

# ANALYSIS OF THE DIGITAL AND TALENT COMPETITIVENESS OF THE VISEGRAD FOUR COUNTRIES

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## **Abstract**

Competitiveness of a country plays an important role on the international market, since based on this indicator foreign policy and economic relations are formed or on the contrary in some cases failed. In addition, with the constantly developing technology, mapping the countries digital development and talent cannot be neglected either. The International Institute for Management Development (IMD) has set up the World Digital and Talent Competitiveness Ranking, which examines the digital skills and talents of 64 countries, thereby promoting the efficient use of resources, the smooth implementation of digital transformation, and the analysis of the correlations between the motivation of the employees and the competitiveness of the country. In this research paper, we describe the three main factors of the digital ranking and their corresponding sub-factors, as well as the three main pillars of talent. In this study, the main focus concentrates on comparing the digital skills and talents of the Visegrad Four countries. For analysing the selected four countries, we work with data from two years, 2017 and 2021. In addition to the observed divergence between the four countries, we also describe the developments and declines of the two observed years.

**Key words:** competitiveness, digital competitiveness, talent ranking, V4

**JEL Code:** F43, I25, O32

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## **Introduction**

*“Competitiveness is like a race. It's not about running faster than you ran yesterday. It's about running faster than all the horses. “*

Stephan Garelli

Determining a country's competitiveness plays an important role in assessing the country's international market situation, which can be used as a basis for other countries to decide whether it is worth building foreign policy and economic relations with the selected country

(Kovačević, 2002). “The relationship between information and communication technologies (ICT) and economic growth is an issue of particular interest in terms of both theory and practice. There are two prevailing understandings about the impact of ICTs application on economic growth (Thompson Jr & Garbacz, 2011): direct impact, which implies productivity improvements resulting from the application of ICTs, and indirect impact, which means the materialization of externalities resulting from the application and development of ICT.” (Stankovič et. al. 2021) To analyse a country's economic situation, it is important to determine the indicators that can provide relevant information about the country's competitiveness. While studying domestic and foreign literature, we come across different indicators, among which are micro- and macroeconomic indicators, also they can be considered in short-term or long-term (Sopková, 2012). This study assesses the digital and talent competitiveness of the Visegrád Four countries, based on the World Digital Competitiveness Ranking and the World Talent Competitiveness Ranking published by the IMD Competitiveness Centre.

In the year 2021, indicators as countries' digital preparedness, up-to-dateness and the talent level of the workforce were assessed and studied for the fifth time, based on the indicators determined by the IMD Competitiveness Centre. Data was collected from 64 countries with the help of a survey. Digital skills are analysed based on specific criteria, which is based on the adoption and use of digital technologies in business, government and society (World Digital Competitiveness Ranking - IMD, 2022). Based on the IMD Competitiveness Ranking, it can be assumed that the digital transformation is primarily present at the company level, but similarly occurs in the government and society as well. Based on this assumption, we can say that this survey helps companies and the government to assess the areas on which it is worth focusing resources and to reveal the most effective digitization transformation (World Competitiveness Ranking - IMD, 2022). Based on the essential criteria for the examination of talent the process of development is analysed. Also, the shortcomings of companies and the economies are mapped. (World Talent Ranking - IMD, 2022)

## **1 World Competitiveness Digital Ranking**

During the creation the World Digital Competitiveness Report, three main factors are taken into consideration: knowledge, technology, future readiness, which are made up of additional sub-factors. All three main factors include 3 additional sub-factors, which are based of 52 criteria in different distributions. The final Digital Competitiveness Ranking created as the

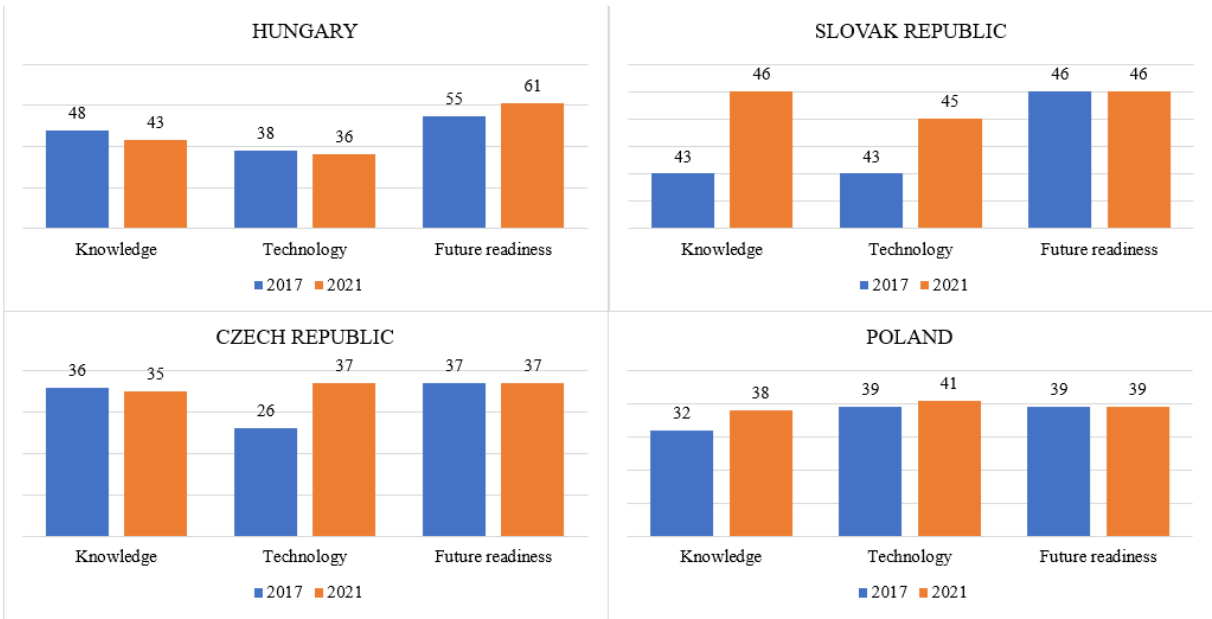
result of summing up the 9 sub-factors, where all 9 sub-factors have the same importance, regardless of the number of criteria in each sub-factor. Criteria can examine hard data and soft data, while hard data analyses digital competitiveness (e.g., internet bandwidth speed), and soft data processes information that can be perceived during the assessment of competitiveness. Of the 52 mentioned criteria, 32 criteria are hard data, while 20 criteria can be grouped into the soft data category. Among the criteria we can find criteria, which are also included by the IMD World Competitiveness Ranking. However, 19 indicators appear only in the World Digital Competitiveness Ranking. The survey also includes population and GDP data, which is not authoritative for establishing the final ranking, but only serves as background information (World Digital Competitiveness Ranking – IMD, 2022).

**Fig. 1: Digital Competitiveness factors and sub-factors**



Source: World Digital Competitiveness Ranking – IMD, 2022

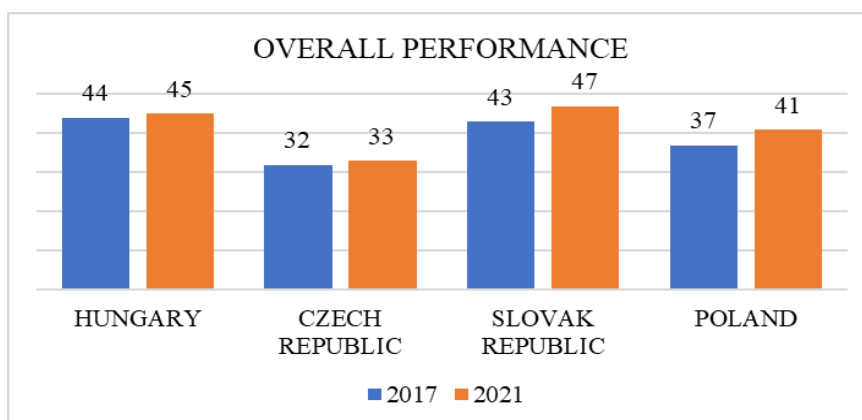
**Fig. 2: The evolution of the Digital Competitiveness Ranking based on factors in the V4 countries in 2017 and 2021**



Source: Own elaboration, based on World Digital Competitiveness Ranking – IMD, 2022

The attached figure demonstrates the evolution of the 3 main factors of the Digital Competitiveness Ranking in the two observed years in the V4 countries. In 2017, Hungary improved 5 places in knowledge indicator and 2 places in the technology. On the contrary, it fell 6 places in terms of future readiness, it means only 3 of the 64 countries participating in the research achieved a lower result. During the observed period, the Slovak Republic did not improve its digital competitiveness, in terms of future readiness it remained on the same level, while knowledge indicator has reached 3 places lower and technology 2 places lower position in the ranking. Czech Republic's future readiness ability is unchanged, in terms of knowledge it has improved 1 place, but the technology factor has dropped 11 places out of the 64 observed countries. Taking all three factors into account, this is the largest drop among the V4 countries in the two observed years. The tendency of Poland is similar to the Slovak Republic, i.e., future readiness is unchanged, the development of knowledge and technology has fallen, while the knowledge by 6 places and technology by 3 places on the ranking. Considering the results of the countries of the Visegrád Four, we can conclude that Hungary performed the best in terms of the total in all the three factors, despite the fact that Hungary was the only country, which had a decline in the future readiness factor.

**Fig. 3: Representation of overall performance in the V4 countries in 2017 and 2021**



Source: Own elaboration, based on World Digital Competitiveness Ranking – IMD, 2022

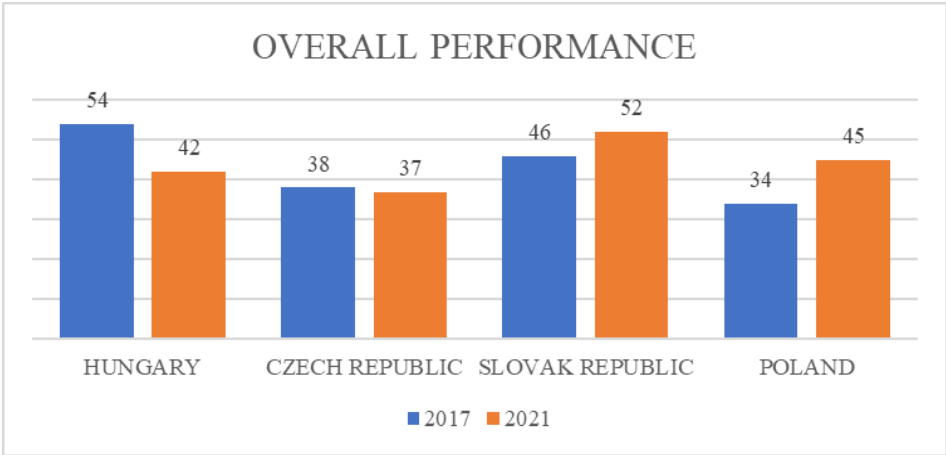
Figure no.3 shows the development of the aggregated Digital Ranking in the years 2017 and 2021 in the V4 countries. After processing the results per factor, we can state that all 4 countries achieved a weaker result in the year 2021 than in the first year of the survey, in 2017. Based on the 2021 survey, Hungary and the Czech Republic fell by only 1 place, Slovak Republic and Poland by 4 places. Among the 4 countries, the most advantageous is the

Czech Republic, which ranked 33rd out of 64 countries in 2021. It is followed by Poland, Hungary and the Slovak Republic.

## 2 World Competitiveness Talent Ranking

In order to create a long-term value creation, IMD Competitiveness Center evaluates the development possibilities and situation of the competences necessary for businesses and the economy. In order to achieve this goal, they created the World Talent Ranking, which assesses the development of the domestic and international highly qualified workforce, and the necessary steps to keep them. The definition of talent competitiveness is based on three main factors, on investment and development, appeal and readiness. These three factors include 31 criteria, the division of which is different for each factor, since a different number of subfactors is required for the proper assessment of the listed topics. Similar to the World Digital Competitiveness Ranking, all three factors have the same weight, not depending on the number of included criteria, which can be hard data and survey data. In the survey, 14 criteria are hard data, which process the measurable data of talent development based on International Regional and National Sources, and 17 criteria soft data that analyse the quality of investments based on the International Panel of Experts Executive Opinion Survey. These hard and soft data are individually processed and used to create the final talent classification of the countries. (World Talent Ranking – IMD, 2022)

**Fig. 4: Representation of overall performance in the V4 countries in 2017 and 2021**



Source: Own elaboration, based on World Talent Ranking – IMD, 2022

The attached figure shows the development of the Talent Ranking in the two years studied in the V4 countries. We can state that of the four countries, Hungary and the Czech

Republic achieved a more favourable position in the ranking in 2021 than in the first year of the survey, in 2017. The Czech Republic improved only by one place on the list, ahead of Hungary, which improved 8 places over the years to 42nd place, making it the second best-rated country among the V4. This ranking position is considered as a great success, since based on the 2017 survey, it was the weakest performing country among the V4 countries. The performance of Slovakia and Poland shows a decline, while Slovakia fell by 6 places, Poland has fell by 11 places in the ranking. With its 2017 result, Poland performed as the best country of the V4, but the results in 2021 were only enough for 3rd place. Due to the weakening of Slovakia, its 3rd place in 2017 has deteriorated and in 2021 it is situated in the ranking as the worst performing country among the Visegrád Four.

Also, we cannot forget about COVID-19 or the Corona virus, which has started in 2019 and rapidly has changed the digital competences of the population all over the world. The virus and the it following pandemic have created new work and study environments. The place of these activities has been relocated to the houses of the population. It means that in the case of the students the educational process has been done via Internet through computer, laptop, tablet, etc. Employees were advised to work in home office as well. By completing the everyday professional activities people have parallelly increasing their own digital competences as well. “In the EU countries, the benefits of digital transformation relate to enhancing productivity, fostering innovation, triggering the creation of new jobs related to artificial intelligence, data analytics, robotics, cybersecurity. The European Union is committed to boosting the digital transformation, representing a key priority for its future economic growth.” (Savulescu, Antonovici, 2022) The digital development and changes do have significant influential effects on countries from macro economical point of view. Economies have to be reshaped based on the changes, the digital development has to build into the everyday routine base. (Laitsou, Kargas, Varoutas, 2020) On the other hand, the same effect happens even on micro economical actors, on the corporations. Vilaplana and Stein (2019) have emphasized the need of changes to happen and be realized in corporations, in case of being able to keep up with the competitive companies. With the constantly developing digital technologies for companies is not enough to keep up with the competition. Their employees should be open-minded and ready to adapt the changes. Vaselica (2019) agreed with them, in her publication wrote about the importance of competitiveness, as well.

### **3 Comparison of the studied countries**

In the research, we use SWOT analysis, which is used, as a basis for the description of the countries' internal factors (strengths, weaknesses) and external factors (opportunities, threats). The mentioned factors are closely related to each other.

The long-term good position of the Czech Republic is contributed by the amount of financing capital allocated to technological developments, which points to the country's strong position in terms of key development aspects, the digital revolution. The Czech Republic uses the financing opportunities of the stock markets for the development of digital solutions and IT projects, which provides significant help to companies that are looking for alternative financing options to increase their income independence and security, primarily for research projects. Regarding the V4 countries, the Czech Republic dominates highly in terms of its spending on science and research, which helps to achieve above-average results in terms of the quality of science and research, as well as in terms of the use of robots not only in research and science, but also in the educational sphere. Further development is hampered by the inflexibility of the legislation required for innovative entrepreneurial projects, the low proportion of women employed in the scientific field, or despite advanced technology, most of the population is not open to accepting new technology. (BusinessInfo.cz., 2015)

In the case of Poland development of the country and the attraction of talent from neighbouring countries is significantly important (e.g., Ukraine and Belarus), as well as the creation of key regional clusters in the field of digital technology. Similar to the Czech Republic, Poland's use of robots cannot be neglected either. The population's attitude towards globalization, the quality differences between the public and private sectors and the ratio of technology transfer between universities, the private sector and public institutions are causing problems in the country. Poland has very strong and very weak points, while it is highly outstanding in terms of the quality of the broadband connection, it is the driving force in terms of the ratio of telecommunications investments and the quality of communication technologies. The country's development is not facilitated by incorrectly defined legislation for starting a business and the slow pace of technological development. Despite this, its prospects are favourable, as the quality of primary and secondary education in the country is high, and the digitalization and technological skills of the population are high. (European Commission, 2019)

For a long time period, Hungary was considered as the weakest country economically, which was contributed to by its weak preparation for the future, the willingness and ability of

companies to adapt to changes, which companies experience a lot. Its attitude towards globalization is even worse among the countries participating in the ranking. It offers different performance in terms of its technological development, while the broadband mobile internet is well above average. However, the quality of wireless Wi-Fi, the financing of technological development, banking and financial services, and the availability of venture capital are well below average. Despite these facts, Hungary was ahead of Slovakia in the ranking, which is caused by the positive legislative environment for business development and the political commitment to the objectives of digital development. Also, in Hungary, the proportion of women graduating in science and technology is low, which is related to the high-income differences between the sexes. (Hungarian National Bank, 2020).

Slovakia has built a strong industrial base, which was contributed to by its good relations with Germany and the beneficial wage system. In the case of Slovakia, it is important to mention the representation of women in the scientific profession is high, as well as the use of robots in the scientific and research field, as well as in the field of education. Despite this, the number of publications published in the scientific and research field and the level of expenditure devoted to this field are low. Slovakia's weaknesses stem from long-term problems in business and the lack of key capacity-building changes. Slovakia's decline reflects the lack of an adequate number of highly qualified workers, the low number of graduates entering the labour market, the rejection of the reform of the education system by employers and the inflexibility of the migration system, due to which Slovakia's labour market does not arouse the interest of qualified labour. Slovakia has significantly low level of continuing education opportunities both in adulthood and at the workplace. By developing this deficiency, less qualified persons on the labour market and persons with technological deficiencies could gain additional knowledge, thereby promoting quality work and easier placement on the labour market. (TARS, 2019)

## **Conclusion**

After the presentation of the basic theoretical factors and the methodology, this study presented the digital and talent ranking data in the V4 countries assessed in 2017 and 2021. Both rankings created their criteria based on different number and type of factors. With the help of the factors, we can get a comprehensive picture of the digital preparedness of the 4 countries and the extent of the talent of the workforce. After the evaluation process of various factors, based on the comparative figures it can be stated that the development trend of the



countries is differential. In the evaluation of the digital ranking, the Czech Republic performed as the best among the V4 countries in both years studied, despite the fact that by 2021 it had slipped one place in the ranking. Compared to its 2017 result, Poland's digital development fell by 4th place by 2021, but it finished as second among the V4 countries. Hungary and Slovakia exchanged their positions in the two observed years, which is contributed to by the development of Hungary, which we could experience in several factors during the evaluation.

In the study we tried to describe the strong and weak sides of the countries, and we reached the point of asking how the digital development of the countries can be promoted!? In the case of the Czech Republic and Slovakia, we were talking about a well-developed industrial sector at the European level, which has enormous potential. Taking the described weaknesses as a basis, more emphasis should be placed on further technological training and the expansion of the population's digital capabilities, which they could use in the work process. To use Hungary's greatest strength, broadband mobile Internet access, to shape a new digital strategy that includes achievable goals. By reducing the wage gap between the sexes, women could take a more active part in technological research, so that research can be carried out with a broader perspective and new successes can be achieved. To take advantage of Poland's strong training system and the population's continuous desire for training and to steer it in the direction of technology, to explain the opportunities provided by technology and to fill these jobs with domestic talent.

The talent ranking examined in the study was very fluctuating in the studied four countries. The biggest decline was observed in Poland, which dropped from the most advantageous place to the 3rd place. Despite the fact that the Czech Republic has risen from the second place to the top by 2021, the biggest jump can be observed in Hungary, which improved from the bottom of the V4 ranking to 2nd place.

During the comparison, it was proven that despite the close cooperation of the V4 countries, the development of the countries took place in a different direction and at a different pace during the observed years. The main goal of our study was to present the results of these two rankings, to reveal the differences between the V4 countries. Since the main factors can be studied in more detail on the basis of sub-factors and different criteria, the strengths and weaknesses of each country can be revealed during their partial development.

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## References

- About Hungary (2020). Government's new National Digitalization Strategy unveiled, *About Hungary*, 2020. Available: September 19, 2022, <https://abouthungary.hu/news-in-brief/governments-new-national-digitalization-strategy-unveiled>.
- BusinessInfo.cz (2015). Národní iniciativa Průmysl 4.0 [online]. *BusinessInfo.cz*, 2016. Available: September 22, 2022, <https://www.businessinfo.cz/navody/narodni-iniciativa-prumysl-40/#!&chapter=1>.
- Center for Scientific and Technical Information SR (2020) Further education in numbers 2019, *Ministry of Education, Science, Research and Sports of the Slovak Republic*. Available: September 20, 2022, [https://www.cvtisr.sk/buxus/docs//VS/DALV/DALV\\_v\\_cislach/Dalsie\\_vzdelavanie\\_v\\_cislach\\_2019\\_final.pdf](https://www.cvtisr.sk/buxus/docs//VS/DALV/DALV_v_cislach/Dalsie_vzdelavanie_v_cislach_2019_final.pdf)
- European Commission (2019). Digital Government Factsheet 2019 – Poland. *European Commission*, 2019. available: September 22, 2022, [https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital\\_Government\\_Factsheets\\_Poland\\_2019\\_4.pdf](https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Poland_2019_4.pdf).
- Hungarian National Bank (2020). Competitiveness Report. Budapest: *Hungarian National Bank*, 2020. Available: September 22, 2022, <https://www.mnb.hu/letoltes/mnb-competitiveness-report-2020-final.pdf>.
- Kovačević, Radovan (2002). Transition of Central and Eastern European Countries into Market Economy. *Privredna Izgradnja*, 45(3–4), p. 149–178. Available: September 20, 2022.
- Laitsou, E., Kargas, A. & Varoutas, D. (2020). Digital Competitiveness in the European Union Era: The Greek Case. <https://doi.org/10.3390/economies8040085>.
- Safonova, E. A. (2018). The Visegrad Group: Stages of Formation and Development. *Vestnik Tomskogo Gosudarstvennogo Universiteta. Istorija*, (53), p. 69–73. Available: 07.08.2022. [http://journals.tsu.ru/history/en/&journal\\_page=archive&id=1724&article\\_id=38110](http://journals.tsu.ru/history/en/&journal_page=archive&id=1724&article_id=38110).

- Savulescu, C. & Antonovici, C.G. (2022). Digital Talent in a learning European Union, *Towards Sustainable and Digital Organisations and Communities*, p. 495-496.  
<https://strategica-conference.ro/wp-content/uploads/2022/04/38-1.pdf>
- Sopková, G. (2012). Konkurencie schopnosť, jej teoretické vymedzenie a postavenie SR v Global Competitiveness Report. Bratislava. *Vydavateľstvo EKONÓM*
- Stankovič, J., Veselinovič, I., Drezgic, S. & Popovič, Ž. (2020). The Digital Competitiveness of European Countries: A Multiple-Criteria Approach. *Journal of Competitiveness* 13(2):117-134. DOI: 10.7441/joc.2021.02.07
- TASR (2019) „Vážnou výzvou je akútny nedostatok kvalifikovanej pracovnej sily“, *Internet guide to the labor market*. Available: September 21, 2022.  
<https://www.istp.sk/clanok/14943/vaznou-vyzvou-je-akutny-nedostatokkvalifikovanej-pracovnej-sily>
- Thompson Jr, H. G., & Garbacz, C. (2011). Economic impacts of mobile versus fixedbroadband. *Telecommunications Policy*, 35 (11), 999–1009.  
<https://doi.org/10.1016/j.telpol.2011.07.004>
- Vaselica, R., (2019). The Impact of Digital Innovation on National Competitiveness. *Economic and Social Development: Book of Proceedings*,  
<https://www.proquest.com/openview/fcf1a28ddc09c39c1d8da63d972f07ca/1.pdf?pq-origsite=gscholar&cbl=2033472>
- Vilaplana, F. & Stein, G. (2019). Digitalización y personas. *Revista Empresa y Humanismo / Vol XXIII / Nº 1 / 2020 / 113-137*, <https://revistas.unav.edu/index.php/empresa-y-humanismo/article/view/38562/33944>
- Word Economic Forum (2020). The Global Competitiveness Report 2019. Available: 28.09.2022. [http://www3.weforum.org/docs/WEF\\_TheGlobalCompetitivenessReport2019.pdf](http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf).
- World Competitiveness Ranking – IMD. IMD business school. Available: September 22, 2022, <https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/>
- World Digital Competitiveness Rankings - IMD. IMD business school. Available: September 22, 2022, <https://www.imd.org/centers/world-competitiveness-center/rankings/world-digital-competitiveness/>
- World Talent Ranking – IMD. IMD business school. Available: September 22, 2022, <https://www.imd.org/centers/world-competitiveness-center/rankings/world-talent-competitiveness/>

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