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# EDUCATION, SCIENCE AND RESEARCH – KEY ELEMENTS SUPPORTING DYNAMICS OF ECONOMIC GROWTH IN THE EU IN THE PERIOD AFTER OVERCOMING THE EFFECTS OF THE COVID-19 PANDEMIC[1]

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## *Abstract*

*Education, support of science and research currently represent one of the key factors supporting the dynamics of economic growth and development, both at the regional and global level. In the context of the indicated development, both within the European integration area and individual member states, there is a gradual implementation of projects focused on the reform of educational systems in order to increase the level and quality of education and its close connection with the needs of current social and economic practice. A highly qualified workforce possessing the necessary knowledge, competences and skills represents the core and at the same time the engine of supporting the growth and development of individual economic sectors and increasing the degree of their achieved competitiveness. Currently, almost every economic or social entity is confront with the need to constantly improve and respond flexibly to the needs and demands coming from its external environment, which leads to the need to innovate and improve internal structures and processes in relation to prevailing trends. The results of the educational process transformed into a qualified workforce can significantly help to correctly identify and appropriately and purposefully adapt to these trends. In this direction, the emphasis on the necessity to connect education with the field of science and research is predominant, which represents key factors supporting economic growth and increasing competitiveness. Within the European integration area and individual member states, these starting points are reflect in the entire spectrum of*

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*strategic documents implemented in their internal economic environment. For all of them, we can especially mention the current NextGenerationEU plan, in the implementation of which the key will be the use of new knowledge, the results of scientific research and research activities of various types and focus.*

***Keywords: education, science and research, economic growth***

## 1. INTRODUCTION

In recent decades, the European Union has been confronted with a whole spectrum of problems and new challenges connected with them, which it tries to respond to adequately by adopting a series of measures and their subsequent implementation in its internal space.

The creation of measures and their subsequent implementation is carried out in the area of the European Union with regard to one of its key goals oriented towards maintaining and strengthening the position in the area of the world economy, with regard to its dynamics, amplified by the process of globalization, in the recent period relatively turbulent development also with regard to for the growth of importance and strengthening of the position of other actors of this complex space, as well as with regard to strengthening of internal cohesion, economic cohesion and strengthening of economic growth and development of the internal space.

The global financial crisis, the negative effects of which were observable and also affected the economic space of the European Union, represented one of the fundamental economic shocks of such a nature that it was necessary to create a wider and more effective mechanism aimed not only at remediation of its consequences, but also at anticipating and effectively preventing similar economic shock, that is, to create an efficiently functioning mechanism of recovery and increasing resistance. After overcoming the consequences of the global financial crisis and the onset of a period of gradual consolidation, there were other specific upheavals and situations at the global and regional level that required and will require an increase in the European Union's ability to act in the field of quick reaction and response to these new phenomena and situations. In this context, we can point, for example, to the process of the gradual withdrawal of Great Britain from the European Union, which also brought with it new questions related to the necessity of reformulation and transformation of mutual economic relations so that both partners could in the future develop economic cooperation based on standard patterns of foreign trade cooperation.

The Sars-CoV-2 pandemic had a fundamental impact on the development of the global geo-economic space and its individual actors with broad-spectrum effects, the manifestations of which are felt very intensively even in the current period, which, as a result of the measures taken to prevent the spread of the given virus, led not only to the suppression of mobility, but also to a decline in economic growth and development. However, after overcoming several culminating phases of the spread of the new coronavirus, the global geo-economic space, and especially one of its integral parts, including the European and Asian macro-regions, is affected by another fundamental shock manifested in the economic, as well as social, political and cultural fields, and thus the armed conflict on Ukraine and other crisis phenomena associated with the problem of the energy crisis, the increase in migration from crisis regions affected by the conflict. Dependence on energy resources flowing into the European Union, especially from the external environment, brings with it new challenges associated with the search for effective solutions that would help replace the lack of energy resources necessary for the functioning of several economic sectors.

In the calculation of the group of challenges that the European Union is currently facing and has to deal with, it is possible to include problems related to the environmental area, especially in the context of the climate crisis, but also other problems that are directly related to the given area. This mainly concerns soil, water, air pollution, environmental burdens of various kinds, remediation of industrial areas after the cessation of production or extraction of mineral raw materials, depletion and reduction of land fund area, forestry and water management, or waste management, etc. As indicated in previous parts of the text, the European Union is currently facing

a spectrum of problems and new challenges that are connected to both military and non-military aspects of security. Individual areas intertwine and require the search for optimal, but especially effective solutions with a high degree of efficiency and relatively quick results.

The search for optimal solutions in the entire spectrum of the problems raised requires that in the process of their creation, expert opinions and expert studies processed by experts and specialists from individual areas and sectors are taken into account. The search for solutions and ways out of the current crisis is directly connected with the application of new, innovative approaches and solutions, and this is precisely where the essence and importance of education, science and research lie, not only as key factors in strengthening economic growth and development, but especially as key factors in advancing development of human civilization and its creations forward, towards a successful model of further progress and development.

The importance of education, science and research within the European Union is highlighted in several types of strategic documents that were adopted and implemented within its internal space. From the calculation of several types of these documents, we can point to the most fundamental ones that determined the strategic direction of the European Union within individual decades. In this context, we can point to the Lisbon Strategy, which already in its introductory provisions emphasized the basic, initial goal of the entire strategy aimed at building the European Union as the most dynamic and knowledge-based economic space in the world. Another of the group of strategies implemented within the European integration area, with a fundamental influence on its future economic growth and development, was represented by the strategy with the apt name Europe 2020. Within the Europe 2020 strategy, several goals were aimed at strengthening the educational level of the population of the European Union, as well as the goal oriented towards increasing the volume of investments in the field of science, and especially research and development, and their stronger connection with the needs of contemporary social and economic practice.

Within the European Union, the importance of education, science and research is also integrated into strategic documents aimed at overcoming the negative impacts of the Sars-CoV-2 pandemic in a relatively wide range of goals and related areas.

## 1.1. Model and Data

The goal of the paper is focus on the investigation of the current state and level of the system of education and support of science and research in the context of the evaluation of approaches and implemented models.

In the context of the main goal of the paper and its overall content focus, we have selected those that emphasize the importance and role of human capital as a key source of economic growth and increasing competitiveness and the main initiating and transferring factor influencing the dynamics of building a knowledge economy. In the context of these assumptions, we focused mainly on selected factors in the field of education and training as key factors in building a highly skilled workforce and also in the field of science and research as the core of new innovation processes, which represent a significant source of economic growth and competitiveness.

Several methods and procedures were used in the process of processing the submitted paper. Among the most important ones we can point to the comparison of selected spectrum of data and data, the dynamics of which was monitored in a defined time series, especially in the period 2002 - 2022. On this basis, data analysis was performed in the context of defining the main development trends and determining factors recorded development. Subsequently, the synthesis of collected data and information into comprehensive and logically consecutive units was carried out, which was supplemented by comments and observations of the authors.

In the process of elaborating of the submitted paper, several databases of examined indicators were used. From the point of view of the overall content focus of the presented paper, the most widely used databases were Eurostat data, as well as data published in the EU in the world, periodically published data on monitoring the level of progress in the process of implementing the Europe 2020 objectives processed by Eurostat, The 2022 EU Industrial and R&D Investment Scoreboard 2022, Next Generation EU financial tool and Recover and Resilience Soreboard 2023.

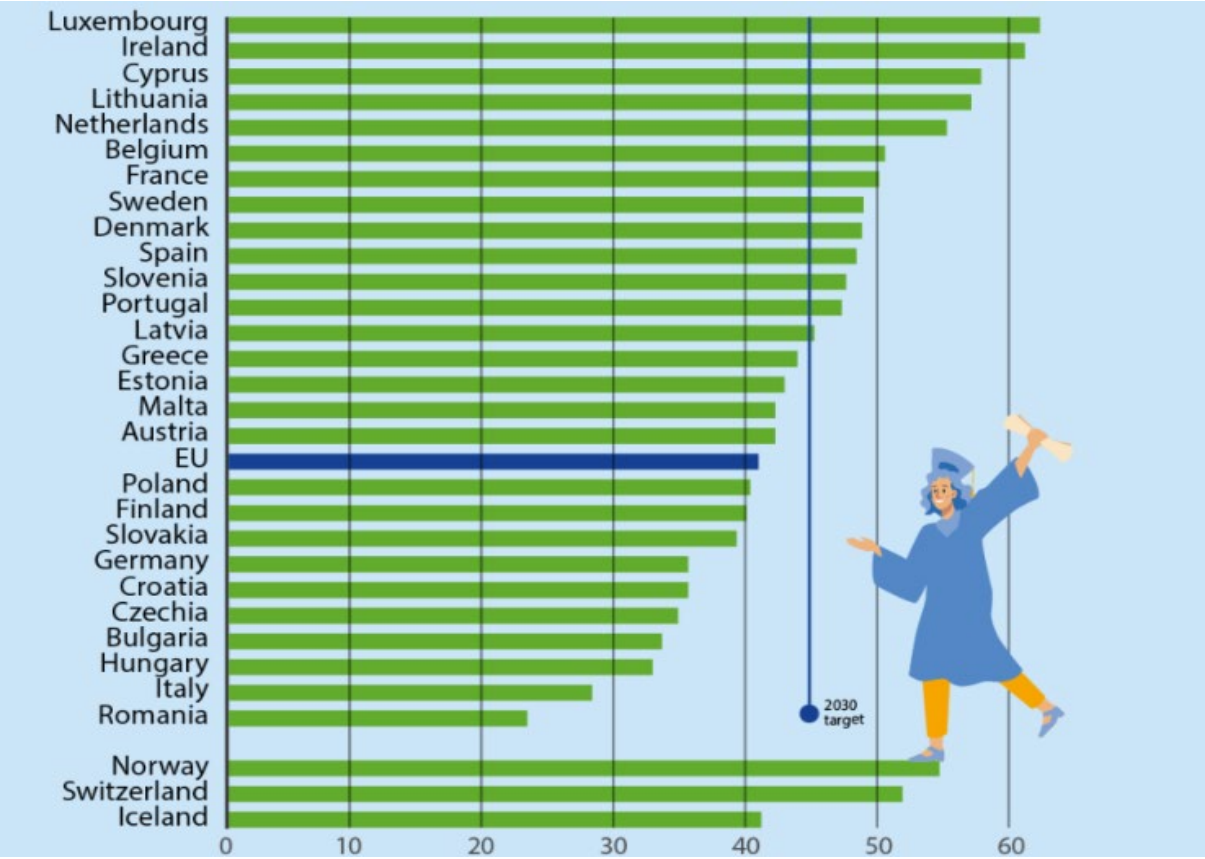
## 2. EDUCATIONAL LEVEL OF THE POPULATION OF THE EUROPEAN UNION AND ITS TENDENCIES

Education and educational level of the population is one of the basic indicators monitored and reflected in the entire spectrum of other areas and indicators. Education is of fundamental importance both for the individual and for the entire society and its further development and advancement. From the point of view of the importance of education for an individual, we can point out that education opens up wide possibilities in the area of getting a job, a good job position, professional growth associated with an adequate salary. Educated individuals significantly contribute to the progress of society and at the same time contribute to economic growth and development in terms of their professional orientation. As A. Zancajo, A. Vergler and P. Bolea emphasize education and the level of education achieved within a given society also contribute to the strengthening and development of the principles of modern civil society. Educated individuals and groups are aware of their importance and role in society, therefore they are more determined and more active in the area of taking responsibility for public administration, whether through the creation of interest groups, various social movements and, last but not least, political parties. (Zancajo, Vergler, Bolea, 2022)

Thus, education forms the core and should be the central point of effort of every individual and target society, a society that supports and values educated people has all the prerequisites for strengthening the dynamics of its further development. Education also creates prerequisites for economic growth and development, especially in the context of implementing new ideas and procedures into economic practice in the form of various types of innovations, which are currently considered the core of the dynamics of economic growth, development and increasing competitiveness. (Busemeyer, Vossiek, 2016)

In this context, we can point out that within the European integration area, considerable attention is paid to the area of education and the achieved educational level of the population, as well as to the implementation of tools and procedures aimed at increasing the level and quality of education. The results of efforts aimed at supporting the growth of the educational level of the population will be presented in the next part of the paper.

In 2021, the following development trends were recorded in the area of the educational level of the population and its stratification. In the age group of 25 – 34 years, more than 40% of the population of the European Union achieved higher education according to the ISCED 5-8 classification. Figure 1 shows the stratification of the achieved educational level of the population in the age category 25-34 within the European integration area.




Figrue 1 Population of EU member states in the age category of 25-34 years with attainable education in terms of classification (ISCED 5-8) in comparison with selected EFTA states

Source: Eurostat, 2022a

As can be seen from the presented figure 1, in 2021 Luxembourg, Ireland and Cyprus achieved the most significant share of the population in the age category of 25-34 years of age with a university education or its equivalent in terms of the ISCED 5 - 8 classification. On the contrary, the lowest share of the population in the age category 25 – 34 years of age with a higher education or its equivalent according to the ISCED 5 - 8 classification was achieved by Hungary, Italy and Romania. (Eurostat, 2022a)

In the age group of 25 – 74 years, 31.3% of the population of the European Union achieved higher education in terms of ISCED classification 5 – 8, or its equivalent. In the 25 – 74 age group, 23.6 % of the population had a low educational level, and 45.3 % of the population had an education at the level of secondary education or its equivalent. The structure of the educational level of the population of the European Union in the 25 – 74 age group in 2021 is presented in figure 2. (Eurostat, 2022a)

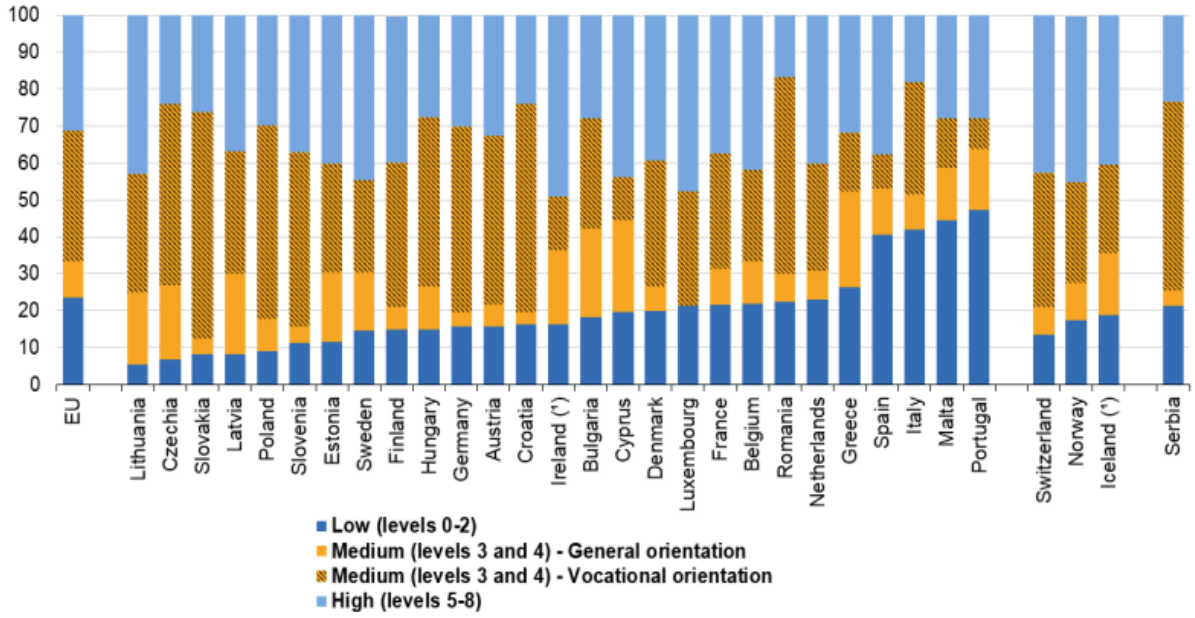



Figure 2 The structure of the educational level of the population of the European Union in the age category 25 – 74 years of age in 2021

Soruce: Eurostat, 2022b

It is clear from figure 2 that the structure of the educational level of the population of the European Union in the age category of 25 – 74 years of age in 2021 was differentiated. In this regard, we can point out that in the case of member states such as Lithuania, the Czech Republic, the Slovak Republic, Latvia and Poland, a lower share of the population in the age category of 25 – 74 years with a low level of education was recorded, at a level of less than 10 %. On the contrary, a higher proportion of the population in the monitored age category with a low level of education was recorded in the case of Spain, Italy, Malta and Portugal, at the level of more than 40%. Even in the case of this observed age category, the highest share of the population with a university education according to the ISCED 5 – 8 classification, or its equivalents, was recorded in the case of the following countries: Luxembourg, Ireland, Cyprus, Lithuania, Sweden, the Netherlands and Belgium. (Eurostat, 2022a)

Based on monitoring the development of the educational level of the population of the European Union in the age category of 25-74 years old on the timeline covering the period of 2011-2021, we can point to the following identified development tendencies. The analysis of individual monitored indicators shows that the share of the population in the age category 25-74 years of age increased during the monitored period from 23.7% (2011) to 31.1% (2021), which represents an increase of 7.4 per cent point. Conversely, the share of the population in the 25-74 age group with a low level of education in the monitored period decreased from 30.7% (2011) to 23.6% (2021), which represents a decrease of 7.1 percentage points . The share of the population of the European Union in the age category of 25-74 years with a high school education level or its equivalent recorded a stable development in the monitored period and reached the level of 45%. The development of the educational level of the population of the European Union in the age category 25-74 years of age in the years 2011-2021 is shown in figure 3. (Eurostat, 2022a)

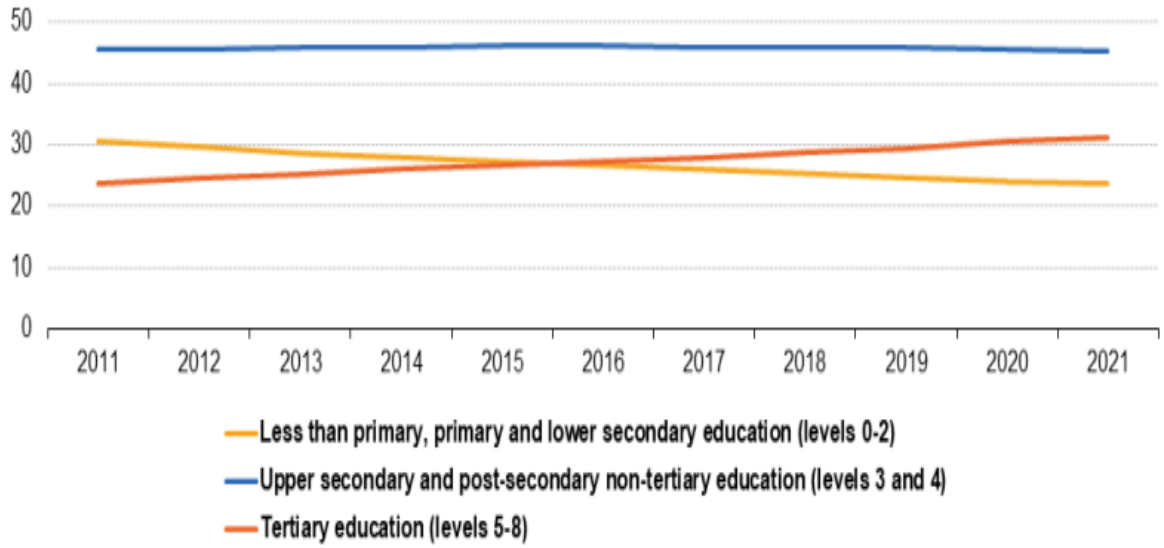



Figure 3 Development of the educational level of the EU population aged 25 – 74, in the period 2011 – 2021

Source: Eurostat, 2022c

In the field of monitoring the educational level of the EU population and its stratification within individual age groups, it is possible to state that within the European integration area we note certain differences in the level of education achieved within individual age categories. In general, it can be stated that the educational level of the EU population is growing, with younger age groups achieving a higher level of education. In 2021, 81.7 % of the EU population in the 25 – 54 age group achieved upper secondary education, while 68% of the EU population in the 55 – 74 age group achieved upper secondary education. The projection of the indicated development trend was also reflected when monitoring the share of the EU population in selected age categories achieving a lower level of education. In the 25 – 54 age group, only 18.3 % of the European population had less than secondary education in 2021, while in the case of the 55-74 age group, this share reached the limit of 32 %. In the framework of the European integration area, the number of the population with first- and second-degree university education or its equivalent is gradually increasing, while in 2021, within the European integration area, in this group of monitored indicators, growth was recorded in the age group of 25 – 54 years at the level of 36 .7 %, while in the case of the age group 55 – 74 years of age, the limit was reached at the level of 22.1 % in the given area. Table 1 documents the distribution of the educational level of the population of the European Union within the single member states. (Eurostat, 2022a)

Table 1 Distribution of the educational level of the EU population within individual age categories

| | 25–54 years | | | | | 55–74 years | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Low (ISCED 0–2) | Medium (ISCED 3–4) | of which | | High (ISCED 5–8) | Low (ISCED 0–2) | Medium (ISCED 3–4) | of which | | High (ISCED 5–8) |
| | | | General orientation | Vocational orientation | | | | General orientation | Vocational orientation | |
| EU | 18.3 | 45.0 | 10.5 | 34.5 | 36.7 | 32.0 | 45.9 | 8.8 | 37.1 | 22.1 |
| Belgium | 15.1 | 36.8 | 10.6 | 26.3 | 48.1 | 33.1 | 35.4 | 12.8 | 22.6 | 31.5 |
| Bulgaria | 16.2 | 52.2 | 24.5 | 27.7 | 31.6 | 21.4 | 56.8 | 23.6 | 33.2 | 21.8 |
| Czechia | 5.3 | 65.9 | 20.7 | 45.2 | 28.8 | 9.7 | 74.4 | 18.9 | 55.6 | 15.9 |
| Denmark | 15.9 | 38.4 | 8.1 | 30.3 | 45.7 | 26.5 | 44.4 | 4.0 | 40.4 | 29.1 |
| Germany | 15.3 | 52.1 | 5.1 | 47.0 | 32.6 | 16.2 | 57.3 | 2.0 | 55.3 | 26.5 |
| Estonia | 11.3 | 46.4 | 17.9 | 28.6 | 42.2 | 11.9 | 51.5 | 20.0 | 31.5 | 36.6 |
| Ireland | 9.0 | 33.9 | 17.0 | 15.0 | 57.1 | 31.9 | 35.4 | 20.5 | 13.2 | 32.7 |
| Greece | 15.4 | 47.3 | 27.4 | 20.0 | 37.3 | 43.8 | 33.0 | 24.0 | 9.0 | 23.2 |
| Spain | 32.4 | 23.3 | 12.7 | 10.6 | 44.3 | 54.7 | 19.3 | 12.5 | 6.8 | 26.0 |
| France | 14.5 | 39.9 | 9.3 | 30.6 | 45.6 | 32.2 | 43.2 | 10.6 | 32.6 | 24.6 |
| Croatia | 9.5 | 62.6 | 3.3 | 59.2 | 28.0 | 25.7 | 56.0 | 3.3 | 52.7 | 18.3 |
| Italy | 32.8 | 44.5 | 10.4 | 34.1 | 22.7 | 55.7 | 32.7 | 7.8 | 24.9 | 11.6 |
| Cyprus | 12.6 | 35.7 | 23.4 | 12.2 | 51.7 | 34.5 | 38.5 | 28.0 | 10.5 | 26.9 |
| Latvia | 8.8 | 48.9 | 21.0 | 27.9 | 42.2 | 7.4 | 64.3 | 22.9 | 41.3 | 28.3 |
| Lithuania | 6.1 | 43.4 | 17.6 | 25.8 | 50.5 | 4.2 | 65.0 | 22.9 | 42.2 | 30.7 |
| Luxembourg | 16.5 | 27.8 | : | 27.8 | 55.6 | 32.1 | 37.7 | : | 37.7 | 30.2 |
| Hungary | 13.0 | 55.8 | 12.9 | 43.0 | 31.2 | 18.7 | 59.7 | 9.0 | 50.7 | 21.5 |
| Malta | 31.3 | 32.5 | 16.7 | 15.8 | 36.2 | 72.0 | 16.6 | 8.7 | 8.0 | 11.3 |
| Netherlands | 15.7 | 36.8 | 7.0 | 29.8 | 47.5 | 34.5 | 37.0 | 8.8 | 28.2 | 28.5 |
| Austria | 12.7 | 49.6 | 6.6 | 43.1 | 37.7 | 21.1 | 55.0 | 4.6 | 50.4 | 23.9 |
| Poland | 5.9 | 55.9 | 9.8 | 46.1 | 38.2 | 13.7 | 69.9 | 7.2 | 62.7 | 16.4 |
| Portugal | 32.5 | 31.7 | 19.8 | 11.8 | 35.8 | 70.0 | 14.4 | 11.6 | 2.8 | 15.6 |
| Romania | 18.2 | 60.6 | 8.4 | 52.3 | 21.2 | 30.6 | 60.9 | 6.0 | 54.9 | 8.5 |
| Slovenia | 6.5 | 48.6 | 5.1 | 43.6 | 44.9 | 18.7 | 56.5 | 3.3 | 53.2 | 24.7 |
| Slovakia | 6.2 | 63.1 | 4.1 | 59.0 | 30.7 | 11.6 | 71.0 | 4.4 | 66.6 | 17.3 |
| Finland | 9.8 | 46.1 | 8.2 | 37.9 | 44.1 | 22.4 | 44.1 | 3.3 | 40.8 | 33.4 |
| Sweden | 11.3 | 38.5 | 14.7 | 23.8 | 50.2 | 20.3 | 45.0 | 17.1 | 28.0 | 34.7 |

Source: Eurostat, 2022d

The gradual growth of the educational level of the population of the European Union undoubtedly contributed to the implementation of the entire range of measures implemented during the period of fulfillment of the goals of the Europe 2020 strategy. An integral part of the given strategy were the goals aimed at supporting and increasing the educational level of the population of the EU, which focused mainly on overcoming the problem of early school leaving attendance, or other support systems of professional training, and also in the area of achieving higher education, especially in the population group of the European Union in the age category of 30-34 years. During the implementation period of the Europe 2020 strategy, several measures aimed at increasing the level and quality of education and the effectiveness of educational systems were adopted at the level of the European Union and individual member states.

As a follow-up to the already implemented measures and with a view to the need for continuous support in the field of education and training, the Council Resolution on a strategic framework for European cooperation in education and training was adopted in March 2021 in order to create a European educational area for the period 2021 – 2030. The strategic framework creates of individual priorities, attention is also focused on the area of increasing the educational level of the population of the European Union, and in particular, young people in the age category of 25-34 years. Within this strategic priority, the main goal is aimed at achieving a 45 % share of the population in the age category of 25 – 34 years, which will achieve a higher level of education in terms of classification (ISCED 5 – 8) in 2023.

In 2021, the share of the population of the European Union in the age category of 25 – 34 years with a higher education in terms of ISCED classification 5 - 8 reached the level of 41.2 %. The share of the population of the member states of the European Union in the age category of 25 – 34 years with a higher education in terms of the ISCED 5 – 8 classification is shown graphically in figure 4.

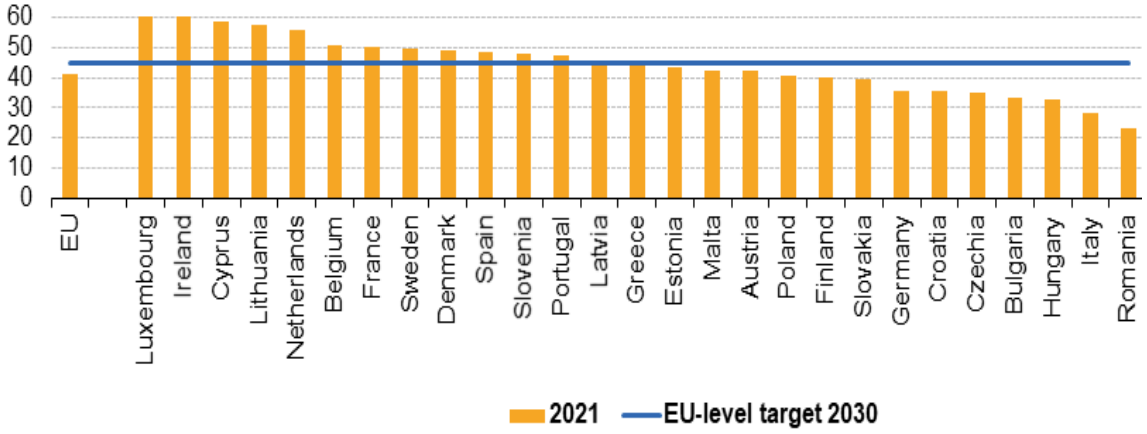



Figure 4 Population of the EU aged 25–34 with tertiary educational attainment (ISCED 5–8), 2021

Source: Eurostat, 2022e

It is clear from the presented graph 5 that we can identify certain differences between the individual member states of the European integration area in achieving the given goal. From the point of view of the ranking of the success rate in achieving the goal set within the aforementioned Strategic Framework for European Cooperation in Education and Vocational Training in order to create a European educational area for the period 2021 – 2023, we can assume that the best results in the given area, which already in In 2021, Luxembourg, Ireland, Cyprus, Lithuania, the Netherlands, Belgium, France, Sweden, Denmark, Spain, Slovenia, Portugal exceeded the limit of 45 %. The threshold of 45 % was reached in 2021 by Latvia, Greece and Estonia. On the other hand, on the opposite side of the spectrum in terms of evaluating the degree of fulfillment of the given goal in 2021, there were countries such as Romania and Italy. (Eurostat, 2022a)

As already indicated in the previous text, the importance of increasing the level and quality of education and the effectiveness of educational systems at all levels and areas is directly related not only to the creation of the potential of a qualified workforce, the ability to integrate it into the labor market and, subsequently, the ability to apply acquired knowledge, skills and competences in the performance of professions in various areas of current common and economic practice, but also in the area of the development of science, scientific research and the subsequent transferability of research results to practice through various types of innovations applied in the form of innovative procedures, processes, or aspirational changes in the field of the technical-economic paradigm. The dynamics of current development in the area of the world economy, amplified by the process of globalization and the trends and development tendencies conditioned by it, indicate that current, but especially future economic growth and development and increasing competitiveness will be more and more significantly linked with the ability of the national economy and the economy of transnational economic complexes to generate and effectively use potential new knowledge transformed into the entire spectrum of innovations, both within new industries with high growth dynamics and significant potential for further development, as well as in traditional industries which, in the context of increasing competition, are exposed to increasingly significant pressure towards higher efficiency and competitiveness . In the conditions of the European Union, these aspects and trends of current development are emphasized in several strategic documents. In this context, we can point to the Europe 2020 strategy already mentioned in the text, which integrated into the five main goals a goal oriented towards increasing the share of generated GDP in the area of research and development, while assuming an increase of this share to the level of 3% of GDP by 2023. However, in the period of evaluation and assessment of the success rate in achieving the goals set out in the strategy, significant differences were found at the level of individual member states in the level of fulfillment of this goal. These

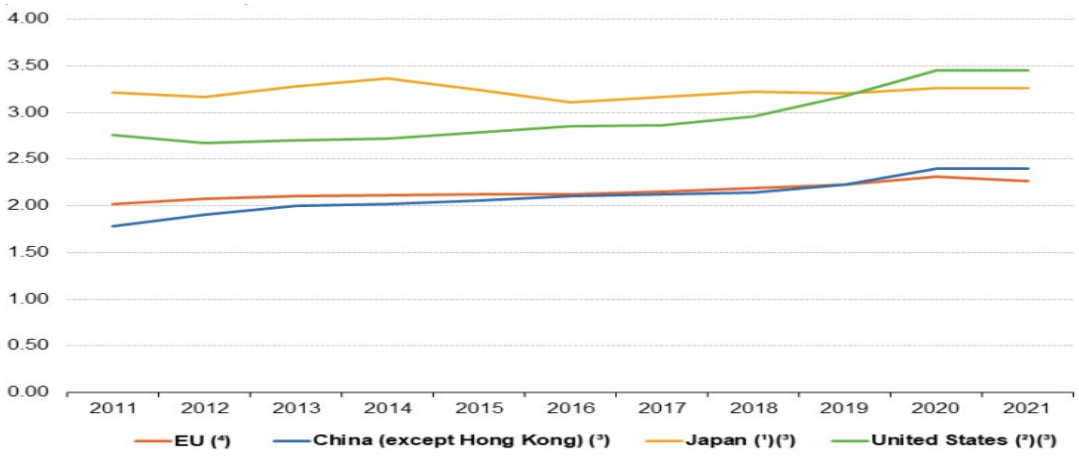
findings led to the necessity of an even stronger orientation to support research and development, using a wide range of funding sources, but also understanding the immense social and economic value of research and development results.

As B. Hošoff mentioned in the period after overcoming the negative economic, social and societal consequences of the Sars-CoV-2 pandemic, strategic documents of the European Union place a fundamental emphasis on the support of research and development in several strategic areas: such as information and communication technologies, healthcare and medical technologies , technologies in the field of environmental protection and improvement, technologies used in the field of education, training and professional training, as well as in individual economic sectors. In the next part of the article, we will focus more closely on monitoring development trends in the area of research and development support in the European Union. We will point out the key development tendencies and trends recorded in the given area with an indication of the potential future development trajectory in the given area. (Hošoff, 2021)

In the next part of the article, we will focus more closely on monitoring development trends in the area of research and development support in the European Union. We will point out the key development tendencies and trends recorded in the given area with an indication of the potential future development trajectory in the given area.

## 3. SUPPORT FOR RESEARCH AND DEVELOPMENT IN THE CONDITIONS OF THE EUROPEAN UNION, CURRENT SITUATION AND POSSIBLE PERSPECTIVES

In 2021, within the European Union, the share of GDP invested in science and research reached the limit of 2.27%. Compared to 2020, stagnation was recorded in the given area, as in 2020 the share of GDP invested in science and research reached the level of 2.31%. Figure 5 shows the development and comparison of the share of GDP invested in science and research in the European Union and selected key players in the world economy. (Eurostat, 2023a)

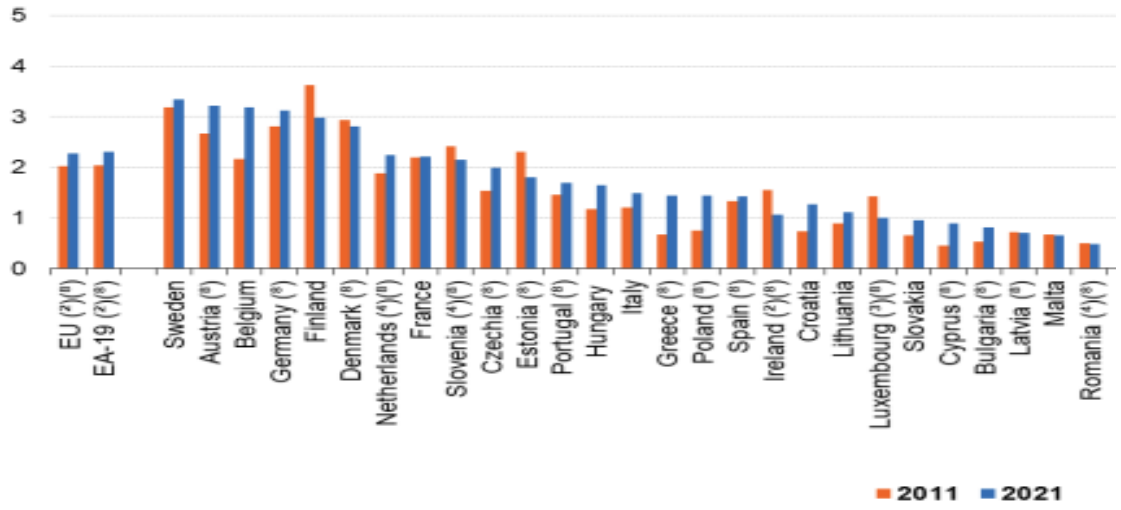



Figrue 5 Comparison development of the share of GDP invested in research and development in the European Union and selected actors of the world economy in the years of 2011-2021

Source: Eurostat, 2023a

As can be seen from the comparison of the indicators shown in graph 6, the share of GDP invested in research and development in Japan and the USA is growing faster and more significantly, compared to the share of GDP invested in research and development within the European Union and in China. In 2021, the share of GDP invested in science and research in China reached 2.4 %, in Japan 3.26 % and in the USA 3.45 %. (Eurostat, 2023a)

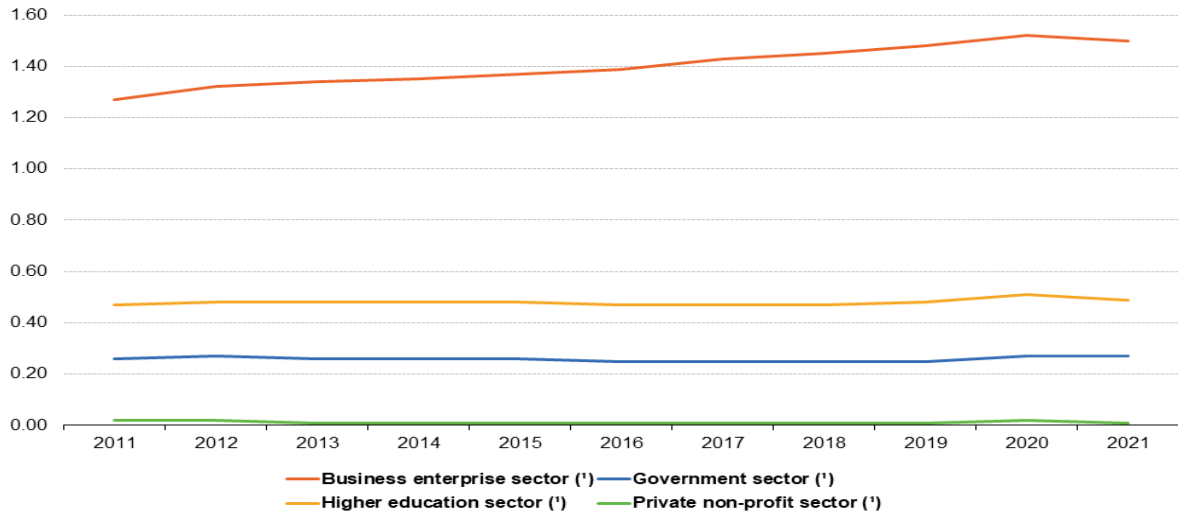
Within the framework of the European integration area, it is possible to identify the following development trends in the area of analysis of indicators of the share of GDP invested in research and development. In 2021, one of the highest shares invested in R&D was recorded for Sweden at 3.35%, Austria at 3.22% and Belgium at 3.19%. Exceeding the three percent limit of the share of GDP invested in research and development was recorded in 2021 also in the case of Germany at the level of 3.13%. Just below the three percent mark were Finland and Denmark, which recorded the share of GDP invested in research and development at the level of 2.98% (Finland) and 2.81% (Denmark). On the rough side of the evaluation spectrum is a group of member states that in 2021 recorded the share of GDP invested in research and development at the level of less than 1%. Of this group, the lowest share of GDP invested in research and development was recorded by Romania - 0.48%, Malta - 0.65% and Latvia - 0.71%. In 2021, more than two-thirds of the EU member states declared the achievement of a higher intensity of investment in research and development compared to 2011. The most significant increase in the intensity of investment in research and development in the monitored period of 2011-2021 was recorded by Belgium - 1.2 percentage points, Greece - 0.76 percentage points, Poland - 0.69 percentage points, Poland - 0.69 percentage points, Austria - 0.55 percentage points, Croatia - 0.53 percentage points, the Czech Republic and Hungary - both 0.46 percentage points , Cyprus – 0.44 percentage points and the Netherlands – 0.37 percentage points. Finland (-64 percentage points), Estonia (-0.51 percentage points), Ireland (-0.49 percentage points) and Luxembourg (-0.41 percentage points) recorded the most significant decrease in the intensity of spending on research and development in the monitored period 2011-2021 ). A comparison of the monitored indicator of the intensity of the share of GDP expenditures invested in research and development is shown in figure 6. (Eurostat, 2023b)




Figrue 6 Intensity of spending on research and development within the European Union and member states in 2011 and 2021

Source: Eurostat 2023b

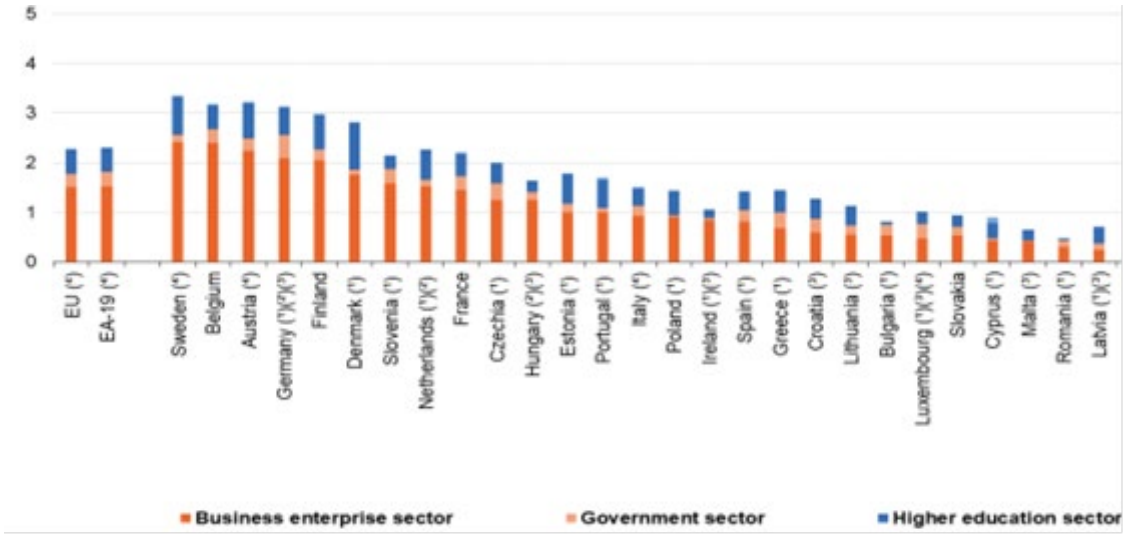
Monitoring the achieved level of research and development spending intensity within the European Union and individual member states is only one of the fundamental areas to which it is necessary to pay due attention. A relatively fundamental group of factors determining the development of this monitored area is the distribution of research and development expenditures within individual sectors. Based on the analysis of indicators expressing the direction of research and development expenditures and their distribution within the individual sectors, we can point out that within the European integration area, the most prominent volume of GDP expenditures directed to support research and development is reinvested in the business enterprise sector, followed by the higher education sector , further expenditures go to the government sector and private non-profit sector. The development trends, reflecting the above statements, are shown graphically in figure 7.




Figrue 7 Intensity of spending form GDP on research and development within the European Union in specific gorups of sectors in the period of years 2011 – 2021

Source: Eurostat 2023c

The projection of the mentioned development trend can also be observed at the level of individual member states. Based on the analysis of the collected data for the year 2021, it is possible to point out that the countries Sweden, Belgium, Austria, Germany, Finland and Denmark are included in the group of member states with a relatively high level of investment of expenses aimed at supporting research and development in the business and enterprise sector. The achieved rate of investment in research and development spent on the business enterprise sector ranged from 2.41 % (Sweden) of GDP to 1.75 % of GDP (Denmark). The second highest share of GDP expenditures for research and development support in these member states went to the higher education sector. Germany, the Czech Republic, Greece, Slovenia and Luxembourg recorded a relatively high volume of spending in the government sector. The relatively low level of GDP expenditures for research and development support was recorded by the private non-profit sector in almost all member states. The lowest level of spending in this sector was invested in Cyprus and reached the level of 0.12% in 2021. The results of the comparison of the collected data in the monitored indicators of the share of investments from GDP directed to individual sectors within the European integration area and partially within individual member states are presented in figure 8. (Eurostat, 2023a)




Figrue 8 Gross domestic expenditure on R&D by sector in the EU and the member state in year 2021

Source: Eurostat 2023d

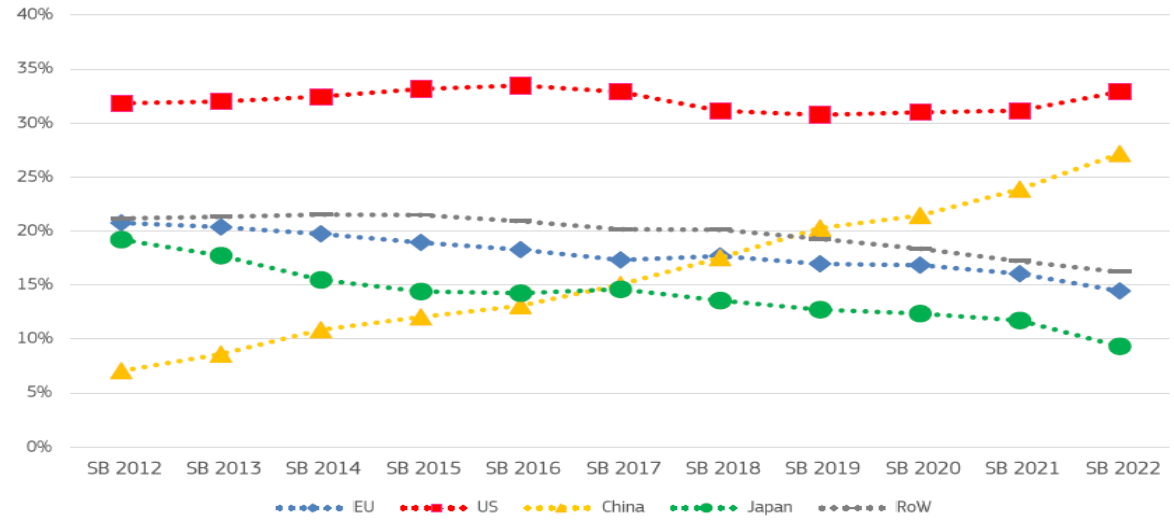
As already mentioned in the previous text, the most significant volumes of expenses were invested in the business enterprise sector within the European integration area and individual member states. In the next part of the paper, we will focus on the analysis of the approach of large companies and companies operating within the European integration area to support research and development through financial investments. As is known, these economic entities with a strong and stable position on the regional and global market have in their business strategies an integrated area of support and development of research and development aimed at increasing the rate of investment in the area of research and development in order to support the growth of the level of competitiveness achieved and thereby also increasing the achieved profit. In the recent past, the area of investment and support for research and development at the level of large industrial and commercial companies has been influenced by several factors and the development trends conditioned by them, having a wide-ranging impact on current economic and social practice. Among the most important ones, we can mention in particular the Sars-CoV-2 pandemic, inflationary pressures, prices of energy sources (especially fossil fuels), as well as the growing conflict in Ukraine, European Union sanctions against the Russian Federation, and the energy crisis. The aforementioned development trends and the factors determined by them have affected the entire global geo-economic space, even if their impact is asymmetric within individual regionally defined parts of the global geo-economic space. Several of the mentioned factors, as well as their mutual combinations, had a fundamental effect on the subsequent economic development and character, quality and efficiency of global and regional production chains within the geographically extensive and complex economic ties of the global geo-economic space. The global Sars-CoV-2 pandemic and related measures aimed at preventing the spread of the new coronavirus among the population at the global and regional level led most business entities to modify their economic activities and financial operations. (Hošoff, 2020)

In this context, we can point to the impact of working from home, when several entities modified the previously applied models of work and mutual communication of employees and, in the interest of creating an effective and continuously ongoing system of work on various types of business projects, transferred these processes to the virtual space, by which we can point out that in under the influence of the pandemic, the global economy has indeed become a virtual economy for a certain defined part. The increasing prices of energy resources, in turn, led many economic entities to search for more efficient and sustainable production models. They oriented the production process towards the use of renewable energy sources and towards an overall more sustainable model of production processes. Restrictions in the field of transport and transport connections, in turn, led economic entities to look for new possibilities of building supplier-customer relations in a wider and more accessible regional space. (Grek, Landri, 2021)

We also notice significant changes in the area of growth in the importance of research and development in the field of biotechnology, the pharmaceutical industry, healthcare and health care, as well as in the area of software solutions and hardware equipment and components supporting new software solutions. The pandemic of the new coronavirus brought with it an increase in the importance of the pharmaceutical industry and innovations, especially in the field of rapid response to the situation and the development of new vaccines, ensuring during the individual culminating phases of the active spread of the given disease a certain required level of resistance, especially of selected groups of the population, and subsequently also of the entire population against new forms and virus mutations. The pandemic has also brought with it new challenges in the field of health care, which is also gradually moving into the virtual space together with rapid progress in the field of technological solutions and the technical equipment of medical facilities with state-of-the-art equipment, which largely contributes to early diagnosis and thus a quick response to developing diseases and reduces the systemic costs of treatment, through effective preventive care of preventable diseases, as well as the health and economic burden of the patient himself. In the area of innovation in software solutions and IT, we are seeing the most significant increase in dynamics, in various areas from technology and industrial solutions to

trading with virtual currencies, or the creation of smart cities, to the prospect of using artificial intelligence.

On the basis of the initiated development trends and the factors conditioned by them fundamentally determining the current situation in the area of support and investment in research and development by business companies and business entities operating in the global geo-economic space, we present in the clear form of figure 9 a comparison of the share of business companies and business entities in supporting research and development in the cross-section of 2021 – 2022.




Notes: SB - Scoreboard

Figure 9 Development of the global share of business companies and other economic entities in the area of research and development support in the cross-section of 2021-2022

Source: Grassano at all, 2022, The 2022 EU Industrial R&D Investment Scoreboard, 2022

As can be seen from the presented graph 10, a relatively significant growth in the share of investments in the field of research and development support at the global level is recorded in terms of the period of 2012-2022 by trading companies, enterprises and firms originating from the USA. An approximately balanced share of investments in research and development at the global level was recorded in the monitored period in the case of enterprises and firms originating from the European Union and Japan, while in both cases their stagnation occurs and from 2020 this share has a decreasing tendency. Trading companies, enterprises and firms originating from Japan recorded a more significant growth in the share of investments directed to support research and development in the monitored period. Since 2012, this share has recorded an upward trend, while in 2022 it exceeded the 25% mark.

Based on the collected data of companies originating from 41 countries operating within the global geo-economic space, while 16 of these 41 countries represent the member states of the European Union participating in the total global support of research and development at the level of 86.3 %, we can point to the following findings, which are contained in table 2.

Table 2 Companies involved in supporting research and development on a global scale, divided by country and region

| EU countries | No. of companies in | R&D (EUR bn) | Non-EU countries | No. of companies in 2022 (2021) | R&D (EUR bn) |
|---|---|---|---|---|---|
| Germany | 114 (124) | 91.03 | US | 822 (779) | 439.7 |
| France | 57 (66) | 28.78 | China | 678 (597) | 195.9 |
| Netherlands | 38 (34) | 24.08 | Japan | 233 (293) | 113.8 |
| Sweden | 26 (34) | 11.50 | Switzerland | 55 (57) | 34.9 |
| Ireland | 24 (27) | 8.28 | South Korea | 53 (60) | 34.3 |
| Denmark | 25 (29) | 7.14 | UK | 95 (105) | 32.8 |
| Finland | 12 (15) | 5.30 | Taiwan | 84 (86) | 24.8 |
| Italy | 20 (21) | 5.21 | India | 24 (25) | 5.6 |
| Spain | 12 (14) | 4.48 | Canada | 28 (26) | 5.2 |
| Belgium | 12 (13) | 3.11 | Israel | 22 (21) | 4.1 |
| Austria | 13 (14) | 2.04 | Australia | 10 (11) | 3.1 |
| Luxembourg | 3 (4) | 1.25 | Singapore | 7 (6) | 1.6 |
| Portugal | 2 (2) | 0.18 | Norway | 9 (11) | 1.4 |
| Hungary | 1 (1) | 0.17 | Saudi Arabia | 1 (1) | 0.9 |
| Slovenia | 1 (1) | 0.15 | Brazil | 4 (5) | 0.5 |
| Malta | 1 (1) | 0.06 | Other 10 countries | 14 (9) | 2.5 |
| Total EU | 361 (401) | 192.8 | Total | 2139 (2099) | 901.1 |

Source: Grassano at all, 2022, The 2022 EU Industrial R&D Investment Scoreboard, 2022

As can be seen from table 2, the highest share of R&D support on a global scale was recorded by companies originating from the USA, followed by companies from China and third by companies from the European Union.

Against the background of the starting points, it is quite interesting to observe the development of the share of investments of commercial companies, enterprises and companies in individual sectors, on the basis of which we can identify the sectors with the most significant potential for growth and development in the following period. Table 3 provides an overview of the values of the share of investment in research and development achieved at the global level in 2022.

Table 3 Sectors with the most significant R&D support at the global level in 2022

| Industrial Sector | Sector classification ICB4 digits | No. of firms | R&D 2021 (EUR bn) | R&D intensity (%) | Total R&D (%) | R&D per firm (EUR million) |
|---|---|---|---|---|---|---|
| Aerospace & Defence | Aerospace; Defence | 44 (43) | 17.7 | 3.9 | 1.6 | 402.3 |
| Automobiles & other transport | Auto Parts; Automobiles; Commercial Vehicles & Trucks; Tires | 179 (184) | 152.4 | 4.9 | 13.9 | 846.7 |
| Chemicals | Commodity Chemicals; Specialty Chemicals | 115 (125) | 25.1 | 2.4 | 2.3 | 218.6 |
| Construction | Building Materials & Fixtures; Construction and Materials; Heavy Construction | 65 (67) | 30.9 | 2.3 | 2.8 | 474.7 |
| Energy | Alternative Energy; Alternative Fuels; Conventional Electricity; Electricity; Exploration & Production; Gas Distribution; Gas, Water & Multiutilities; Integrated Oil & Gas; Multiutilities; Oil & Gas Producers; Oil Equipment & Services; Oil Equipment, Services & Distribution; Renewable Energy Equipment; Water | 80 (82) | 19.5 | 0.5 | 1.8 | 243.7 |
| Financial | Banks; Financial Services; Full Line Insurance; Insurance Brokers; Investment Services; Life Insurance; Real Estate Holding & Development; Real Estate Investment & Services; Real Estate Services; Reinsurance; Specialty Finance | 61 (67) | 19.1 | 2.7 | 1.7 | 313.9 |
| Health industries | Biotechnology; Health Providers; Medical Equipment; Medical Supplies; Pharmaceuticals | 567 (525) | 235.3 | 12.4 | 21.5 | 415.0 |
| ICT producers | Computer Hardware; Electrical Components & Equipment; Electronic Equipment; Electronic Office Equipment; Semiconductors; Telecommunications Equipment | 456 (458) | 246.8 | 7.0 | 22.6 | 541.2 |
| ICT services | Computer Services; Internet; Software; Mobile Telecommunications | 365 (355) | 216.3 | 9.3 | 19.8 | 592.5 |
| Industrials | Aluminium; Containers & Packaging; Diversified Industrials; Delivery Services; Industrial Machinery; Iron & Steel; Nonferrous Metals; Transportation Services | 260 (274) | 54.8 | 2.5 | 5.0 | 210.7 |
| Others* | Beverages; Food & Drug Retailers; Food Producers; Forestry & Paper; General Retailers; Household Goods & Home Construction; Leisure Goods; Media; Mining; Personal Goods; Support Services; Tobacco; Travel & Leisure | 308 (320) | 75.9 | 2.6 | 6.9 | 247.3 |
| Total | | 2500 | 1093.8 | 4.7 | 100.0 | 437.7 |

Source: Grassano at all, 2022, The 2022 EU Industrial R&D Investment Scoreboard, 2022

As can be seen from Table 3, the most significant share of investments in research and development at the global level was invested in the automotive industry and industry oriented to other transport technologies in 2022, at the level of EUR 864 million in research and development per company. This sector was followed by the ICT services sector with a share of EUR 541.2 million, and the third place in the given ranking was taken by ICT producers with the achieved value of the volume of investments in research and development at the level of EUR 541.2 million. A significant share of the volume of investment in research and development at the global level in 2022 also went to the field of scaffolding and construction materials (474.7 million EUR) and also to the field of health industries (415 million EUR). The share of investments in research and development in the area of increasing energy efficiency and especially in the area of alternative energy sources and ensuring energy security (EUR 243.7 million) is gradually increasing.

## 4. EU ECONOMIC RECOVERY AND RESILIENCE PLAN (NEXT GENERATION EU)

The indicated development tendencies and the factors determined by them fundamentally affect development not only at the global level, but their influence and action can also be identified at the regional level, not only at the level of individual states, but also at the transnational level. The European Union, in an effort to reflect the given development and at the same time in an effort to search for effective mechanisms with a high degree of effectiveness, which would increase its resistance to these influences and at the same time help it in the current period in overcoming the effects of the Sars-CoV-2 pandemic, crisis phenomena related to the armed conflict in Ukraine and the need to face the challenges arising from the energy crisis, proceeded to implement a plan aimed at achieving rapid economic recovery and economic recovery, and at the same time aimed at increasing the level of resistance of the European integration area to new challenges coming from the global and wider regional environment, with the designation Next Generation EU . The European Union's Economic Recovery and Resilience Plan focuses on the following main areas, which are currently considered the most significant challenges of current common and economic practice: creating a sustainable model of economic growth and development and supporting the development of a green and circular economy, orientation towards the digitalization of society and effective use of digital technologies in various areas of the life of contemporary society, with a primary focus on the field of education and training, but also on the field of healthcare, public administration, etc., strengthening and improving the health care provided to EU residents with efforts to prevent preventable diseases and support programs aimed at prevention , creating a stronger and more resilient society, especially through supporting young people in the field of education, involvement in research and development, supporting work in the field of new technologies and innovations, supporting the mobility of scientists and researchers, supporting the creation of multidisciplinary research teams by providing grants and adequate remuneration strengthening the spirit of equality and respect for differently defined population groups.

A total of EUR 806.9 billion has been allocated to support all key areas of the EU's Next Generation plan. One part of the allocated funds will be directed to the area of the instrument aimed at restoring and strengthening the resilience of the economy of the European Union and the national economies of the member states. Funds in this area will be divided into two groups: funds provided in the form of grants and funds provided in the form of loans. Another part of the funds will be allocated to the entire spectrum of other support programs, see figure 10. (Next Generation EU, 2023)

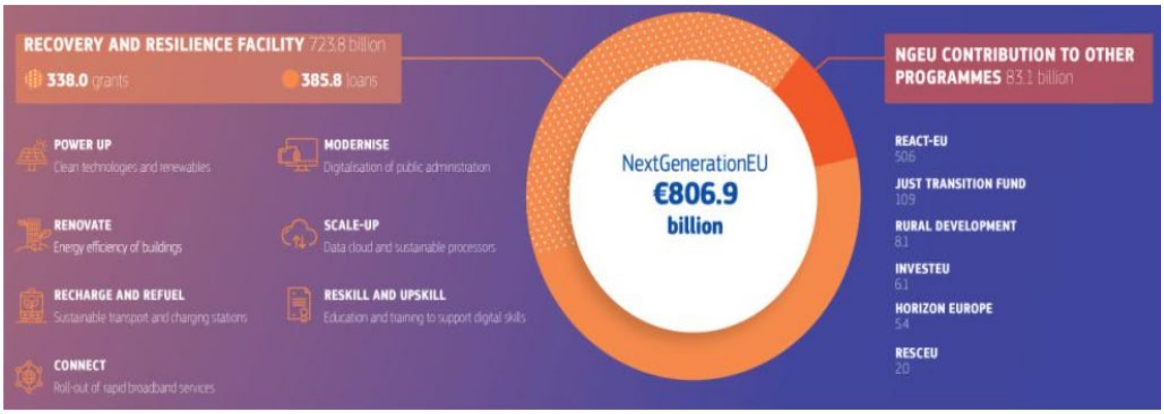



Figure 10 Distribution of funds within the Next Generation EU instrument

Source: Next Generation EU, 2023

One of the main supported areas of the Next Generation EU plan is strengthening the level of education and at the same time supporting lifelong learning in the entire spectrum of areas and branches of current economic and social practice. The main challenge in this area is primarily the reform of the educational system so that it better and more effectively reflects the needs of practice in terms of training experts and specialists with the required knowledge, skills and competences. A qualified workforce that possesses not only knowledge but also the necessary skills and competences can actively and significantly contribute to the fulfillment of other goals and priorities of the given plan. It is primarily related to the ability of the workforce employed in individual sectors and branches of the economy to generate and implement innovations, not only at the level of a new technical-economic paradigm, but also small, incremental, incremental innovations that help to improve production processes, technological processes, administrative processes, their processes oriented to the provision of services. Significant attention in the given area should also be focused on the area of research and development support and especially on the area of implementing its results into practice and subsequently their commercialization in the form of offering new innovative products or new ways of providing services. All of these are fundamental areas in which an educated and qualified workforce plays an important role and has a fundamental share in the level of results achieved.

Based on trends in the demographic development of the population of the European Union, it is necessary to focus attention not only on the education of young people in the area of supporting the development and qualification growth of the workforce, in the context of efforts to reduce the share of the population of the European Union that has left school early, or other systems of vocational training, and also efforts aimed at increasing the share of the population of the European Union with a higher education, but also at adult education. In this area, the main attention will be directed primarily to the support and building of lifelong learning systems. As S. Grek and P. Landri emphasizes the dynamism of current development, manifested in all spheres of life of contemporary companies, brings with it fundamental changes also in the field of employers' requirements for knowledge, skills and competences of the workforce. It is primarily about the ability to adapt to constant changes in the performance of individual work activities related to shifts not only in the field of methods and techniques used in the work process, but also with the necessity of growing digital skills. It was the Sars-CoV-2 pandemic that brought with it a relatively fundamental emphasis on digital skills and their effective use at the time of the implementation of measures limiting the mobility of the workforce. (Grek, Landri, 2021) Several companies and companies see the potential for the future in the area of more significant use of information and communication technologies in terms of savings and efficiency in the management and organization of work and work activities. The use of information technology can also contribute to

the growth and development of employees, especially through the organization of training or various educational activities, which is currently of fundamental importance, especially in terms of dynamics and progress in the level of knowledge of individual scientific areas and fields. The share of investments in adult education spent within the member states of the European Union according to calculations carried out in 2023 based on the values of national economic recovery and resilience plans is graphically presented in figure 11.

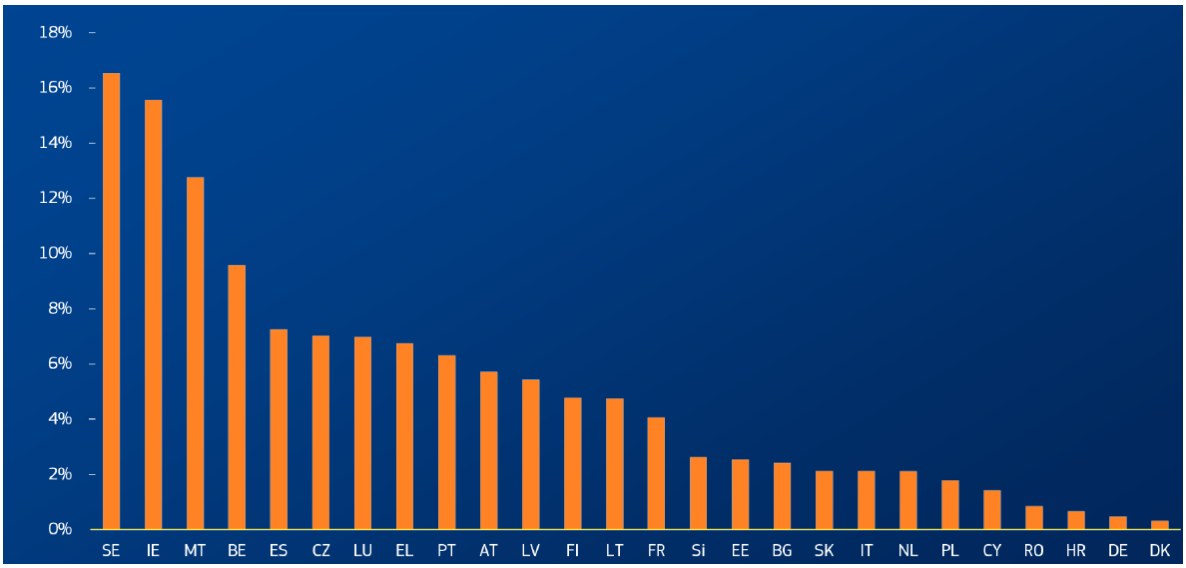



Figure 11 Share of investment in adult education spent within individual Member States on the back of national economic recovery and resilience plans

Source: Recovery and Resilience Soreboard, Thematic analysis, Audlt learning and skills, 2023

As can be seen from the presented graph, Sweden has taken the leading position in the given area with the level of the share of investments spent on adult education at the level of 16.5%. The share of investments spent on adult education exceeding the 10% mark was achieved by Ireland, Malta and Belgium.

As already mentioned in the previous text of the article, the field of research and development can contribute significantly to the fulfillment of the goals of the economic recovery and resilience plan. It is the results of research and development that can be effectively used in various areas of economic activity, as well as joint and political management and organization of society, whether it is innovations in the field of new ecological technologies helping to protect, preserve and restore the environment, or the already mentioned innovations in the field of improvement production processes and processes of organization, management and control of the work process, as well as in the field of using information and communication technologies in the field of health care, or in the field of services to citizens, in the field of public administration, or in the field of transport systems and waste management, etc. In the context of the plan for economic recovery and resilience in the area of research and development support, the following fundamental questions resonate in particular: strengthening the role of research and development in society and realizing its social and economic value, strengthening research and development funding and significantly diversifying research and development funding sources, eliminating administrative burden related to the search for supporting sources of funding for research and development from various grants and financial schemes, support for building international research teams, increased investment in the field of technical and technological research and development infrastructure, support for the transfer of research and development results into practice, etc. (Hošoff, 2021)

The priority areas of the economic recovery and resilience plan in the area of research and development support are mainly focused on its connection with other strategic goals, such as green energy, circular economy, ecological transport, digital technologies, health and health care. Figure 12 provides an overview of the share of European Union member states' investments in the area of research and development support in the context of fulfilling the strategic goals of national economic recovery and resilience plans.

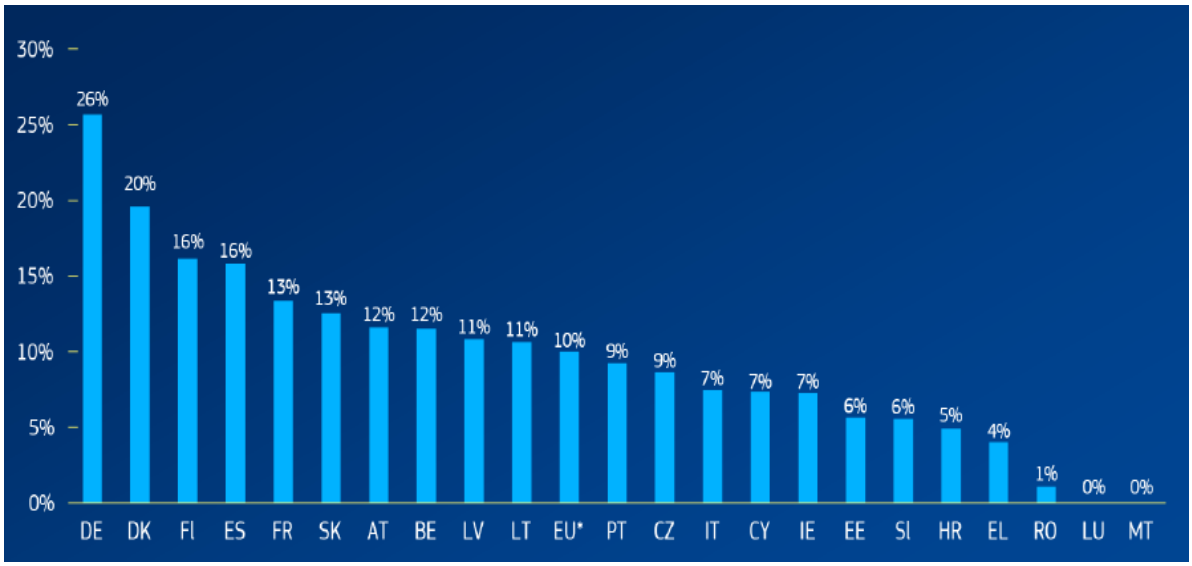



Figure 12 The share of investments spent to support research and development in the member states of the European Union based on the fulfillment of the thematic areas of the national economic recovery and resilience plans

Source: Recover and Resilience Soreboard, Thematic analysis, Research and innovation, 2023

As can be seen from the presented figure 13, so far the most significant volume of investments in the area of research and development support was reinvested in Germany at the level of 26%. Only Denmark reached the twenty percent mark in the given area. Finland and Estonia reached the threshold of 16% in the monitored area. The lowest share in the area of investment of funds to support research and development in the context of the fulfillment of the thematic areas of the economic recovery and resilience plan has so far been achieved by Romania at the level of 1%. It is clear from the data presented that the rate of progress in the area of research and development support in the individual member states of the European Union is significantly differentiated. From the point of view of numerical expression, the differences are up to 19 percentage points. A similar development trend was also noted in the area of evaluating the level of fulfillment of the goals of the Europe 2020 strategy, which also within its priority goals focused on increasing support for research and development, especially in the area of financial support through a progressive increase in the share of GDP generated in this area. Reflection and evaluation of the level of fulfillment of this strategic goal brought interesting results. One of the most fundamental was the significant differentiation in the level of fulfillment of this goal at the national level. Several states in the given area did not reach the threshold of even one percent. The degree of fulfillment of the given goal was therefore evaluated as one of the lowest. The mentioned results pointed out once again that it is necessary to pay more attention to the given area both at the level of the European Union and at the national level. (Čajka, 2019)

The economic recovery and resilience plan brings many challenges, the fulfillment of which is aimed at creating a functional model of sustainable development of the economy and other areas of social life and political management and organization of society. Quality education and the results of research and development applicable in practice can significantly help the fulfillment of

these ambitious goals and objectives and thus strengthen the position of the European Union not only on a regional but also on a global scale.

## 5. CONCLUSIONS

The European Union, as one of the important actors of the world economy, focuses primarily on strengthening economic growth and development of its internal economic space as part of its economic strategy, and thereby increasing the degree of economic stability, internal cohesion and economic resistance to external pressures and influences coming from the regional, but especially the global economic environment. As part of its economic strategy in relation to the external economic environment, the European Union tries to orient its efforts towards maintaining and strengthening its position in the area of the globalized world economy. The dynamics of current development, as well as fundamental changes occurring in the area of the world economy influenced by the accelerating process of globalization and the development tendencies and trends conditioned by it, as well as the development of the foreign political situation in its immediate neighborhood, lead to the fact that the European Union must increasingly face many challenges on which must be able to react quickly and flexibly adapt to them. Among the most significant challenges that the European Union had to face, we can include the global financial crisis, which later grew into a global economic crisis with a major impact on the internal economic space of the European Union, the Sars-CoV-2 pandemic, the armed conflict in Ukraine, the energy crisis, the deterioration of the living conditions environment and climate change, the reduction of the dynamics of economic growth in the pandemic period, the rapid growth of inflation in the post-pandemic period, the growth of the influence and position of regional economic actors, with global ambitions. Following the whole spectrum of challenges and problems that the European Union is currently facing and trying to deal with, the question of what tools and mechanisms need to be implemented in the given situation in the context of efforts to create a sustainable model of economic growth and social development comes to the fore. The strengthening of economic stability, as well as the support of economic growth in the context of its more significant acceleration in conjunction with the process of transformation of economic structures to their more sustainable forms, are fundamental challenges of the current development of the European Union. The reconstruction of such complex and interconnected systems as the system of the national economy, as well as the entire social system and the system of political management and organization of society, goes hand in hand with processes leading to the support of the growth and development of human capital, because it is individuals, communities, social groups that are the basis socio-economic and socio-political processes. Changes and reforms and the degree of their acceptance and implementation in economic life and social processes are proof of the preparedness, knowledge and conviction of society about their validity and importance for future development. At the back of the indicated starting points, the field of upbringing and education appears as one of the key areas on which it is necessary to focus attention. Education and the implementation of the achieved level of knowledge into new innovations and innovative procedures were the core and at the same time the transmission mechanism of moving and developing the company forward towards its more organized forms and more efficient functioning. At the present, much more strongly than ever before, emphasis is placed on the field of education and training and the functionality of educational systems with regard to the creation of a qualified legal force capable of creating new values and strengthening economic growth and development.

Economic analysts have been pointing to the importance of knowledge for a relatively long time, thereby indicating that its role and importance will grow more and more significantly. Many of them emphasize that the increase in the importance of knowledge will lead to a reevaluation of traditional economic theories in the context of including knowledge in the group of production factors. The process of creating new knowledge is directly linked to education and the functionality

and quality of the delivery system. The ability to acquire, correctly evaluate and contextualize data, data, information into an individual knowledge base is a specific and unique process occurring in the human mind. The result of this complex activity is new knowledge that can be transformed by an individual and, when shared, by the entire work group into various improvements or completely new work procedures, the more routinized tasks are interconnected more effectively and thus their effectiveness expressed in work productivity increases.

The European Union emphasizes the mentioned development tendencies in its strategic documents. In the post-pandemic period, which is primarily focused on overcoming the effects of the pandemic associated with the weakening of economic growth, the support of education and research and development are becoming key priorities. In terms of the declared shares of the level of education achieved, the European Union is characterized by relatively good results in the given area. The share of educated people is increasing, the share of educated women is increasing, gender differences and thus gender stereotypes in the field of views on the level of education achieved by men and women are gradually being overcome. The number of jobs that require higher education is gradually increasing. The question of connecting the educational system with the needs of practice remains fundamental in the given area. In this area, relatively significant differences are noted within the European integration area. To the greatest extent, the educational system approaches the necessary practices, especially in the Nordic countries, on the contrary, certain and sometimes significant reserves in the given area can be identified in the countries of Central and Eastern Europe. Many of them are going through a complex process of reforming educational systems in the context of a more significant reflection on the needs of practice. It is therefore no surprise that even in the post-pandemic period, this area was included in the thematic areas of the economic recovery and resilience plan at the European and national level. Supporting education, but also increasing the level of skills, especially the so-called soft skills have become crucial in terms of supporting the growth and development of individual economic branches and sectors. Another important aspect that is directly related to the use and application of acquired knowledge, skills and competences is the support of research and development. In this area, the European Union is making some progress, but from the point of view of the dynamics of research and development support of other important players in the world economy, this dynamics is relatively low within the European integration area. The economic recovery and resilience plan of the European Union, with its content focus and definition of priority goals, emphasizes the importance of education and training in connection with the implementation of its results in practice through innovations, as a product of research and development. These wafers are interconnected with other priority goals such as digitalization of society or green transformation. In this direction, we can point out that the setting of strategic goals in the given area is correct and reflects the current dynamics of development in the regional and global economic environment, but in this direction, it is necessary to implement the entire spectrum of fundamental measures that will contribute to the fulfillment of these ambitious goals.

One of the fundamental challenges in this area will be the field of digitization, which is gradually penetrating all areas of life in modern societies. It is precisely in the field of education and training, as well as raising the educational level and training of the qualified workforce, that this area will play an important role. The implementation of new, modern forms of education is currently more than desirable, however, it is necessary to consider and create a mechanism for its gradual implementation and mutual combination with traditional and proven forms of education, so that they bring positive results in mutual synergy. In the field of research and development, digitization also represents one of the challenges to which it is necessary to respond appropriately. In the given area, it is not only about its effective use as one of the supporting means of research, development and putting innovations into practice, but especially about securing the technical and technological equipment used in the given area so that they do not create a potential risk of possible leakage and misuse of research results.

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