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KNOWLEDGE AND INNOVATION AS A COMPETITIVE ADVANTAGE OF REPUBLIC OF CROATIA

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Abstract

Knowledge and investment in innovation is becoming the main criteria of competitiveness. The purpose of this paper is to examine concepts of knowledge, innovation and competitiveness. To prove the stated, comparative analysis was conducted on Eurostat data on EU public expenditure on education. Further analysis involved the data of employed and unemployed persons depending on the completed educational program in Croatia. Furthermore, a benchmarking of countries' innovation performance was carried out based on the Global Innovation Index, the Bloomberg Innovation Index and the European Innovation Scoreboard. The aim was to determine the most competitive economies compared to Croatia. The third analysis included innovation performance of Croatian companies. The contribution of the paper is visible in the analysis of the theoretical determination of knowledge and its development completed with the list of future jobs. The importance of the paper is reflected in the necessity of creating strategies corresponding to the future.

Keywords: knowledge, innovation, competitiveness, education policy, economic growth

1. INTRODUCTION

Knowledge is the imperative of progress. In order for companies to remain competitive, they need to invest in knowledge and develop innovation. Under the influence of globalization and the rapid flow of information, society is facing the

emergence of new jobs and brain drain. Highly educated workers ready to take training and develop new skills are needed (Sima et al., 2020, p. 4). Industry 4.0 refers to the adoption of new business models, production processes, but also to the curricula of educational institutions. The rapid response of legislation and educational institutions to market needs is crucial for a company's competitive advantage. The role of governments is to continuously conduct an analysis of the alignment of education and labor market needs in order to direct education policy to respond in a timely manner to the required labor market needs. Furthermore, when it comes to future skills and knowledge - Big data technologies, BI (Business Intelligence) and IOT (Internet of Things) will become an indispensable tool for the development of the organization in the near future (Tavera et al., 2021, p. 2).

The paper provides answers to the questions: How does knowledge contribute to achieving competitive advantage? What is the competitive advantage in the new economy? Throughout the paper, the method of description was used in describing the terms: historical aspects of knowledge development, explicit and tacit knowledge, knowledge-based economy, different indexes, etc. The second method used was the comparative method when comparing data related to allocations of EU countries regarding education in the period 2018-2020. It was also used when comparing the results of three indexes regarding the innovation performance of countries. The deductive method was used to test the theory of the importance of knowledge that leads to competitive advantage. Synthetic analysis was used in order to present the research problem in the simplest possible way. In addition to the introduction and conclusion, the concept of knowledge as a source of increasing competitive advantage through historical aspects and its importance is presented at the beginning of the paper. The third part of the paper deals with the investment in innovation in Croatian companies. The fourth part analyzes the strategic framework for encouraging innovations in the Republic of Croatia. The aim of the paper is to analyze how the application of knowledge affects the competitiveness of individuals, organizations and countries.

2. KNOWLEDGE AS A SOURCE OF INCREASING COMPETITIVE ADVANTAGE

2.1. Historical aspects of knowledge development

Knowledge and work are two inseparable concepts. Knowledge is: “a unique resource: there are no limitations (unlike all other resources, it is limited only by the human mind) and therefore provides endless opportunities for development and its successful management makes it possible to achieve a sustainable competitive advantage. Knowledge is not wasted by its use but is constantly increasing. It does not consume much energy or negatively affect the environment (Sundać and Švast, 2009, p. 63).

The development of knowledge can most easily be traced through the industrial revolutions. Every revolution is a product of additional knowledge. The

concept of revolution is defined as: “a leap change that significantly affects people's lives, changing social relations, the education system, and if it relates to the industry, then it brings significant changes in technology, processes and ways of working“ (Nikolić, 2017, p. 37). Up to this point, humanity has had four industrial revolutions that changed the world.

The first industrial revolution made work easier and faster with the creation of the steam engine patented by James Watt in 1763. The development of the steam engine led to the transformation of previous work and life based on the use of their own strength and the strength of animals. People were replaced by machines. The use of a steam engine required new knowledge to operate those machines (Raguž, 2015, p. 6).

The second industrial revolution relied on the knowledge and achievements of the first. The period of the second industrial revolution from 1860 to 1914 was marked by electricity, the emergence of large factories and mass production. The third industrial revolution was marked by the emergence of smart software, new materials, 3D printers, automation. new materials are lighter, more resistant and more durable, and carbon fibers are replacing steel and aluminum. The development of new technology allows engineers to design objects of different dimensions (Tien, 2012, p. 280). The fourth industrial revolution is associated with Industry 4.0, which is based on smart factories. It uses information and communication technology to manage production and business processes, reducing production costs and increasing quality. Industry 4.0 is looking for experts with knowledge from the STEM field (Nikolić, 2017, p. 38). STEM areas are study programs in the biotechnical, technical, biomedical and natural fields of science and study programs, which acquire the academic or professional title of Bachelor of Informatics, Business Informatics, Information Sciences, Informatics and Information Technologies (Ministry of Science and Education, 2017).

The concept of Industry 4.0 is based on digitalization and networking of all functions inside and outside the factory where workers are replaced by robots. Industry 4.0 is marked by a reduction in the number of employees. The employee structure is also changed because new knowledge is required - especially in informatics. It is a concept focused on the production facilities that produce “large quantities of products, which can be different, personalized, but use the same type of work technology” (Nikolić, 2018, p. 2).

People are involved in the entire production system - as designers, workers but also as buyers of the product. Workers should be highly qualified and ready to improve and develop new skills. The changes affected by Industry 4.0 are related to the adoption of new business models, production processes, but also to the curriculum of educational institutions (Sima et. al, 2020, p. 21).

Shortly after the term Industry 4.0, Rada uses the term Industry 5.0 in the article „INDUSTRY 5.0 - from virtual to physical“. In the article, Rada is stating that after the implementation of the concept of Industry 4.0, industry will be fully automated and will exclude man from the process of work. It is a new form of

cooperation between man and robot. The interaction between humans and machines, as a mix of creativity and precision, would lead to the creation of new commercial and social values (Nikolić, 2018, p. 6).

Society has changed through history, so the concept of work has changed as well. For some authors, the idea of labor is: “To emphasize the importance of knowledge and intellectual capital while emphasizing the need to use balance to establish a balance of interests, reconstruct humanity, establish a degree of social, economic and political equality, i.e., create a welfare society based on knowledge“ (Jakovac, 2012, p. 2). Therefore, knowledge itself does not represent competitiveness but the activities of individuals who use knowledge for the benefit of the organization in which they operate. The value is in the people who possess the knowledge and use it. Importance of knowledge and education is crucial in the effort to achieve competitive advantage. Following the above, the duty of the individual is to work on the skills that enable them to be employed. Necessary skills are communication skills, teamwork, problem solving and technology skills. Some authors believe that soft and technological skills will prevail in the future (Fajaryati et al., 2020, p. 597). For this reason, it is crucial that education systems monitor upcoming demands/trends so that individuals are prepared to respond to market needs. Knowledge is crucial when it comes to reducing costs, making quality business decisions, defining goals and strategies when making high quality products and services (Bratić, 2021, p. 48).

Analyzing future skills and knowledge, considering the Big data technologies, BI (Business intelligence) and IOT (Internet of Things) will be the development pillars of an organization. Business intelligence technologies and IOT will become an indispensable tool in development, primarily in smaller organizations and will strengthen their economy (Tavera Romero et. al., 2021, p. 12). The above is also substantiated by a study of The World Economic Forum “*The Future of Jobs Report*” which predicts that by 2025, 97 million new jobs will be developed and will require human-robot collaboration, the use of algorithms and artificial intelligence (World Economic Forum, 2020). The study clearly states that new knowledge and skills are necessary. Based on the World Economic Forum report, company A1, a provider of digital services and communication solutions, created a map of jobs and skills of the future, in collaboration with an expert team of 27 scientists, professors, managers, experts from various industries. The map contains an overview of 100 occupations in 10 industries¹ that will be required in the near future. An added value of the map is a description of the skills required for the selected industry. The map contains expert advice for those entering the education system or in the labor market who want to invest in their future.

¹ More detailed information can be found at the link: <https://vjestinebuducnosti.a1.hr/index>

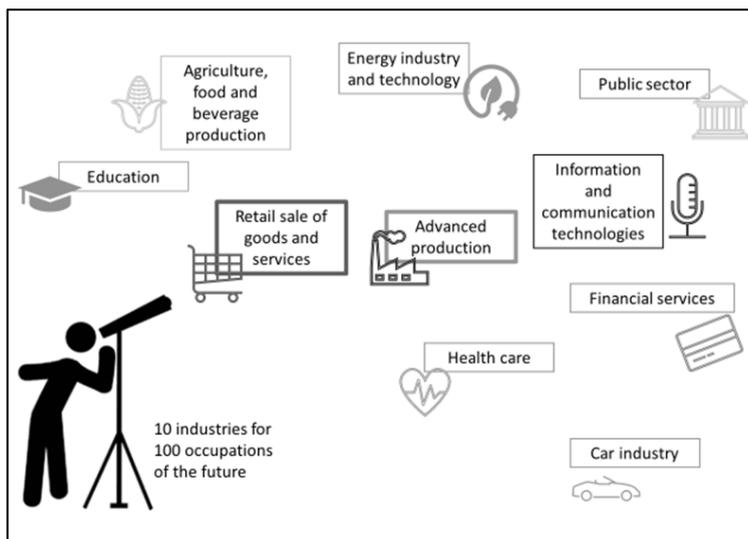


Figure 1 Ten industries for 100 occupations of the future

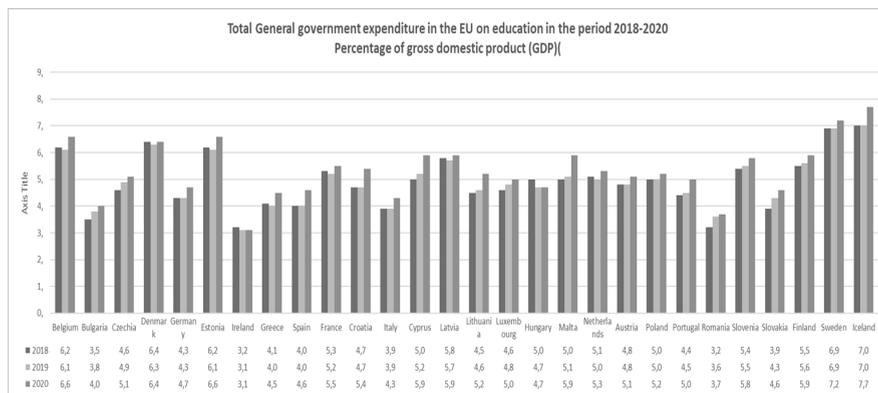
Source: Created by authors based on the Map of Jobs and skills of the future

The map contains 10 industries/areas of the future (Picture 1): information and communication technologies, health, education, financial services, public sector, agriculture and food and beverage industry, advanced manufacturing, consumption and retail industry, energy industry and automotive industry. Data analysts and specialists in artificial intelligence are just some of the occupations that will be necessary. In the future, workers will be required to embrace and learn new skills. Lifelong learning is becoming imperative to keep industries ready to face development.

2.2. Importance of knowledge and education in the effort to achieve competitive advantage

The human brain has replaced manual labor and became the most important element of enterprise growth and development: “Capable employees, who develop new ideas, create value and innovate business operations have become key assets of the new economy.” (Kolaković, 2003, p. 926). The purpose of each system is: “to connect the knowledge process with the requirements of economic development and labor market and generate as many professional and educated staff, thus enabling permanent employability, reduce unemployment and develop knowledge and education, i.e., lifelong learning“ (Sudarić, 2012, p. 72).

Considering this, the authors included the allocation of EU countries related to education (Graph 1) in the analysis. The analysis included the period from 2018 to 2020 based on Eurostat data. The biggest allocations in 2020 had Iceland, Sweden, Belgium, Estonia, Denmark, Cyprus, Malta and Finland. Croatia was ranked 14th place. However, when analyzing the 2018 to 2020 period for Croatia, there is an increase in investments in education and Croatia is in the top three countries.



Graph 1 Total General government expenditure in the EU on education in the period 2018-2020

Source: Created by authors based on Eurostat data

Lifelong learning is "any activity with the aim of improving knowledge, skills and competencies within the personal, civil, social or professional activities of an individual" (Sudarić, 2012, p. 72). It includes formal, non-formal and informal learning. Lifelong learning has a positive effect on employability (Sudarić, 2012, p. 72-73). "The competitive advantage of the economy is based on continuing education, i.e., lifelong learning and the development of entrepreneurship and entrepreneurship education, with an emphasis on the embrace of the necessary entrepreneurial competencies" (Sudarić, 2012, p. 74).

With the aim of making Croatia competitive based on education, in December 2020, the Croatian Employment Service published the document *Recommendations for Educational Enrollment Policy and Scholarship Policy*. The document contains an analysis conducted based on statistical data and indicators on the employment of unemployed persons depending on the completed educational program, as well as a survey of employers on the lack of workers and the opinion of counselors/mediators in employment. The aim of the analysis is to contribute to the harmonization of education and labor market needs. Strategies and plans for economic development at the local, regional and national levels were taken into account. The recommendations were given in the direction of increasing or decreasing the number of students enrolled in educational programs. It is

important to mention that analysis, forecasts and recommendations at the level of local labor markets take into account the regional offices of the Employment Service and are not quantitative in nature, i.e., do not specify the number of places for which it is necessary to increase or decrease enrollment quotas. The analysis shows the need to increase the number of students in electrical engineering, mechanical engineering, power engineering, accounting, shipbuilding, computer science, medicine, nursing, physiotherapy, physics, computer science, mathematics and crafts in most cities and their surroundings and reduce the quota for students of business economics, philosophy, archeology, political science and journalism, and kinesiology (Croatian Employment Service, 2020).

The role of the state should be strengthening infrastructure that will encourage investment in labor and education, support industrial clusters, improve living standards and quality of work and not its quantity (Škuflić & Vlahinić-Dizdarević, 2003, p. 464).

When it comes to learning, as a process of acquiring knowledge, it is necessary to make a difference between explicit and tacit knowledge. Explicit knowledge is expressed in words and numbers, in the form of data, scientific formulas or manuals. Tacit knowledge is associated with personality and is difficult to formalize because it depends on the experience of the individual. It is a strong basis for achieving a competitive advantage of the company and it is an essential intangible resource. "Almost every type of work requires the mobilization of specific, tacit knowledge and that is incorporated into organizational routines, processes, products, services, customers and their habits, etc." (Alpeza, 2010, p. 8). Tacit knowledge is also called unspoken knowledge because it is linked to an individual's experience that is difficult to pass on to others. An example of tacit knowledge is playing the piano which can be explicitly learned. However, the feeling for breaks in the melody and the creation of feelings in the audience is not something that can be transferred. Another example is the power of speech which is able to spark emotions in others. Tacit knowledge is expressed in jobs where communication is crucial.

However, some research states the importance of endogenous and exogenous factors that have a strong influence on company competences, but points out that competitive advantage stems from the type and quality of knowledge a company possesses and uses, emphasizing the importance of tacit knowledge (Aurel Burciu & Kicsi, 2015, p. 13).

Although the continuity of the transfer of knowledge, skills and abilities is a challenge, especially in the context of organizational transformation processes and the associated mobility of employees at all levels and in all processes, it is necessary for the survival of the organization. (Vrabцова, Urbancova, & Hudakova, 2022, p. 183).

3. KNOWLEDGE AND INNOVATION AS A COMPETITIVE ADVANTAGE OF THE COMPANY

Knowledge, technological innovation, education and ability are factors of production (Škuflić and Vlahinić-Dizdarević, 2003, p. 461). The term new economy is based on knowledge and ideas. Improving living standards and creating new places is possible with the creation of new products, services and processes based on innovative ideas and technological change (Atkinson, 2002, p. 5).

In order for employees to be willing and able to experiment, it is necessary to create a climate for innovative behavior. Technology plays an important role in creating such a climate. Those companies that use technology for the production of other goods and services, and where the necessary role of employees with specific knowledge of production processes have the opportunity to learn and experiment and innovate, create an innovative climate. (Bogers, 2018, p. 15)

Knowledge is a crucial and strategic economic resource necessary for successful adaptation to globalization processes. "It is the accumulation of knowledge and investment in human capital that appear as key determinants of technological progress, unlimited economic growth, growing income and increasing living standards" (Jakovac, 2012, p.2).

When it comes to knowledge, it is inevitable not to mention the theory of intellectual capital which "is based on the belief that the wealth of a company is based on human capital, structural capital and consumer capital" (Kolaković, 2003, p. 925). The old economy was dependent on tangible assets (real estate and factories), while the new economy is based on a new type of company which depends on intangible assets (information and knowledge). Knowledge has become more valuable than ever because it creates value and new knowledge to which the arrival of the Internet has contributed (Kolaković, 2003, p. 925). The knowledge of employees is a part of intangible assets and refers to intellectual capital (Alpeza, 2010, p. 7). It is an intangible asset, formed through the learning process in educational institutions, companies and families. It is an individual process – a combination of knowledge, skills and competencies (Cvetanović and Despotović, 2014, p. 4). Intellectual capital is: "a set of people with their knowledge, abilities, creativity, inventiveness, skills, experiences, cultures, motivations (...), with information networks that transfer knowledge and information, software, database, licenses, company culture, law and customer information and the quality of market relations" (Zelenika and Pupovac, 2001, p. 1038). Besides human capital, as an intangible asset, they also call it the invisible, intangible, "hidden" asset of the company. The terms mentioned refer to what is not fully included in the balance sheets, but include what human capital is in the minds of employees and what remains in the company after they leave the company.

Additionally, when it comes to the new economy, it is impossible to avoid mentioning the term „the knowledge-based economy” and it refers to the continuity of human civilization – balancing production, consumption, distribution and

energy (Carrillo, 2015, p. 4). The nature of knowledge-based as opposed to material-based economics is central for a new economic culture that will affect on the emergence of knowledge cities and societies (Aurel Burciu & Kicsi, 2015, p. 13).

Knowledge and information are products of the human intellect, intangible goods whose value is multiplied when used and displayed to other people (Milović et al., 2016, p. 81). In order to protect this type of property, a system of legal protection of intellectual property has been developed. It includes copyright and related rights, as well as industrial property rights. "The importance of human capital is reflected in achieving a high variety of innovation performance." (Milović et al., 2016, p. 81). The organizations, which are based on knowledge and interaction of employees, lead to higher productivity, new values and the creation of greater competitive advantage of the organization, which ultimately leads to the creation of wealth and sustainability of the organization (Ali et al., 2020, p. 13). Human capital can influence economic growth only through the opening of new and greater capacity to absorb employment. Developed institutions, a high enrollment rate, higher investment in research and development as well as a higher degree of attracting foreign direct investment lead to high economic growth (Shukarov and Marić, 2016, p. 163). Therefore, the priority of national policy is: "strengthening more technologically complex industries in the economy, because these are industries that are associated with faster growth of gross value added, i.e., creating faster income based on investment in capital and labour" (Jurčić and Aralica, 2009, p. 157).

The knowledge-based view of the company has two principal implications for the distribution of decision-making (Grant, 1996, p. 119). By organization theory, the employees are the ones who own most of a company's resources, if we agree that the value of the company is in the knowledge the company possesses. However, the quality of decisions depends on relevant knowledge. What if employees hide knowledge? In this regard, an important research (Sulistiawan et al, 2022, p. 13) showed that the greater the complexity of knowledge, the greater the tendency of employees to hide their knowledge. It follows that the company is not as competitive as it should be and it is necessary to go deeper into the problem of employee behavior and relations with the company.

On the other hand, some authors believe that the importance of success and development is based on innovation. For them, innovation is: "the key to successful competition in the global market, facing many global challenges, but also an important element in the pursuit of sustainable development" (Bilas and Franc, 2018, p. 2). Others define innovation as "the most valuable resource of every company" (Gregorić et al., 2018, p. 1) and consider it important to encourage creative thinking and ideas. Innovation has "a direct impact on increasing productivity and competitiveness, while continuous business innovation implies constant adjustment and the ability to navigate in a competitive market" (Gregorić et al., 2018, p. 1).

The importance of innovation and investment in it proved important during the crisis caused by the COVID-19 pandemic. The crisis caused by COVID-19 is likely to leave many companies financially weaker, with the most significant impacts on the willingness and ability of small and medium-sized enterprises (SMEs) to sustain research and development activities. However, those organizations that invest in research and development are more likely to survive, achieve stronger growth and increase their profitability. A positive example is the United Kingdom, which announced additional funding in the form of support for these activities aimed at SMEs (Roper and Turner, 2020, p. 1).

The innovation depends on the exchange of knowledge. Such behavior affects the design of services, products, business models, but also organizational schemes. Knowledge sharing refers to the transfer of experience, skills and information in practice and this is exactly what happens with innovation. Those organizations that encourage knowledge sharing facilitate innovation skills (Ignacio Castaneda and Cuellar, 2020, p. 170). An analysis of the attitudes of different authors leads to the conclusion that knowledge and innovation are causally-consequential links in the creation of development. In addition to the above, the role of tacit knowledge is inevitable.

In support of the importance of education and the educational system in the development of innovation, Koellinger's research proved that innovation will be made by highly educated individuals, because higher education trains to recognize, analyze and solve complex problems, which leads to the ability to design innovative business ideas. (Koellinger, 2008, p. 27)

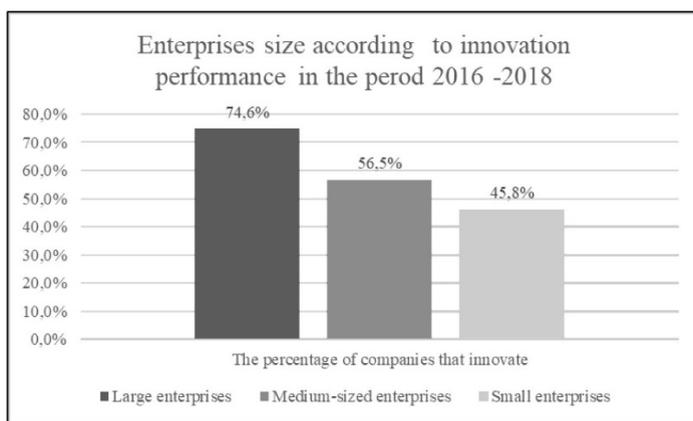
“The main task of managers should therefore be to support individual initiatives and creativity of individual employees. It is also possible to say that innovativeness founded on knowledge and the ability to respond to a turbulent environment is perceived as a source of profitability and success of organisations in the present competitive environment” (Urbancová 2013, p. 93)

When it comes to the creation of a culture of innovation capabilities in the organization, managing bodies should play special attention to the seven factors: individual personality, individual attitude, reward and recognition, competence based trust, benevolence based trust, ICT infrastructure and availability and ICT know how, because those seven factors have a positive effect on innovation capabilities of employees. (Hafeez Siddiqui, Rasheed, Shahid Nawaz, Abbas, 2019, p. 478)

4. INVESTMENT IN INNOVATION IN COMPANIES IN CROATIA

The Croatian Bureau of Statistics (2020) published a press release related to innovation in enterprises in the period 2016-2018. The survey was conducted on a sample of 4.499 companies. Innovative companies are defined as those

companies that have introduced product innovation (physical product or service) or process innovation in the specified, observed period. According to the definition of innovative companies, the report showed that 48.2% of the observed companies in the Republic of Croatia were innovative. When analyzing the size of enterprises (Graph 2), the data presented in the report shows that large enterprises are the most innovative (74.6%), followed by medium-sized enterprises (56.5%), and the least innovative enterprises are small enterprises (45.8%).



Graph 2 Enterprises size according to innovation performance in the period 2016-2018.

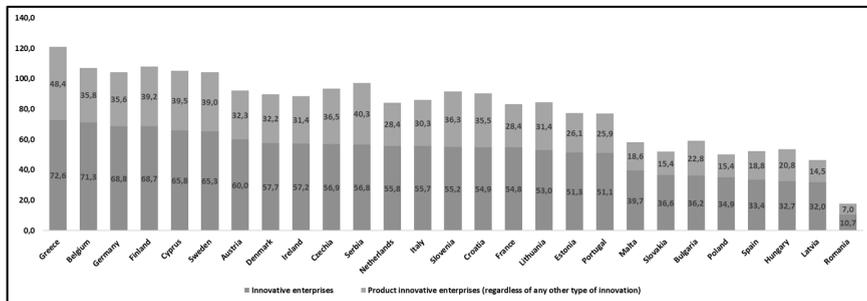
Source: Created by authors based on the press release published by The Croatian Bureau of Statistics

The manufacturing companies invested the most in innovation and development activities. Innovative companies participate in the realization of 69.4% of the total turnover of all observed companies in 2018. In 2018, 64.2% of all employees were working in innovative companies.

According to the size of innovative enterprises, the largest share in the total turnover of enterprises is realized by large enterprises (87.8%), followed by medium-sized enterprises (65%), while small enterprises shared 43.9%. The report of the Croatian Bureau of Statistics (2020) states that product innovation was carried out by 5.8% of all enterprises and process innovation by 13% of enterprises. However, this is mostly implemented by the parallel introduction of process innovation and product innovation, which made 29% of all companies with an emphasis on large companies, in which the share is 52.8%.

The analysis showed that companies most often innovate products and processes independently, while a smaller number cooperate with other institutions to develop innovation. Excessive costs, lack of their own funds for innovation and other priorities of the company are mentioned as the biggest obstacles to investing and starting innovation activities.

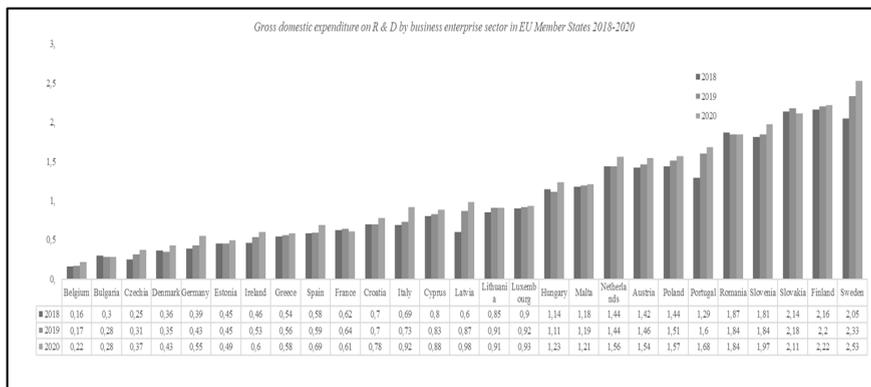
According to the CIS 2020, the most innovative enterprises in 2020 were in Greece, Belgium, Germany and Finland. All companies (regardless of size) had at least one innovative product in 2020. When we compare Croatia, we see that it is at the level of France, Slovenia, and Italy. (Graph 3)



Graph 3 Innovative enterprises and product innovative enterprises in 2020

Source: Created by authors based on Eurostat database

Graph 4 shows picture of R&D intensity in the EU Member States. In 2020, R&D intensity ranged from 0.22 % to 2.53 % across the EU, which is an increase compared to the previous two years, when the percentage of gross domestic expenditure on R & D by business enterprise sector ranged from 0.16% to 2,05% in 2018, and 0.17% to 2.33% in 2019. When we compare Croatia with other European countries, we see that it is tied with France and Italy when it comes to allocations, while the leaders are Finland and Sweden.



Graph 4 Gross domestic expenditure on R & D by business enterprise sector in EU Member States 2018-2020

Source: Created by authors based on Eurostat database

Today's form business is under constant competition. It requires companies and managers to observe the market and deliver goods and services that exceed the requirements already contain the goal and exceed the expectations of the market, which will build the company's goods/services as well as connections with customers, loyal and professional employees. The responsibility is on large companies to become creative through incremental innovation, while continuously renewing or destroying an existing company through radical innovation, with the aim of improving their position in the market. (Nassar & Tvaronavičienė, 2021).

Increasing attention is being paid to social innovations, which "must be seen as an interscalar, strategic enterprise, with agents able to accelerate the movement of an idea from invention to institutionalization". Their main focus should be improving social connection, cohesion and inclusiveness, and the ability of individuals to participate in the market by solving social challenges, it meets social needs. (Olsson, Moore, Westley & McCarthy, 2017, p. 3).

There are three important indexes as tools for comparing the country's innovation performance: the Global Innovation Index (GII), the Bloomberg Innovation Index (BII) and the European Innovation Scoreboard (EIS) (Bilas et al., 2019, p. 35). These tools help policy makers direct the necessary instruments to invest in innovation.

The Global Innovation Index (2021) provides an overview and ranking of innovation performance for 132 countries and economies around the world based on the overall Global Innovation Index and 81 sub-indices. The Global Innovation Index is a tool that assists policy makers, business leaders and other stakeholders in assessing innovation progress on an annual basis.

The Global Innovation Index 2021 ranks Croatia 42nd place compared to the year before when it was ranked 41st. The five leading positions are held by Switzerland, Sweden, the United States, the United Kingdom and the Republic of Korea.

The Bloomberg Innovation Index (2021) observes seven areas: research and development intensity, value added production, productivity, high technology, higher education, researchers and patent activity. According to the index, Croatia is in 45th place, while the other European countries in the leading places are Switzerland, Germany, Sweden, Denmark and Finland.

The European Innovation Scoreboard "provides a comparative assessment of the research and innovation performance of EU Member States and selected third countries and the relative strengths and weaknesses of their research and innovation systems. It helps countries assess areas on which they need to concentrate their efforts in order to boost their innovation performance" (European Commission, 2021). The EIS distinguishes four main types of activities: framework conditions, investments, innovation activities and impacts. It has 12 innovation dimensions, covering a total of 32 indicators. The European Innovation Scoreboard 2021 contains new indicators - digitalisation and sustainable innovation. The Republic of Croatia is in the group of emerging innovators.

By using a comparative analysis of all three indexes when looking at 2021 and innovation performance by the top five countries (Table 1), it is evident that countries that invest in innovation are more competitive than others. The most significant example is Sweden, which is among the top 5 countries in all three indices. When analyzing the rank of Croatia, it can be concluded that Croatia should work on its innovation performance to improve its competitiveness at the national, regional and global level.

Table 1

Country innovation performance analysis based on three indexes in 2021

Rank	Country according to the different Index 2021 which analyzed innovation performance		
	Global Innovation Index	Bloomberg Innovation Index	European Innovation Scoreboard
1.	Switzerland	South Korea	Sweden
2.	Sweden	Singapore	Finland
3.	United States of America	Switzerland	Denmark
4.	United Kingdom	Germany	Belgium
5.	Republic of Korea	Sweden	The Netherlands
Croatia	42 nd	45 th	21 st

Source: Created by authors based on Indexes which analyzed innovation performance in 2021

5. STRATEGIC FRAMEWORK FOR ENCOURAGING INNOVATIONS IN THE REPUBLIC OF CROATIA

The institutional environment is a key aspect of sustainable economic growth. Countries with a high rate of institutional engagement are those with the highest economic growth (Borges et al., 2017, p. 214). The lack of cooperation between industry and the scientific research sector, technology transfer and academic entrepreneurship causes a lack of innovative SMEs. As a result, there is a lack of incentives and financial and organizational resources that would allow companies based on new technologies to go through the seed phase and the start-up phase (Račić et al., 2008, p. 109).

By adopting the The Strategy for Innovation Encouragement of Croatia 2014-2020 (OG 150/2011 and 119/2014), the Croatian government recognized the importance of innovations and the impact they have on the economy. In the long run, the strategy directs the development and encouragement of innovation through four strategic goals:

- 1) Improved innovation performance of Croatia,
- 2) Increased share of business sector investments in total investments in research and development,
- 3) Increased number of basic and applied research aimed at strengthening the competitiveness of the economy,

- 4) Increasing human capacity for research, technological development and innovation.

The strategy states that the achievement of four strategic goals should increase the level of competitiveness of the Croatian economy and increase social benefits as a result of investing in knowledge, creativity and innovation, which is the main strategic goal.

The second strategy regarding innovation is The Croatian Smart Specialization Strategy (S3) 2016 – 2020, (OG 150/11 and 119/14, 2016). The strategy was adopted on the basis of an initiative of the European Union as a new approach to economic development based on research and development activities. The strategy defines five thematic priority areas (TPAs): Health and quality of life, Energy and sustainable environment, Transport and mobility, Security and Food and Bioeconomy, into which it is necessary to direct research and development activities.

The strategies also define the framework of the national innovation ecosystem as well as the division of competencies of organizations within the system. The implementation of strategies has created an innovative system in Croatia in which, based on the triple helix model, cooperation between the private, scientific research and public sectors in investing in research and development activities is encouraged. This is evident through the project applications in the field of research and development from the Operational Program Competitiveness and Cohesion. Following the new programming period (2021 to 2027), the Croatian government has started drafting a new Smart Specialization Strategy of the Republic of Croatia (S3). The smart specialization approach is based on the development of “transformation activities“ in selected priority areas. EU Member States have adopted research and innovation strategies for smart specialization with the aim of investing in areas with the greatest potential for innovation, based on identified resources and capabilities. The key concept of smart specialization is the bottom-up approach in the entrepreneurial discovery process (EDP).²

Furthermore, in the National Reform Programme 2020, one of the priorities is Sustainable Economic Growth and Development, which emphasizes future-oriented investment policy – the promotion of private sector investment in areas and projects that will contribute to achieving sustainable development goals. This should lead to sustainable economic growth, increased employment and the creation of a secure and sustainable society.

The program includes Measures to achieve the goals of the Europe 2020 Strategy and one of the measures is *Strengthening the national innovation system and the innovation potential of the economy*. The adoption of the Measure was based on Eurostat data, which states that the share of total spending on research

² More information on the Smart Specialization Strategy for the period 2021-2029 is available on the websites of the ministries responsible for its preparation: the Ministry of Economy and Sustainable Development and the Ministry of Science and Education. <https://mzo.gov.hr/vijesti/pocetak-izrade-strategije-pametne-specijalizacije-republike-hrvatske-i-doprinos-tematskih-inovacijskih-vijeca/4513>

and development in the GDP of Croatia in 2018 was 0.97%, while the goal of Croatia is to reach 1.4% by 2020. The report of the European Commission states that Croatia is falling behind other member states due to the lack of high-tech, innovative export products and services, positioning itself in 26th place, making it a moderate innovator.

6. CONCLUSION

Given the process of globalization, rapid exchange of information and the emergence of new technologies, investing in knowledge for organizations is necessary in order to stay competitive in the market. The World Economic Forum report clearly pointed out the future direction of new jobs, the necessary knowledge and skills. Necessary occupations of the future will be those related to data analysis and artificial intelligence, which will require workers to constantly learn and develop new skills. „Knowledge is power“, a well-known quote by Francois Bacon, is still applicable today, given the speed of development and the necessary readiness to respond to increasing competition. It is the main tool for creating added value.

Knowledge is a competitive advantage, but it depends on the will of the individual to share it in the environment in which he operates. For this reason, it is crucial that companies prioritize their employees' desire to share and create the same values that the company represents in order to be competitive.

A comparative analysis of three different indexes (Global Innovation Index, Bloomberg Innovation Index and European Innovation Scoreboard) of countries' innovation performance showed the strongest economies that have maintained their competitive position with their investment over a period of three years. The Croatian analysis have shown that the government cares about encouraging investment in research and development and creating an education policy in accordance with the needs of the labor market. When examining the analysis of EU country allocations related to education in 2020, Croatia was ranked 14th. However, it is important to emphasize that in the period of 2018-2020, Croatia increased its investment in education and came in the top five countries that increased investment. In the interests of making greater investments in the knowledge of the future, the Croatian Employment Service published *Recommendations for Educational Enrollment Policy and Scholarship Policy* with the aim of contributing to the harmonization of education and labor market needs.

The analysis of the indexes provides an overview of the components that countries need to work on in order to strengthen their competitive position, which is a good indicator for policy makers. In addition, the analysis of companies showed the importance they have in creating innovation and the ways in which countries can help encourage innovation, which is evident in the example of Croatia through the adoption of strategic documents.

Research results can be used as an assistance to policy makers in creating new guidelines for creating education policies based on the knowledge and skills

of the future. It can be the basis for the analysis of the best techniques for promoting knowledge in organizations (e.g., mandatory training on an annual basis, ad hoc courses, etc.) in order to retain highly educated workers and ensure their competitive advantage and consequently ensure the progress of the Croatian economy.

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Orcid: <https://orcid.org/0000-0002-9482-2894>**ZNANJE I INOVACIJA KAO KONKURENTSKA
PREDNOST REPUBLIKE HRVATSKE*****Sažetak***

Znanje i ulaganje u inovaciju postaje osnovni kriterij konkurentnosti. Svrha je ovoga rada ispitati koncepte znanja, inovacije i konkurentnosti. Da bi se dokazalo navedeno, provedena je komparativna analiza Eurostat podataka o EU javnim troškovima za obrazovanje. Daljnja analiza uključivala je podatke o zaposlenima i nezaposlenima, ovisno o završenom stupnju obrazovanja u Hrvatskoj. Nadalje, provedena je usporedna analiza inovacijske uspješnosti zemalja na temelju globalnog inovacijskog indeksa, Bloomberg inovacijskog indeksa i Europskog inovacijskog semafora. Cilj je bio odrediti najkonkurentnije ekonomije u usporedbi s Hrvatskom. Doprinos ovoga rada vidljiv je iz analize teorijske odrednice znanja i njegova razvoja upotpunjenog popisom budućih zaposlenja. Važnost rada odražava se u potrebi stvaranja strategija u skladu s budućim potrebama.

Ključne riječi: znanje, inovacija, konkurentnost, obrazovna politika, ekonomski rast.

JEL klasifikacija: I25, O32.