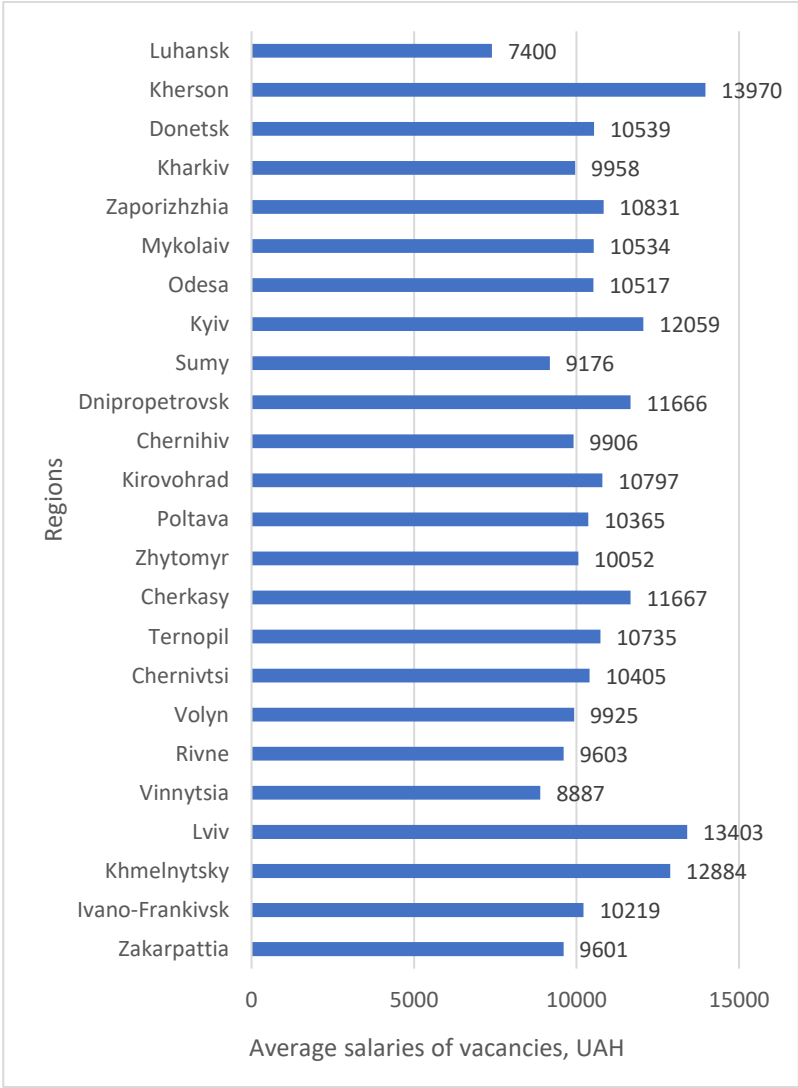


Fig. 10.5. The average salary for vacancies in the regions of Ukraine in 2023.

Created by the authors based on [1]

10.3. Post-war recovery of the labour market in Ukraine: influencing factors and opportunities

After two and a half years of Russia's full-scale war against Ukraine, various ideas, programs, plans, and visions of how to restore the country's economy appear. Economists and scientists are looking for their "Marshall plan" for Ukraine. The experience of countries that have gone through a path similar to Ukraine's can help us. It is known that after World War II, there were 30 major wars and more than 250 military conflicts in the world, in which approximately 60 countries were involved.

One of the main directions of post-war development is the formation of the country's labour market. Therefore, let's consider the factors that affect and will affect the demand and supply of labour force, and the efficiency of the functioning of the market.

1. Labour supply. We can highlight the main factors that will influence changes in supply on the labour market:

- *Creating a demographic strategy.* First, let's analyze some statistics on demography in Ukraine. According to the forecast of the Institute of Demography and Social Studies in 10 years, i.e. in 2034, no more than 35 million people will live in the borders of Ukraine in 1991 [10]. And this is a very optimistic figure. Many experts believe that the population will be 26-27 million people. As of January 1, 2023, the population was approximately 37.7 million people. There are 31.6 million people in the controlled territories. Moreover, as of January 1, 2024, there were 8.5-9 million Ukrainians outside of Ukraine, of which approximately 3 million left by February 24, 2022 [10].

With the recovery of the economy, the state needs to develop a program in which there will be three key points: 1) facilitating the return of Ukrainians who migrated due to the military conflict, as well as their adaptation; 2) reduction of labour migration of Ukrainians after the war; 3) attraction of labour migrants from other countries.

Today it is necessary to initiate and motivate people to return to Ukraine so that temporary migration does not turn into a permanent one. A rapid economic recovery will create new jobs. According to the experts of *Forbes*, Ukraine will need to attract at least 300,000 migrants every year [11]. The question arises: who will come from other countries to work in Ukraine? Labour migration stimulates the global economy, but we can attract migrants only from Uzbekistan, Tajikistan, Kyrgyzstan, etc. But for this, it is necessary to change the legal framework and create appropriate conditions of encouragement.

- *Involvement of youth in the labour market.* According to statistical data, as of the end of 2021, people aged 15-24 accounted for 17.7% of the economically inactive population (at the same time, only 30.7% of people aged 15-24 are economically active [12]. The main influencing factor there is a very low participation rate among young people in the labour market. The main reason for this is the desire of young people to get an education and increase their expected income. But the Ukrainian educational system is not flexible enough to allow full-time students to have an official job. Besides, graduates usually earn less than those who have experience and this does not provide incentives to work. Therefore, the state should promote the entrepreneurial initiatives of young people in the conditions of economic recovery.

- *Involvement of pensioners in the labour market.* In Ukraine, the retirement age is lower than in most European countries, and raising the retirement age could seem like an appropriate policy to encourage older people to work. However, the life expectancy for Ukrainians is lower than for EU citizens by 8.928 and 12.529 years for women and men, respectively [13]. Under such conditions, a statutory increase in the retirement age may lead to a situation where a significant proportion of workers will not live to reach it. Today, the pension system in Ukraine prevents the formal employment of older people in productive sectors. In Ukraine, the continuation of professional activity after retirement reduces the cost of benefits. Therefore, pensioners

face an incentive to work informally. According to data from 2021, the ratio of the number of informally employed to the employed in the 71+ group was almost 52%, that is the highest indicator among all age groups [14]. It is necessary to carry out reforms in the pension system in Ukraine in such a way as to encourage people of retirement age to continue official professional activity.

- *Involvement of persons with disabilities in the labour market.* Today, war veterans and people with disabilities make up 2% and 6%, respectively. But after the end of the war, their number will increase [15]. In our opinion, companies need to take this factor into account. But there is a problem even now: such vulnerable categories of the population do not turn to employment centers and do not look for work. In addition, employers are not ready to change working conditions at enterprises. The state needs to implement a program that will compensate businesses for the costs of improving workplaces, and for persons with disabilities, such a program will provide an opportunity for training and retraining. For this, you can use the centers of professional and technical education of the State Employment Service (SES). This step is logical because such centers are already working with the adult population and have short-term educational programs in their arsenal. This also applies to war veterans: to change their profession, improve their skills at the expense of the state.

- Involvement of women in the labour market. As a rule, the supply of women in the labour market is always lower than that of men. First of all, in most cases, they are responsible for taking care of children and they are not always able to combine motherhood and work. Secondly, the differentiation in incomes between men and women is very high. And this also prevents high employment among women. Thirdly, the demand for women's labour is always less than for men. In the future, it is necessary to review the family policy of the state carefully, which can have a positive effect on the general state of the labour market, as well as increase the share of the offer of women's labour services.

2. Demand for labour. The main factors affecting demand in the labour market include:

- *Investment promotion.* It can be noted that the efficiency of capital investments directly affects productivity. It is known that the increase in productivity will have a positive effect on the employment of the population.

- *Improving the quality of labour resources.* Today the State Employment Service help only the unemployed. But in the future, such a policy must be changed. The experience of the German employment services can be taken as a basis: they work not only with the unemployed, but also with the employed, giving them the opportunity to improve their qualifications.

Unfortunately, in Ukraine, retraining is carried out only by professional and technical education centers. Persons with higher or professional education are studying there. But this is not enough in the future. In the post-war economy, such a segment as the defense sector will develop, and the export of products will increase. Specialists of the relevant specialties are not able to raise their level or obtain relevant competencies in the centers of the State Employment Service. If all Ukrainian ports are opened, approximately 500,000 additional vacancies will appear literally at once [15]. Therefore, any educational institutions of the 3rd and 4th levels of accreditation, which would introduce new programs for the training of specialists and partial qualifications, could be engaged in state-ordered training and advanced training.

3. Effective functioning of the labour market. In our opinion, it is possible to distinguish three directions of state policy aimed at achieving equilibrium in the labour market:

- *Improvement of the policy of liberalization*. Ukraine is a country with a market economy. And a liberal policy on the labour market could work, but not at the post-war stage. All the same, the state is forced to help overcome unemployment through the State Employment Service. Such assistance can be deepened by stimulating the relocation of job

seekers to those regions where the demand for labour services is high. In addition, increase the costs of training and retraining of persons who have the status of unemployed.

- *Reduction of labour shortage.* An analysis of the distribution of the labour force between women and men showed that men dominate in industry, while women dominate in the service sector. In the post-war period, the labour market will experience a shortage of male labour. In our opinion, the hiring policy will change. Yes, it is possible to use women's labour in industry and at the same time provide them with assistance. Or another option for overcoming the labour shortage is the attraction of migrants with appropriate qualifications. And the last thing is the return of Ukrainians who were forced to temporarily migrate to different countries.

- *Overcoming regional inequality in the labour market.* The economic development of Ukraine's regions is uneven. Therefore, in the development of the economic recovery program after the war, it is necessary to take this into account so that this problem does not worsen.

What professions will be in demand in Ukraine after the end of a full-scale war between Russia and Ukraine? Seven main groups can be distinguished [16]:

- *Construction and architecture.* Demand will grow for all construction specialties (engineers, architects, plasterers, painters, specialists in restoration of buildings, bridges, etc.).

- *Medicine and psychology.* After the war, medical professions, professions related to rehabilitation, psychologists will be very relevant.

- *IT.* This industry will continue to develop. There is already a lot of digital documentation in Ukraine and this will only continue to grow. We have a digital economy ahead of us, and the demand for specialists in the IT field will only grow.

- *Electronic commerce.* A large part of marketing will move to the Internet. Thanks to online sales, consumer demand will be satisfied

very quickly and qualitatively, and the turnover rate of sellers' money will be increased. This applies not only to goods, but also to services, including financial ones. It is e-commerce that will enable Ukraine to increase exports of goods and services.

- *Logistics.* It is the correct logistics scheme that makes it possible to increase the efficiency of enterprises both in the national economy and beyond.

- *Energy and security.* The demand for professions in this field will grow. Ukraine needs to develop its energy independence: development of deposits, nuclear energy, alternative energy, restoration and development of energy infrastructure.

- *Military and industrial complex.* Russian invasion of Ukraine showed that it is necessary to develop own production of weapons, military and other equipment, training of military personnel with new professional skills and competencies. The defense industry will be interested in engineers, scientists and researchers.

It is also necessary to mention the effect of multiplication in the economy. One workplace in the listed industries will contribute to the emergence of approximately 4-5 jobs in related ones. Therefore, the post-war labour market will develop at a very fast pace.

The further development and recovery of our country will depend on the availability and qualification of personnel. So, in order to become an expert in your field, you should choose your future specialty with your heart and mind, as well as have a knack for the chosen profession.

References

1. Державна служба зайнятості. URL: https://www.dcz.gov.ua/analitics/view.

2. Річні підсумки аналізу показників національного ринку праці у 2023 році. Національне агентство кваліфікацій. URL:

https://nqa.gov.ua/news/ricni-pidsumki-analizu-pokaznikiv-nacionalnogo-rinku-praci-u-2023-roci/.

3. єРобота. URL: https://erobota.diia.gov.ua/.

4. Ринок праці оживає: у січні зростали зарплати, кількість шукачів і конкуренція. Work.UA. URL: https://www.work.ua/articles/analytics/3234.

5. Понад 300 тисяч нових ФОПів відкрилося у 2023 році. Опендатабот. URL: https://opendatabot.ua/analytics/foponomics-2023-12.

6. Опитування Американської торговельної палати в Україні та Citi Україна. Ведення бізнесу в воєнній Україні. Вересень 2023. Американська торговельна палата. URL: https://chamber.ua/ua/publikaczii/.

7. Регіональний бізнес в Україні: досвід, можливості та перешкоди. Київстар Бізнес. URL: https://hub.kyivstar.ua/article-category/biznes-ideyi.

8. 7820 компаній переїхали по Україні від початку повномасштабного вторгнення. Опендатабот. URL: https://opendatabot.ua/analytics/relocation-in-war-2.

9. Work.UA. URL: https://www.work.ua/articles/analytics.

10. Інститут демографії та соціальних досліджень імені М.В. Птухи Національної академії наук України. URL: https://idss.org.ua/index.

11. Forbes. URL: https://forbes.ua/ru/forbes-ukraine/forbes-ukraina-serpen-veresen-2023-09112023-17150.

12. OECD. Labour force participation rate. URL: https://www.oecd.org/en/data/indicators/labour-force-participation-rate.html.

13. Giang, T.L., Nguyen, T.H.D. (2021). Determinants of Work Decisions among Older People in Rural Vietnam, Population Ageing. URL: https://www.researchgate.net/publication/310538564_Determinants_of_Work_Decisions_among_Older_People_in_Rural_Vietnam.

14. Обчислення ЦЕС на основі Даних Держстату. Зайнятість населення за статтю, типом місцевості та віковими групами. URL: https://www.ukrstat.gov.ua/.

15. Ринок праці після війни: Україні бракуватиме 4,5 мільйона робочих рук. URL: https://www.ukrinform.ua/rubric-economy/3701857-rinok-praci-pisla-vijni-ukraini-brakuvatime-45-miljona-robocih-ruk.html.
16. ТОП галузей, які потребуватимуть працівників після війни. URL: https://chg.dcz.gov.ua/publikaciya/top-galuzey-yaki-potrebuvatymut-pracivnykiv-pislya-viyny.

Chapter 6

BRINGING NEW SOLUTIONS TO GLOBAL SOCIAL PROBLEMS TO THE MARKET

Topic 11. Natural and Ecological Problems and Perspectives of Their Solving

Questions that reveal the content of the topic

11.1. Natural and ecological problems: a scientific approach
11.2. Natural and ecological problems and European policies

We all know that people in the world have always struggled for their survival. Nature was not a friend of a human. Moreover, the conditions of living used to be hostile. Probably, many tribes and peoples died trying to overcome natural problems and we do not know anything about them.

During the development of civilization, the humanity started to respond to the challenges of nature. People have been changing the natural condition for millennia. On the one hand, it facilitated the existence of human race. But, on the other hand, people created new problems that had never existed before.

Natural and ecological problems are a real danger. Many of European political leaders and opinion makers realize it, regardless of their political views. We need to outline these issues too. Moreover, we are going to analyze the effectiveness of numerous decisions that have already been made to prevent disastrous consequences of the global problems.

Of course, it is not possible to consider all of these issues within this topic. But we are going to analyze the main tendencies in European policies regarding these problems. The experience of the

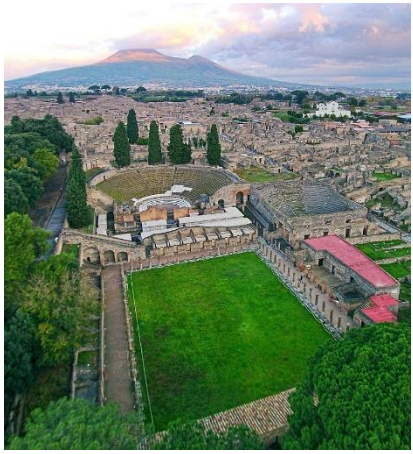
EU is necessary to be studied in Ukraine, considering Eurointegration of our country.

11.1. Natural and ecological problems: a scientific approach

The modern word nature originates from Latin *nātūra* which means birth, origin, natural constitution or quality. All features, forces, and processes that happen or exist independently of people, as well as plants and animals can be considered as nature. It exists beyond the human control and there were times when people were totally dependent on it.

The ***Last Glacial Period*** was a challenge to humans but our ancestors survived and became more adapted to severe climate. Humans made great leaps forward in toolmaking and weaponry. In the history of humanity this period is included into the Stone Age, because most of the tools were made of stone.

The human civilization became more and more developed. People learnt how to work with metals and other materials. The division of labour facilitated the economic development. But the natural forces were still strong and merciless. In 79 AD, the Roman city of Pompeii was totally destroyed by the volcano eruption. Much later, in 1815, another volcano eruption, in Indonesia, caused extreme weather conditions in Europe in 1816. This phenomenon is known as ***"the year without a summer"*** and it was an agricultural disaster in many nations.



Remains of Pompeii in Italy

2002 floods in Germany

Nowadays, these issues are also topical. We can do nothing to prevent earthquakes, volcano eruptions and hurricanes. When such catastrophes happen, it is necessary to provide emergency aid to the people who suffered from the disaster. In recent decades, a significant number of natural disasters happened, but in most cases the international aid was sufficient. For example, a week of ***intense rainfall produced flooding*** across a large portion of Europe in ***2002***. The EU leaders provided aid to the countries that suffered the most (even those of them which were the EU future members). Thus, European countries have some experience in collective action against natural disasters.

Modern natural and ecological global problems are considered by numerous scholars. We are going to mention some of them.

Climate change is one of the most notorious ones. During the last decades it has been observed steady increase in air temperature on Earth. This trend has been going on for a long time, at least since the 19th century. Its pace has significantly increased in the last decades because of the burning of fossil fuels such as coal, oil, and natural gas.

The scientific consensus on climate change is often denied by political leaders and public speakers

Although natural processes can also affect the atmospheric concentrations of gases and aerosols, observations indicate that this has not been an important cause of changes over the past 10,000 years. Thus, it is well-established that human activities are the major cause of the dramatic changes in atmospheric composition since the start of the ***Industrial Revolution*** about 200 years ago [1]. ***So, human activity is the main factor of global warming.***

Greenhouse gases act similarly to the glass in a greenhouse: they absorb the sun's heat that radiates from the Earth's surface, trap it in the atmosphere and prevent it from escaping into space. The greenhouse effect keeps the Earth's temperature warmer than it would otherwise be, supporting life on Earth [2]. Among greenhouse gases there are: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, nitrogen trifluoride, etc.

According to NASA research, future effects of global climate change in the United States will be:

- U.S. sea level likely to rise 1 to 6.6 feet by 2100;
- climate changes will continue through this century and beyond;
- hurricanes will become stronger and more intense;
- there will be more droughts and heat waves;
- wildfire season will be longer;
- frost-free season (and growing season) will lengthen;
- global temperatures will continue to rise;
- Arctic is very likely to become ice-free [3].

As we can see from the above, these consequences of climate change apply not only to the USA, but also to the other countries.

One of the most dramatic consequences of climate change is **water scarcity**. Some ***1.1 billion people worldwide lack access to water, and a total of 2.7 billion find water scarce for at least one month of the year***. Many of the water systems that keep ecosystems thriving and feed a growing human population have become stressed. Rivers, lakes and aquifers are drying up or becoming too polluted to use [4]. Many urban rivers have a questionable reputation. One of the

well-known examples is the Seine in France. For a century it had been forbidden to swim in this river because of water pollution. Paris organized massive infrastructure improvements costing $1.5 billion to ensure the 2024 Olympic swimming events could be held in the Seine [5].

More than 60 percent of all freshwater resources are shared by two or more countries, including major rivers. For example, the water of Mekong is shared by 6 countries [6]. ***In Europe, many counties rely on the Rhine and Danube*** (both of them are heavily polluted). The Danube is the world's most international river with its river mouth in Romania and Ukraine.

According to the European Commission, ***water deficit is a topical problem for Europe***.

- 38 % of the EU population was affected by water scarcity in 2019;
- 29 % of EU territory was affected by water scarcity in 2019;
- €2 to 9 billion cost of droughts each year [7].

Another global issue is **deforestation**. Around 10% of the world's forests have been lost worldwide through deforestation over the past three decades [8]. Rainforest destruction in Brazil and African States is dangerous for environment in the whole world. It is mostly caused by human activity, especially agriculture and wood industry. In Europe, economic activity almost does not influence forest now, but wildfires are still dangerous. Spain, Portugal, Greece and many other countries suffer from these disasters. In the last five years, wildfires in Spain and

2024 wildfires in Greece

Portugal have devastated nearly one million hectares of land [9]. ***Long wildfire seasons are mostly caused by unprecedented heat***. With climate change driving up temperatures and creating drier conditions, fire seasons are now starting earlier and finishing later [10].

Most European city inhabitants are exposed to dangerous levels of **air pollution**. Europe is facing a severe public health crisis caused by breathing toxic air. One of the most hit countries in Europe is North Macedonia (especially its capital, Skopje). Among the EU members, on of the highest pollution levels is in Italy, mostly in the north of the country [11]. In Poland, significant amounts of coal are used in residential and commercial heating, and in industry and power production that lead to one of the highest pollution rates in the EU [12]. Fine particulate matter, nitrogen dioxide and ozone are among the key air pollutants.

Diseases also can be included into the list of natural and ecological problems, because bacteria and viruses are elements of nature. Of course, diseases cause more damage to societies in the Global South while the situation in the EU is relatively stable. But the case of COVID-19 proved the fragility of health care system even in the richest states of the world.

Thus, Europe is exposed to various natural and ecological problems. They are mostly cause by human activities. Also, these problems are global and concern all of humanity. So, it is necessary to provide sustainable development across the entire EU. We assume that these problems could be solved on different levels of European politics, but anyway it will be the result of political activity.

11.2. Natural and ecological problems and European policies

As we know, the European Union was created in 1992, but some of its institutions had been functioning before. The process of decision making in the EU has been evaluating for decades. Now the

institutions of the EU function like those in a state. All policies of the EU are adopted and regulated by European institutions.

The European Green Deal was designed as the EU's compass to achieve those goals. It aims to ensure zero emissions by 2050, ***making Europe the first climate-neutral continent in the world.*** There are some objectives of this policy:

- no net emissions of greenhouse gases by 2050
- economic growth decoupled from resource use
- no person and no place left behind [13].

There are some key figures of the European Green Deal.

- Europe will become the first climate-neutral continent by 2050;
- greenhouse gas emissions will decrease by at least 55% by 2030, compared to 1990 levels;
- 3 billion additional trees will be planted in the EU by 2030 [13].

The European Green Deal consists of numerous plans that cannot be listed and analyzed in this chapter, but some of them are related to economic and social policies. E.g., the investment pillar of the Green Deal is the ***Green Deal Investment Plan***.

The ***Green Deal Industrial Plan*** is also worth mentioning. It enhances the competitiveness of Europe's net-zero industry and is accelerating the transition to climate neutrality. The four pillars of the plan are:

1. Predictable and simplified regulatory environment. It includes the Net-Zero Industry Act, Critical Raw Materials Act and Electricity market design
2. Faster access to funding that will will speed up investment and financing for clean-tech production in Europe.
3. Enhancing skills. Withing this pillar, the European Commission tries to facilitate access of third country nationals to EU labour markets in priority sectors.

4. Open trade for resilient supply chains is designed to develop the EU's network of Free Trade Agreements and other forms of cooperation with partners to support the green transition [14].

Wind farm in Skåne, Sweden

The official webpage of the European Commission informs us about the achievements of this policy. E.g., the results are following:

1. Over €100 billion is the value of EU's net-zero start-ups ecosystem in 2021, doubling since 2020.

2. More than 400 GW of wind and solar renewable energy production capacity in the EU was produced in 2022, an increase of over 25% compared to 2020.

3. There were 4.5 million green jobs in the European economy in 2019 up (in comparison with 3.2 million in 2000).

2023 has been the most successful year on record for EU's new offshore wind installations. CEO of WindEurope G. Dickson said that wind power is now 19% of all the electricity consumed in the EU [15].

In order to tackle the **water problem**, the EU provides various policies, including drinking water policy. The EU's main law on drinking water is the Drinking Water Directive (DWD). It concerns the access to and the quality of water intended for human consumption to protect human health [16]. In 2024, the European Commission adopted new minimum hygiene standards for materials and products that come into contact with drinking water. These measures will make water safer to drink, as well as reduce the administrative burden for companies that produce the relevant materials and products [17].

We have already mentioned that the problem of rivers is also very topical, not only regarding drinking water issues. The ***EU Strategy for the Danube Region (EUSDR)*** was launched in 2010. The priority areas of this program include waterways mobility, water quality, environmental risks, etc. [18].

To tackle **air pollution** and achieve the EU's zero pollution vision for 2050, the EU has a comprehensive clean air policy based on three pillars: ambient air quality standards, reducing air pollution emissions, and emissions standards for key sources of pollution. The objectives of this policy are:

- reduce the number of premature deaths and sicknesses caused by air pollution;
- reduce pollution pressure on ecosystems and biodiversity [19].

In 2023, M. Neira, the director of the World Health Organization's department of environment, climate change and health, said that ***politicians of Europe have a moral responsibility to urgently tackle the continent's dangerously polluted air*** [20]. In 2024, the European Parliament adopted the revised law to improve air quality. The new rules set stricter limits for several pollutants, including particulate matter, nitrogen dioxide, and sulphur dioxide. Javi López, a EP member representing Spain, said after the successful vote: «Today is a significant victory in our continuous commitment to secure a safer, cleaner environment for all Europeans» [21].

The EU also makes efforts to **protect forests**. It aims to improve the health of existing forests in Europe, and significantly increase sustainable, biodiverse forest coverage worldwide. There are five main priorities:

- reduce the footprint of EU consumption on land and encourage EU consumption of products from deforestation-free supply chains;
- co-operate with producer countries to reduce pressures on forests;
- strengthen international cooperation to avoid deforestation and forest degradation and encourage restoration of forests;

- redirect finance to support more sustainable land-use practices;

- support the availability and quality of information on forests and commodity supply chains, the access to that information, and support research and innovation [22].

One of the topical issues is the problem of public health. Among numerous factors that influence health there are **diseases**. The rapid spread of disease to a large number of hosts in a given population within a short period of time is an epidemic. ***2009 swine flu pandemic*** was a challenge to Europe. EU Member States' responses ranged from wholesale vaccination programmes to none at all (in the case of Poland) [23].

In 2020, the measures against ***COVID-19*** were much stricter. The pandemic was considered as a threat to the whole humankind. The most common ways to tackle the pandemic were lockdowns and vaccination. Both of these measures lead to protests in many countries. Also, numerous conspiracy theories emerged in European societies. ***Anti-vaccine activism became popular in many countries***. The European Commission proposed more factchecking and algorithm changes to tackle disinformation about COVID-19 and vaccination [24].

Conspiracy theories became very popular during the COVID-19 pandemic

Thus, the European Union faces a lot of challenges caused by natural and ecological problems. The European institutions have elaborated flexible mechanisms of solving these problems, but the challenges also become more and more dangerous. Every new problem needs a special way to tackle it. E.g. COVID-19 has changed the attitude to safety. Also, this pandemic has led to new conspiracy theories that was also harmful for the society and healthcare system.

References

1. Global Warming: A Science Overview. U.S. Department of Transportation. URL: https://www.transportation.gov/sites/dot.gov/files/docs/maccracken2_Global-Warming.pdf

2. Climate change: the greenhouse gases causing global warming. European Parliament. URL: https://www.europarl.europa.eu/pdfs/news/expert/2023/3/story/20230316STO77629/20230316STO77629_en.pdf

3. The Effects of Climate Change. NASA. URL: https://science.nasa.gov/climate-change/effects/

4. Water scarcity. WWF. URL: https://www.worldwildlife.org/threats/water-scarcity/

5. Water quality was acceptable when Olympians swam in Seine River, data shows. Associated Press. URL: https://apnews.com/article/olympics-2024-seine-water-quality-paris-1e1cd295bb4c757b52ff6cdab1b3f8b5

6. Global water crisis fuelling more conflicts, UN report warns. Al Jazeera. URL: https://www.aljazeera.com/news/2024/3/22/increasing-water-scarcity-fuelling-more-global-conflicts-un-report-warns

7. Water scarcity and droughts. European Commission. URL: https://environment.ec.europa.eu/topics/water/water-scarcity-and-droughts_en

8. Deforestation. European Commission. URL: https://environment.ec.europa.eu/topics/forests/deforestation_en

9. Spain and Portugal join forces in the fight against natural disasters. Euronews. URL: https://www.euronews.com/my-europe/2024/07/08/spain-and-portugal-join-forces-in-the-fight-against-natural-disasters

10. Portugal is among the worst affected countries as climate change ramps up extreme wildfires. Euronews. URL: https://www.euronews.com/green/2024/06/25/portugal-is-among-the-worst-affected-countries-as-climate-change-ramps-up-extreme-wildfire

11. Revealed: almost everyone in Europe is breathing toxic air. The Guardian. URL: https://www.theguardian.com/environment/2023/sep/20/revealed-almost-everyone-in-europe-breathing-toxic-air

12. Poland Air Quality Management – Poland Final Report. January 2019. World Bank. URL:

https://documents1.worldbank.org/curated/en/574171554178748054/pdf/Air-Quality-Management-in-Poland.pdf
13. The European Green Deal. European Commission. URL: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
14. The Green Deal Industrial Plan. European Commission. URL: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal-industrial-plan_en#paragraph_33968
15. Wind energy: How are EU countries contributing to the 2030 targets? Euronews. URL: https://www.euronews.com/business/2024/02/08/wind-energy-how-are-eu-countries-contributing-to-the-2030-targets#:~:text=Germany%20was%20the%20frontrunner%20in,the%20EU's%20total%20production%20capacity.
16. Drinking water. European Commission. URL: https://environment.ec.europa.eu/topics/water/drinking-water_en
17. Drinking water to become safer thanks to new EU-wide hygiene standards for materials and products in contact with water. European Commission. URL: https://ec.europa.eu/commission/presscorner/detail/en/ip_24_350
18. One Strategy – 12 Priorities. Danube Region Strategy. URL: https://danube-region.eu/about/priority-areas/
19. Air. European Commission. URL: https://environment.ec.europa.eu/topics/air_en
20. Europe's politicians have moral responsibility to tackle air pollution, says WHO environment director. The Guardian. URL: https://www.theguardian.com/world/2023/sep/21/europes-politicians-have-moral-responsibility-to-tackle-air-pollution-says-who-environment-director
21. Air pollution: Parliament adopts revised law to improve air quality. European Parliament. URL: https://www.europarl.europa.eu/news/en/press-room/20240419IPR20587/air-pollution-parliament-adopts-revised-law-to-improve-air-quality#:~:text=Parliament%20on%20Wednesday%20adopted%20a,225%20against%2C%20and%2017%20abstentions.
22. Deforestation. European Commission. URL: https://environment.ec.europa.eu/topics/forests/deforestation_en

23. Swine flu: lessons to learn from "disproportionate" EU response. European Parliament. URL: https://www.europarl.europa.eu/news/en/press-room/20110125IPR12478/swine-flu-lessons-to-learn-from-disproportionate-eu-response

24. EU cites ‘anti-vaccine campaign’ as reason to toughen social media code. The Guardian. URL: https://www.theguardian.com/media/2021/may/26/eu-cites-anti-vaccine-campaign-reason-toughen-social-media-rules

Topic 12. Social and Economic Problems and Perspectives of Their Solving

Questions that reveal the content of the topic

12.1. Social and Economic Problems: a scientific approach
12.2. Social and Economic Problems and European policies

According to Aristotle, humans are social animals. Indeed, the history of people is connected with the history of social entities. There are many theories of the emergence of the state, society, economy and other phenomena. Accordingly, numerous scientists and philosophers paid considerable attention to consideration of social and economic problems. Among them were utopian theories, for example, the ideas of Plato (Ancient Greece) and T. More (England). Some theories had a rational basis, for example, the theory of the social contract. According to this theory, people agree to create a state and limit their freedoms in order to secure their rights. The state is a product of the collective will of people, not a creation of God or the result of a spontaneous process. Thus, the ideas of the social contract were formulated by T. Hobbes, J. Locke, J.-J. Rousseau and other philosophers.

In the 19th century, socio-economic problems began to globalize. Thus, they affected a large number of people. Accordingly, not only philosophical theories appeared, but also ideologies. The ideologies were aimed to explain the problems faced by the peoples of the world. Most of the authors of ideological concepts lived in Europe. Classical liberalism and conservatism appeared there (mostly in the UK and France). Marxism and social democratic ideology also emerged in Europe. Also, in the XX century Nazism and fascism appeared, offering radical solutions to global and national problems.

All these doctrines tried to explain socio-economic problems and offer different options for their solution. But, considering the current state of these problems, we will consider not philosophy or ideology but science. We assume that modern science offers relevant and multidimensional interpretations of socio-economic issues in Europe.

12.1. Social and Economic Problems: a scientific approach

The modern world is far from ideal. Even the most developed countries of Europe suffer from the influence of many destructive factors. Specific implementations of these problems often depend on the specifics of the country or even of the particular region.

The demographic problem is one of those global challenges to which no single answer can be suggested. In our opinion, it is possible to consider two of its main dimensions: **demographic explosion** (population explosion) and **demographic crisis** (population decline). These problems have deep social roots and are associated with changes in the values of the society. Demographic explosion is not faced by any European country. In Europe, there are no countries in which the population has been growing rapidly for many decades. At the same time, most European countries are facing a demographic crisis.

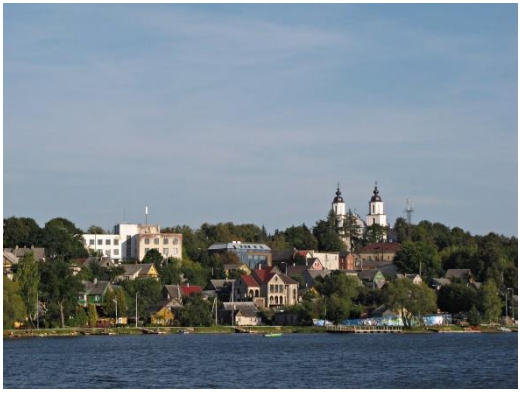
Between January 1, 2021 and 1 January 2, 2022, during the COVID-19 pandemic, the EU's population decreased by 265 thousand people. This reduction could be attributed to natural population changes (more deaths than births), as net migration plus adjustment remained positive (more people entered the EU rather than left it). Unfortunately, the pandemic also played its role [1].

From 2003 to 2023, the total population of the European Union increased from 431.2 million to 448.8 million, so we can see a growth of 4%. During this period, 18 EU members showed increases and 9 recorded decreases of their population. The largest relative increases were recorded in Luxembourg (47%), Malta (36%), Ireland (33%), and

Cyprus (29%). The largest relative decreases were observed in Latvia (−18%), Lithuania and Bulgaria (both −17%), and Romania (−12%). The largest absolute increases were recorded in France and Spain (both 6.3 million), while the largest absolute decreases were observed in Romania (−2.6 million), Poland (−1.5 million), and Bulgaria (−1.4 million) [2].

We can see that the largest increase of the population is observed in the developed countries of Europe that have been EU members for decades. And on the contrary, the former Warsaw Pact members and former Soviet republics face depopulation. One of the reasons for these tendencies is migration. People from poorer countries (Latvia, Romania, Bulgaria, etc.) are trying to move to richer countries with higher standards of living. Moreover, people from the Global South (especially from Africa and the Middle East) mostly arrive to the richer members of the EU (Italy, France, Germany, Spain, etc.).

Even across a particular country, the depopulation can have some peculiarities in different regions. E.g., in Lithuania, the most radical demographic changes take place in the peripheral countryside regions, which are losing population at the highest rates. According to the newest research, there are differences in the socio-demographic characteristics of the population of different regions. For example, older, less educated people, those working in the primary sector, and those who are unemployed, or not participating in the labour market, are the most likely to live in the most declining areas [3]. Lithuanian regions are dealing with the fastest-shrinking labour



Town Zarasai in Lithuania

market in the European Union [4]. We can take almost any small town and find out that its population is shrinking too fast. For example, in Zarasai there were 8,355 inhabitants in 2001, but only 5,939 people lived there in 2022 [5].

In Latvia, the situation is the same. After the restoration of the country`s independence, many people left and the fertility rate also fell sharply. One of the reasons of these tendencies was the uncertainty of Latvians about their future. Like in Lithuania, we can notice the regional dimension of the demographic crisis in Latvia. E.g., the population of Latgale is shrinking rapidly (sometimes by 2% a year) [6].

Depopulation is extremely fast in post-Communist states including Latvia, Lithuania, Bulgaria, Romania and many others.

As it has been mentioned before, the demographic problem in interconnected with the issues of **migration**. The majority of people who arrive in the richest and most developed European countries were born outside Europe. Many of them come from Syria, Iraq, Palestine and numerous African countries. It is obvious that immigrants differ from native Italians and Germans or other Europeans. Many of immigrants neither work nor study. Also, they often commit crimes. A Syrian citizen who came to Germany as an asylum seeker was charged with killing three people in an attack in the western town of Solingen in 2024 [7]. The Italian island of Lampedusa remains frontline for massive migrant flows. The locals often believe that both the Italian government and EU authorities are not providing any durable solution of the problem [8].

Another topical problem is **unemployment**. Among European Union countries in October 2023, Spain had the highest unemployment rate at 12%, followed by Greece at 9.6%. By contrast, Malta has the lowest unemployment rate in Europe, at 2.5%. The overall rate of unemployment in the European Union was 6% in the

same month [9]. The situation does not seem to be catastrophic, but we should mention youth unemployment. In April 2023, its highest rates were in Spain (27.9%) and Greece (27.7%). Also, 20.7% of youth in Italy were unemployed. The best situation was in Slovenia (only 5.6%) [10]. We should not underestimate the problem of youth unemployment. It often causes crime and radicalism that are key threats to security in the modern world, including Europe.

According to the European Commission, there were 3 862 police-recorded intentional homicides in the EU in 2022, a 4.4 % increase compared with 2021. 231456 offences of sexual violence were recorded by police in 2022, that is 10.3 % more than in the previous year. The number of thefts, robberies and burglaries also increased [11].

French police gathering evidence at the Bataclan theatre after the November 2015 Paris attacks

Terrorism is one of the most dangerous activities. The use of violence against non-combatants to achieve political or ideological aims is widespread in the 21st century. Terrorist attacks in Madrid (2004), London (2005), Paris (2015), Nice (2016), Manchester (2017), etc. were organized by Islamists. But it is not correct to blame all Muslims for this illegal activity. According to J. Borrel, we live in a world in which identity politics is often creating antagonisms between groups and communities, including inside the Islamic world itself [12].

Nevertheless, as we have mentioned above, there are some obvious problems with the integration of immigrants in the European Union. Some of the migrants from Africa and the Middle East do not

share the values of the European society. In Lower Saxony, 67.8% of Muslim schoolchildren believe that the rules of the Quran are more important than the laws of Germany [13]. This situation cannot be ignored by the politicians. For example, **Alternative for Germany (AfD)** has become one of the most popular political parties. This party celebrated its victory in the eastern state of Thuringia in September 2024 [14]. In other EU member states, the far-right political parties are also popular. E.g., **Brothers of Italy** is the Italian national-conservative and populist party led by Giorgia Meloni, the incumbent Prime Minister of Italy. According to her, illegal migrants are the enemies of legal ones [15]. Sometimes there are conflicts between EU officials and national authorities over the problems of migration. E.g. Gergely Gulyás, Hungarian Prime Minister Viktor Orbán's chief of staff, said that his country will offer every migrant "transport to Brussels free of charge" [16].

Björn Höcke celebrating the victory of AfD in Thuringia (Germany)

To sum up, the European Union faces many challenges related to social and economic problems. The perspectives of their solving mainly depend on the effectiveness of the EU policies.

12.2. Social and Economic Problems and European policies

All the issues mentioned above are considered by European institutions and politicians. We will try to outline the results of some policies and initiatives in the field of solving these problems.

European officials admit that the **demographic problem** is one of the most important and acute now. In 2023, the European Commission adopted a Communication presenting a set of policy tools

available to Member States for managing demographic change and its impacts on the EU's society and economy, including its global competitiveness. There are four pillars around which a comprehensive approach to demographic change is structured:

1) support parents by better reconciling family aspirations and paid work, notably by ensuring access to quality childcare and good work-life balance;

2) supporting and empowering younger generations to thrive, develop their skills, facilitate their access to the labour market and to affordable housing;

3) empowering older generations and sustaining their welfare, through reforms combined with appropriate labour market and workplace policies;

4) where necessary, addressing labour shortages through managed legal migration, in full complementarity to harnessing talents from within the EU [17]. As we can see, the European officials underline the necessity of protecting quality of life.

Also, the EU recognizes the right of people to change the place of their living. **Legal migration** is considered to be an investment in the economy and the society. Moreover, legal migration supports the EU's green and digital transition and contributes to making European societies more cohesive and resilient.

The EU rules regulate:

- the admission conditions and rights of students and researchers of non-EU countries;

- the right to family reunification;

- the conditions and procedures for nationals of non-EU countries to obtain a long-term residence permit [18].

The European network of «Cities for Local Integration Policies for Migrants» (CLIP) was launched because of the importance of housing for the integration of migrants. According to this project, city administrations should aim to improve the level of personal security in neighbourhoods with a poor infrastructure, a sizeable proportion of

residents with low socioeconomic status and a high proportion of migrants. In particular, the ideas of equality should be implemented to prevent segregation. One of the solutions is to spread social housing across the city, to build smaller social housing units and to retain the middle class native population in areas with a high concentration of migrants in order to provide a social mix [19].

We have mentioned that radicalization of youth is one of the problems in Europe. Of course, many radicalised young people were born in the EU member states, but their parents are migrants. In order to prevent radicalisation, the **Radicalisation Awareness Network (RAN)** was established in 2011. The practitioners involved in the activities of RAN work daily with people vulnerable to radicalisation and those who have already been radicalised. They are engaged in both preventing and countering violent extremism in all its forms and rehabilitating and reintegrating violent extremists [20].

The fight against **terrorism** among the main priorities of the activity of the EU. One of the directives implementing the counter-terrorism policy is Directive (EU) 2018/843 of the European Parliament and of the Council. In particular, it mentions the growing convergence between organized crime and terrorism in the modern world. The directive contains deep concerns about the financing of terrorist activities in virtual currencies: the anonymity of such currencies enables their potential illegal use of them for criminal purposes [21]. This Directive is the main legal instrument to prevent the use of the financial system of the European Union for the purposes of money laundering and terrorist financing [22, p. 70].

Europol plays an important role in the prevention of criminal, in particular, terrorist acts. Being an international police agency, Europol cooperates with countries and organizations that are not members of the EU. Europol currently has partnership agreements with 22 non-EU countries [23, p. 716]. Europol has been an EU agency since 2010 [24].

Europol headquarters (the Netherlands)

The problem of **poverty** is also being solved within European policies. The Fund for European Aid to the Most Deprived (FEAD) specifically supports actions by EU countries in providing food, clothing and other essential goods to the poorest people in the society. It also provides support through non-material social inclusion measures. Since April 2020, FEAD supported specific measures for addressing the COVID-19 crisis [25]. This is an example of tackling poverty and social exclusion.

The EU pays much attention to employment policies. Reducing youth unemployment and inactivity is an important objective for the European Union. One of the phenomena of the modern European society is NEET (young people not in employment, education or training). The European Pillar of Social Rights Action Plan includes an objective to decrease the rate of NEETs from 12.6% in 2019 to 9% by 2030 by improving their employment prospects [26].

The reinforced Youth Guarantee is a commitment by all Member States to ensure that all young people under the age of 30 receive a good quality offer of employment, continued education, apprenticeship and traineeship [27]. In 2011, the EU education ministers adopted a Council Recommendation on policies to reduce early school leaving, which set out a framework for coherent, comprehensive, and evidence-based policies [28].

In general, considering the main indicators of the development of the EU, we can conclude that almost all the EU countries have very high HDI. For example, Denmark's HDI value for 2022 is 0,952 (the

best result in the EU). The worst result in the EU is estimated 0,799 (Bulgaria). But even this result is better than those of Albania and Ukraine [29].

It is obvious that Europe faces multiple crises of social and economic nature. Political leaders and parties suggest different variants of solving these problems. The activity of political institutions of the EU is one of the key factors of risk reduction. But the whole European society should also contribute to solving these problems.

References

1. Natural population decrease in most EU regions in 2021. Eurostat. URL: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20231121-4

2. Demography of Europe – 2024 edition. Eurostat. URL: https://ec.europa.eu/eurostat/web/interactive-publications/demography-2024

3. Ubarevičienė R., van Ham V. Population decline in Lithuania: who lives in declining regions and who leaves? Regional Studies, Regional Science. 2017. Vol. 4. P. 57-79. https://doi.org/10.1080/21681376.2017.1313127

4. Lithuanian regions face fastest depopulation in EU. LRT. URL: https://www.lrt.lt/en/news-in-english/19/1873230/lithuanian-regions-face-fastest-depopulation-in-eu

5. Resident population by city / town at the beginning of the year. Official Statistics Portal. URL: https://osp.stat.gov.lt/en/statistiniu-rodikliu-analize?hash=e3b442ea-2047-4fe8-a8ef-a1c6ae9d842b#/

6. 'Without enough Latvians, we won't be Latvia': eastern Europe's shrinking population. The Guardian. URL: https://www.theguardian.com/world/2022/nov/16/latvia-baltic-population-demographic-crisis

7. Scholz vows to speed up deportations after Solingen stabbings. BBC. URL: https://www.bbc.com/news/articles/cj081mrlm7eo

8. 'Tired and very worried': Lampedusa locals feel abandoned but keep helping migrants. Anadolu. URL:

https://www.aa.com.tr/en/europe/-tired-and-very-worried-lampedusa-locals-feel-abandoned-but-keep-helping-migrants/3002819

9. Unemployment rate in the European Union and Europe as of June 2024, by country. Statista. URL: https://www.statista.com/statistics/1115276/unemployment-in-europe-by-country/

10. Youth unemployment rate in the European Union as of April 2023, by country. Statista. URL: https://www.statista.com/statistics/613670/youth-unemployment-rates-in-europe/

11. Crime statistics. Eurostat. URL: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Crime_statistics#intentional_homicides_in_the_EU_in_2022

12. Borrel J. We need to fight Islamist terrorism together. European External Action Service. URL: https://www.eeas.europa.eu/eeas/we-need-fight-islamist-terrorism-together-%C2%A0_en

13. Muslimische Schüler nehmen Koran wichtiger als Gesetze. Bild. URL: https://www.bild.de/politik/inland/studie-schockt-politiker-muslimische-schueler-nehmen-koran-wichtiger-als-gesetze-6624d43076790e1ca24f9187

14. German far right hails 'historic' election victory in east. BBC. URL: https://www.bbc.com/news/articles/cn02w01xr2jo

15. Italy premier says illegal migrants are 'enemies' of legal ones. Anadolu. URL: https://www.aa.com.tr/en/europe/italy-premier-says-illegal-migrants-are-enemies-of-legal-ones/3278002

16. Hungary says it will provide free tickets to Brussels for migrants trying to enter the EU. Associated Press. URL: https://apnews.com/article/hungary-orban-eu-migration-fines-ae7e763618b0630dc947068b261de958

17. Commission sets out tools to manage demographic change in the EU. European Commission. URL: https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4807

18. Legal migration and integration. European Commission. URL: https://home-affairs.ec.europa.eu/policies/migration-and-asylum/legal-migration-and-integration_en

19. Housing and integration of migrants in Europe: Good practice guide. Eurofound. URL: https://www.eurofound.europa.eu/system/files/2021-05/ef0818en.pdf

20. About RAN Practitioners. European Commission. URL: https://home-affairs.ec.europa.eu/networks/radicalisation-awareness-network-ran/about-ran_en

21. Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU. European Union. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32018L0843

22. Чернадчук Т.О., Березовська В.О. Політика Європейського Союзу щодо боротьби з тероризмом: аналіз законодавства Європейського Союзу та деяких національних антитерористичних програм. Правова держава. 2022. № 48. С. 66-76

23. Моісеєва Є.О., Латишева М.О., Шалупня К.С. Діяльність Європолу та співпраця з Україною. Юридичний науковий електронний журнал. 2023. № 4. С. 714-717.

24. Governance & Accountability. Europol. URL: https://www.europol.europa.eu/about-europol/governance-accountability

25. End poverty in all its forms everywhere. European Commission. URL: https://commission.europa.eu/document/download/d36d4366-6ff2-439d-af32-36306e2d35cb_en?filename=SDG-Report-01-MD.pdf

26. Youth employment support. European Commission. URL: https://ec.europa.eu/social/main.jsp?langId=en&catId=1036

27. The reinforced Youth Guarantee. European Commission. URL: https://ec.europa.eu/social/main.jsp?catId=1079&langId=en

28. Early school leaving. European Education Area. URL: https://education.ec.europa.eu/education-levels/school-education/early-school-leaving

29. Human development insights. UNDP. URL: https://hdr.undp.org/data-center/country-insights#/ranks

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КОНКУРЕНТОСПРОМОЖНІСТЬ ЄВРОПИ В НОВІЙ ГЛОБАЛЬНІЙ ЕКОНОМІЦІ

Навчальний посібник (англійською мовою)

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