

# ANALYSIS OF GLOBAL INNOVATION ENVIRONMENTAL FACTORS OF INTERNATIONAL BUSINESS AND ECONOMIES

Victoria Kokorina<sup>1</sup>

**Abstract.** *The purpose* of the paper is to identify and assess impact of global innovation factors of modern international business development and the world economies development. *Methodology.* The study uses methods of specification and systematic analysis – to determine factors of global economic environment, global innovation factors, statistical and economic methods – to analyze impact of global innovation factors on the development of international business and economies. *Results* of the survey shows impact of innovation development of global economy on macroeconomic, technological, legal, political and cultural environment of global economic environment of international business development; dynamics of global criteria of integrated indicators to determine impact of global innovation factors on the world economies development. *Practical implications.* The factors of global economic environment in the conditions of global innovation development form a regular tendency of transformation of international business development which causes its new structure and qualitative condition. The Global Competitiveness Index (GCI) assesses the imperatives of global competitiveness: institutions, infrastructure, ICT adoption, macroeconomic stability, health, skills, product market, labor market, financial system, market size, business dynamism, innovation capability, – related to rapid spread of ICT and digital technologies, idea generation, entrepreneurial culture, innovation, openness and innovation adaptability. The Global Innovation Index (GII) is used to assess comprehensively global innovation factors and innovation development of the world's countries in the global economy system. With innovation factors management, estimated by GII, the prospects of innovation development of the world economies could be shown. The GII contains the pillars of the country's innovation development: institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge and technology outputs, creative outputs. *Value/originality.* The analysis assesses of international indices of innovation development, the complexity of innovation process, the innovation activity and innovation potential for the development of international business and the world economies. The methodology of indices concerning the pillars of the innovation development or the innovation capacity of countries helps to predict the innovation factors of the national economy development of a country and the environment of international business.

**Key words:** global innovation factors, international business, global economic environment, Global Innovation Index, innovation capacity.

**JEL Classification:** F23, F64, O31, O57

## 1. Introduction

The study of the content of scientific and technological progress determines it as a catalyst for technological changes and a factor of economic growth. As well as, within rapid globalization development and instability of global economy the technological progress is a key factor in international business relations, economies through innovation adoption in manufacturing and other areas. Thus, an innovation model of the stakeholders of global economy is formed. The driving forces of the global economic environment are human, intellectual capital and knowledge amount.

Trends in development of global economic environment are to be formulated to understand the progress of entire system of international economic relations. Overall, the main trends in evolution and growth of global economic environment based on its components development can be identified the following: the study of global economic environment through the globalism; the economic basis of global economic environment development is the global transition of states of society, i.e. the transformations (from one state of society to another, mostly more progressive); the global economic environment is

*Corresponding author:*

<sup>1</sup> Classic Private University, Ukraine.

E-mail: kokorinatori29@gmail.com

ORCID: <https://orcid.org/0000-0001-6901-7837>

to be understood as a set of economic development conditions; the main pillars (factors) of global economic environment formation are: the macroeconomic sub-environment, the technological sub-environment, the legal sub-environment, the political sub-environment, the cultural sub-environment; the adaptation of the stakeholders of international economic relations occurs through the activities of individuals.

Finally, the preconditions and trends in global economic environment are systemic. The pillars of global economic environment – from macroeconomic to cultural ones – determine the direction of integration of countries, enterprises, business and individuals into global economic environment in the globalism era.

## 2. Survey recent research

Theoretical and methodological issues of formation and development of global innovation environment, its conditions and factors are discovered in works by O. Belarus, D. Lukyanenko, Z. Lutsyshyn, V. Novytskyi, Eu. Panchenko, Y. Pakhomov, A. Poruchnyk, S. Sokolenko, Eu. Savelyev, V. Savchuk, A. Filipenko, I. Shkola, and others. The process of international business development in the global economic system, in particular within the innovation and information globalism and the global innovation competition, is studied by: Eu. Avdokushyn, K. Aswazappa, I. Degtyareva, D. Johnson, S. Paulson, S. Robock, K. Simmonds, K. Turner, L. Timashova, W. Tomlinson, M. Warner, O. Shvydanenko, and others. However, the objective further research of innovation factors of economic development in globalization is still urgent, primarily in the areas of identifying priority innovation pillars of the innovation development strategies of international businesses, countries and formation of the national innovation systems in the global innovation competition paradigm.

## 3. The global innovation competition as a paradigm of modern environment of international business and economies development

At the end of the XX – beginning of the XXI century an integral part, a global paradigm of modern model of economic development of enterprises, business, sectors, national economies the following phenomena and processes became: an innovation, innovation activity, innovation potential and innovation capacity. They are the complex economic categories. Globalization of the world economy, its innovation way of development is a decisive factor that determines business efficiency, stability and competitiveness of economies in foreign markets (Kniazevych, 2013). Simultaneously, the need to mitigate the contradictions

of globalization necessitates the constructive interaction of stakeholders of global economy. These stakeholders carry out innovation activities and have innovation potential, within the integrative model of competitive behavior.

In globalization of the world economy the global innovation competition has been formed. It determines new forms of competitive relations of innovation activity of international business and countries in the world. This process requires them to a certain level of innovation capacity. Thus, the features of the global innovation competition can be considered: (1) the innovation determinism of the competitive process components; (2) the acquisition of global competition; (3) the institutionalization of competitive interaction; (4) the competition as a non-conflicting form of competitive relations; (5) an integrative model of competitive behavior; (6) common goals of the competitors (2016); (7) the state innovation support policy concerning the innovation potential of economic entities and industries.

## 4. Innovation factors of global economic environment of international business

A «global environment» is defined as «a set of the economic conditions for development: entrepreneurial and business life» (Ostapenko, 2019). The economic conditions are formed in the global economic development system. The peculiarities of the global economic environment development determine the efficiency and productivity of the stakeholders of international economic relations.

At present the cyclical development of global economy and its innovation elements transforms the global economic development. Models of global economic growth are based on innovation factors. The shift in the role of innovation factors is due to a change in paradigms (system of views on a phenomenon, based on a key element) as technological, technical-economic, techno-socio-economic and neo-institutional one.

Therefore, we have a global innovation development of world civilization, determined by the dominance of the fifth technological mode. The basis of the mode is microelectronics and software; technological set of electronic components and devices, electronic computers, radio and telecommunications equipment, laser equipment, computer maintenance services (Matjushenko, 2017).

The formation and growth of the sixth mode will form the global innovation development next two to three decades. It was the transition to a new technological mode that formed the basis for a new industrial revolution.

A new, Fourth, industrial revolution came through: (1) the solution of mankind global problems;

(2) increase labor productivity; (3) the creation of new goods and services.

The factors of the shaping global economic environment in the global innovation development are worthily to be singled out (Table 1). They depend on the cyclical development of world economy, in particular its innovation component.

The next condition for the shaping of global economic environment can be considered a nano-economics and the elements of nano-economics system. Nano-economics is determined by the nature of its object – an individual – in the system of economic objects.

Thus, the scientist G. Kleiner defines the task of nano-economics is «to explain and predict human economic behavior, to determine internal and external determinants and factors of its behavior in various economic situations, particularly in terms of rationality / irrationality» (Kleiner, 2004).

Through nano-economics, the identification of the impact of individuals activities on the behavior of microeconomic objects – the enterprises, households, organizations, and the detection of the internal and external factors of customer behavior becomes possible (Ostapenko, 2019).

Thus, first of all, the global innovation development affects macroeconomic, technological and legal sub-environment of global economic environment, together, the nano-economics system affects mostly the political and the cultural sub-environment, where the role of the individual is decisive.

## 5. Global innovation factors of economic development of the countries

To define and compare innovation development and innovation activity of the countries and sectors of the national economies, researchers use global criteria and form integrated (composite) indicators (indices). They objectively determine the innovation capacity

of comparable countries and global innovation factors of the economic development of these countries. Simultaneously, the innovation development indices based on criteria help to compare the opportunities and prospects of the national development in current society, and also become key innovation factors in a favorable environment for international business.

Since the innovation capacity and the technological readiness are integral components of the competitiveness of the national economy, the use of the methodology of the World Economic Forum, Davos, to calculate the Global Competitiveness Index (GCI) is expedient. The methodology tracks the dynamics of global economy in the Fourth Industrial Revolution and focuses on new competitiveness factors related to the rapid spread of digital technologies that were not priority for governance, i.e. idea generation, entrepreneurship, innovation, openness and adaptability.

Thus, in 2019 GCI estimates 141 countries, which produce 99% of world GDP, by 103 components (indicators/factors). The indicators detail the competitiveness of the countries at different stages of their economic development. The WEF Global Competitiveness Reports of 2018 and 2019 integrates the indicators into 12 groups of global competitiveness imperatives (pillars): (1) «Institutions»; (2) «Infrastructure»; (3) «ICT adoption»; (4) «Macroeconomic stability»; (5) «Health»; (6) «Skills»; (7) «Product market»; (8) «Labour market»; (9) «Financial system»; (10) «Market size»; (11) «Business dynamism»; (12) «Innovation capability». Herewith, the 12 pillars are combined into four groups of factors of global competitiveness in the Fourth Industrial Revolution:

- 1) Enabling Environment (1-4 pillars);
- 2) Human Capital (5-6 pillars);
- 3) Markets (7-10 pillars);
- 4) Innovation Ecosystem (11-12 pillars).

Table 1

### The main factors of global economic environment

Factors	Contents of display component
Macroeconomic sub-environment	The macroeconomic preconditions for business development, when the forming economic relations at the national economy level determines whether the activities of individual enterprises in the country will be effective. The sub-environment formed by the determinants of the competitiveness of the national economy (M. Porter's «national diamond») covers all categories of macroeconomic development – enterprises, as well as public authorities.
Technological sub-environment	Forming the international innovation activity – from the use of foreign technologies to the creation of production facilities based on national technological solutions.
Legal sub-environment	The harmonization of internal legislation based on the use of international norms and principles, especially regarding the foreign economic activity in accordance with the norms of international economic law.
Political sub-environment	The conditions when the interaction of power, economy and business is. Such intertwining determines the possibilities of business autonomy from power. Meanwhile, the state is expected to participate in the regulatory activities of the authorities into creating an optimal environment for developing business structures.
Cultural sub-environment	A combination of demographic and psychological aspects of global environment. Leveling business stereotypes, forming a global consumer and unifying needs and values, both cultural and material one.

Source: by the author based (Ostapenko, 2019; Vdovenko, 2017)

The WEF research of the Global Competitiveness Index in 2017–2019 (The Global Competitiveness Report 2017–2018, 2018, 2019) shows the key factors in the development of the competitiveness of the world economies. They are a set of institutions, state policy and productivity factors. Table 2 presents the top-ten countries in the world by the level of GCI in 2017–2019. Note, that in 2018–2019 by GCI the top-ten countries are permanent. Denmark also strengthened its position, rising from 12th to 10th rank in 2018. The first and second place in 2018 and 2019 are taken by Singapore and the United States, which in 2019 have 83.7 scores. That is 2.2% lower than in the previous year. This is the biggest decline of the Index among the compared countries. Hong Kong has the largest advance in the ranking – the third place (83.1 scores) in 2019 against the sixth and seventh ranks in 2017 and 2018, respectively, and the biggest decline in the ranking is Germany – the seventh place (81.8 scores) in 2019 against the fifth and third places in 2017 and 2018, respectively. We emphasize the loss of the leading of Switzerland in 2017 to the fifth rank (82.3 scores).

The dynamics of global competitiveness factors and the GCI pillars by regions of the world economy are presented in Figure 1. Thus, in 2018-2019 there is a maximum growth of «ICT adoption» in all regions of the world. The largest increase is in Latin America and the Caribbean and Sub-Saharan Africa – by 9.8% and 15.8% respectively. Conversely, by the pillars of the group of Markets factors «Product market» there is a decline in all regions except the Middle East and North Africa – 2.7%.

Note, that in 2019 by region the highest points in the groups of factors of global competitiveness have the following components of GCI:

I. Enabling Environment pillars – «Macroeconomic stability» (89.6 and 92.6 scores in East Asia and the Pacific, Europe and North America respectively).

II. Human Capital pillars – «Health» (83.8 and 89.1 scores in East Asia and the Pacific, Europe and North America, respectively).

III. Markets pillars – «Financial system» (70.9 and 74.3 scores in Europe, North America, East Asia and the Pacific, respectively).

IV. Innovation Ecosystem pillars – «Business dynamism» (66.1 and 68.3 scores in East Asia and the Pacific, Europe and North America, respectively).

One notes that the component «ICT adoption» has the lowest impact on the competitiveness of South Asia and Sub-Saharan Africa countries – 35.1 and 34.3 scores, respectively.

The integrated Global Innovation Index (GII) is used to comprehensively assess the global innovation factors and innovation development of the countries in global economy. The Index is calculated by the analytical center of the Lausanne School of Business (INSEAD). GII takes the first rank among other innovation performance indices and has become a control indicator for establishing dialogue between the private and public sectors. The index allows assessing the factors of the country's innovation activity.

Finally, the analysis of GII results contributes to the creation of an environment where the innovation factors are constantly to be assessed. That allows timely adjusting and improving the state policy in the area of innovation (Ghurova, 2016). On the basis of innovation factors management estimated by GII, the prospects of innovation development of national economies of the world are shown.

The Index assesses the rating of countries concerning creating a favorable environment for

Table 2

**The Global Competitiveness Index ranking, by the top-ten countries in 2017–2019**

Country/Economy <sup>1</sup>	Years			Deviation 2019/2018, % (+/-)
	2017 (137 countries)	2018 (140 countries)	2019 (141 countries)	
Singapore	5.71 <sup>2</sup> (3) <sup>3</sup>	83.5 <sup>4</sup> (2)	84.8 (1)	1.6 (+1)
United States	5.85 (2)	85.6 (1)	83.7 (2)	-2.2 (-1)
Hong Kong SAR	5.53 (6)	82.3 (7)	83.1 (3)	1.0 (+4)
Netherlands	5.66 (4)	82.4 (6)	82.4 (4)	0 (+2)
Switzerland	5.86 (1)	82.6 (4)	82.3 (5)	-0.4 (-1)
Japan	5.49 (9)	82.5 (5)	82.3 (6)	-0.2 (-1)
Germany	5.65 (5)	82.8 (3)	81.8 (7)	-1.2 (-4)
Sweden	5.52 (7)	81.7 (9)	81.2 (8)	-0.6 (+1)
United Kingdom	5.51 (8)	82.0 (8)	81.2 (9)	-1.0 (-1)
Denmark	5.39 (12)	80.6 (10)	81.2 (10)	0.7 (0)

Note. <sup>1</sup> Ranking of the countries in 2019. <sup>2</sup> The index rate. <sup>3</sup> Rank of the country. <sup>4</sup> In 2018 the limits of the GCI rate were changed from 0-7 scores to 0-100 scores.

Source: *The Global Competitiveness Report 2017–2018, 2018, 2019*

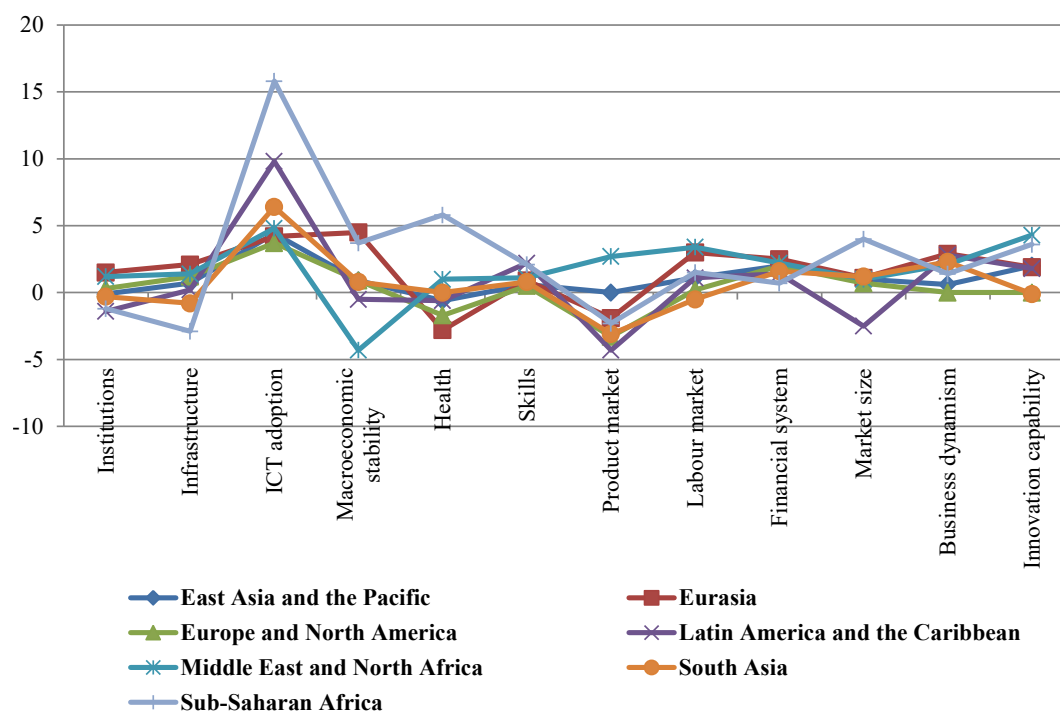


Figure 1. Dynamics of the Global Competitiveness Index by groups of components, by region in 2018–2019, %

Source: *The Global Competitiveness Report 2018, 2019*

innovation and obtaining innovation outputs. The methodology of GII determines indices of factors, which are the preconditions and the innovation outputs. Thus, GII contains 7 pillars (indices), grouped into Innovation Input sub-indices: (1) «Institutions»; (2) «Human capital & research»; (3) «Infrastructure»; (4) «Market sophistication»; (5) «Business sophistication», and Innovation Output sub-indices: (6) «Knowledge & technology outputs»; (7) «Creative outputs». A composite GII reflects the cost-effectiveness ratio to objectively assess the effectiveness of innovation efforts in the country. Thus, the results of the ranking

of countries in the world by the Global Innovation Index (Table 3) show Switzerland and Sweden the leaders in 2017–2019. While, in 2018 they take the third rank. Note, among the ten leaders of the GII rating, the largest index increase in 2019 compared to 2017 has only the United States – by 1.3%. The United States rise by three ranks – from sixth to third place. The Netherlands has the largest fall – by 7.2% to fifth place in the ranking.

Despite the Index fall in 2019 compared to 2017, Sweden, Denmark and South Korea improve their places by one rank and two ranks, respectively. Note, in 2019 South Korea joins the top-ten most

Table 3

**The Global Innovation Index ranking, by the top-ten countries in 2017–2019**

Country/Economy <sup>1</sup>	Years			Deviation 2019/2017, % (+/-)
	2017	2018	2019	
Switzerland	68.40 <sup>2</sup> (1) <sup>3</sup>	67.24 (1)	66.08 (1)	-3.4 (0)
Sweden	63.08 (3)	63.65 (2)	62.47 (2)	-1.0 (+1)
United States of America	59.81 (6)	61.73 (7)	60.56 (3)	1.3 (+3)
United Kingdom	60.13 (4)	61.30 (5)	59.78 (4)	-0.6 (0)
Netherlands	63.32 (2)	61.44 (4)	58.76 (5)	-7.2 (-3)
Denmark	58.39 (8)	58.44 (7)	57.53 (6)	-1.5 (+2)
Finland	59.63 (7)	59.83 (6)	57.02 (7)	-4.4 (0)
Singapore	59.83 (5)	58.37 (8)	56.61 (8)	-5.4 (-3)
Germany	58.03 (9)	58.19 (9)	56.55 (9)	-2.6 (0)
Republic of Korea	56.63 (12)	56.55 (11)	56.11 (10)	-0.9 (+2)

Note. <sup>1</sup> Ranking of the countries in 2019. <sup>2</sup> The index rate. <sup>3</sup> Rank of the country.

Source: *Global Innovation Index 2018, 2019, 2020*

innovation countries in the world with the GII of 56.11 scores.

The dynamics of the share of GII pillars by the countries that topped the ranking is presented in Figure 2. Thus, in 2018–2019 the maximum thrice increase of the share of «Human capital & research» is in Netherlands and «Business sophistication» is in Germany. The «Market sophistication» in Germany and South Korea, «Knowledge & technology outputs» in Netherlands and «Creative outputs» in Sweden, Netherlands, Finland and Germany have fallen by 50%. The shares of all GII indices do not change in 2018–2019 in Sweden and the United States. Note, Switzerland indices have milder fluctuations in the period.

Note, in 2019, the highest indicators of the GII sub-indices as global innovation factors by leading GII countries are following pillars:

I. Innovation Input Subindex pillars – «Institutions», «Human capital & research» and «Infrastructure» have the same shares of 20% in the United Kingdom, the Netherlands, Denmark and Finland. Also, Switzerland has the lowest 5% share of the sub-index in the top-ten ranking of GII.

II. Innovation Output Subindex pillars – «Knowledge & technology outputs» and «Creative outputs» are for Switzerland (with 19% respectively).

We should emphasize that there is a low share of Innovation Output Subindex pillars, i.e. the innovation outputs (5%) in most top-ten countries in the GII ranking.

## 6. Conclusions

The analysis of global criteria of composite indices assesses the impact of general global innovation factors of economic development. The global innovation factors objectively determine the international innovation capacity of countries and the innovation vector of international business development.

The factors of global economic environment within the global innovation development form a natural trend of transformation of international business development leading to its new structure and quality. That ensures the priority of innovation.

The Global Competitiveness Index assesses the imperatives (pillars) of global competitiveness: institutions, infrastructure, ICT adoption, macro-economic stability, health, skills, product market, labor market, financial system, market size, business dynamism, innovation capability, – related to rapid spread of ICT and digital technologies, idea generation, entrepreneurial culture, innovation, openness and innovation adaptability.

The Global Innovation Index (GII) is used to assess comprehensively global innovation factors and innovation development of the world's countries in the global economy system. With innovation factors management, estimated by GII, the prospects of innovation development of the world economies could be shown. The GII contains the pillars of the country's innovation development: institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge and technology

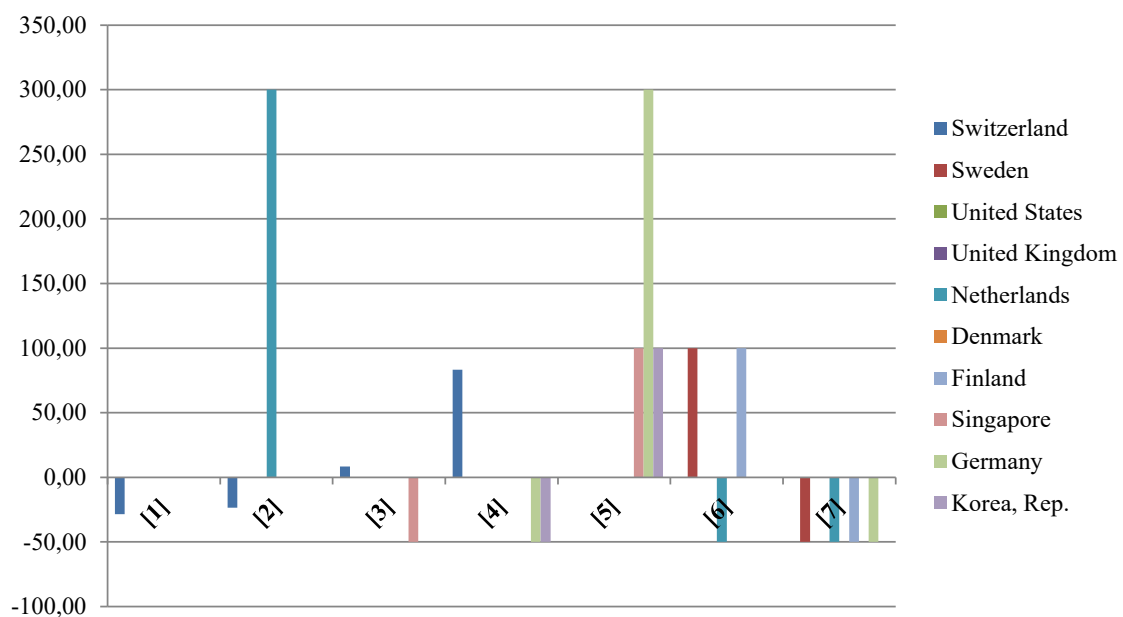


Figure 2. Dynamics of the Global Innovation Index in the top-ten countries in 2018–2019, by the share of pillars, %

Note: the GII pillars: [1] «Institutions»; [2] «Human capital & research»; [3] «Infrastructure»; [4] «Market sophistication»; [5] «Business sophistication»; [6] «Knowledge & technology outputs»; [7] «Creative outputs».

Source: Global Innovation Index 2019, 2020

outputs, creative outputs. The highest GII by leading countries are: the United Kingdom, Netherlands, Denmark and Finland – «Institutions», «Human

capital and research», «Infrastructure»; Switzerland – «Knowledge and technology outputs» and «Creative outputs».

## References:

- Ghurova, V. O., & Korepanova, A. V. (2016). Mizhnarodnyj dosvid aktyvizaciji innovacijnogho rozvytku krajin [International experience of innovational development]. *Economics and organization of management*, vol. 2(22), pp. 45–54. (in Ukrainian)
- Global Innovation Index 2018. Energizing the World with Innovation. Available at: [https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_gii\\_2018.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2018.pdf) (accessed 30 March 2021).
- Global Innovation Index 2019. Creating Healthy Lives – The Future of Medical Innovation. Available at: <https://www.globalinnovationindex.org/userfiles/file/reportpdf/gii-full-report-2019.pdf> (accessed 30 March 2021).
- Global Innovation Index 2020. Who Will Finance Innovation? Available at: [https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_gii\\_2020.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020.pdf) (accessed 29 March 2021).
- Globalization of the world community and the role of international cooperation in sustainable development. Available at: <http://isdc.com.ua/wp-content/uploads/2016/10/3-.pdf> (accessed 01 April 2021). (in Ukrainian)
- Kleiner, G. (2004). Nanoekonomika [Nanoeconomics]. *Economic issues*, vol. 12, pp. 1–17. (in Russian)
- Kniazevych, A. (2013). Ghlobalnyj innovacijnyj indeks – ocinka innovacijnogho potencialu Ukrainy [Global Innovation Index – an assessment of innovation potential of Ukraine]. *Bulletin of TNEU*, vol. 2, pp. 142–148. (in Ukrainian)
- Matjushenko, I. Ju. (2017). *Perspektyvy rozvytku konverghentnykh tekhnologij u krajinakh svitu j Ukraini dlja vyrishennja ghlobalnykh problem: monoghrafija* [Prospects for the development of convergent technologies in the countries of the world and Ukraine to solve global problems: monograph]. Kharkiv: IE Liburkina L.M. (in Ukrainian)
- Ostapenko, T. H. (2019). Rozvytok ghlobaljnogho ekonomichnogho seredovyshha v suchasnykh umovakh [Development of the global economic environment in current conditions]. *Scientific Bulletin of Uzhhorod National University. Ser.: International economic relations and the world economy*, vol. 25, part 2, pp. 37–41. (in Ukrainian)
- The Global Competitiveness Report 2017–2018. Available at: [http://www3.weforum.org/docs/WEF\\_TheGlobalCompetitivenessReport2017-2018.pdf](http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2017-2018.pdf) (accessed 29 March 2021).
- The Global Competitiveness Report 2018. Available at: [http://www3.weforum.org/docs/WEF\\_TheGlobalCompetitivenessReport2018.pdf](http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2018.pdf) (accessed 30 March 2021).
- The Global Competitiveness Report 2019. Available at: [http://www3.weforum.org/docs/WEF\\_TheGlobalCompetitivenessReport2019.pdf](http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf) (accessed 31 March 2021).
- Vdovenko, N. V., etc. (2017). *Ghlobaljna ekonomika* [Global economy]. Kyiv: NULES of Ukraine. (in Ukrainian)