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INNOVATIVE DEVELOPMENT OF UKRAINE'S ECONOMY

Abstract. The development of the world economy, despite the barriers, is quite dynamic. The drivers of growth and stabilization of national economies at present are not raw materials industries, nor even industrial enterprises, but companies that generate innovative products. The enterprises that are most dynamically developing and producing innovations include enterprises in the field of medicine and IT. The updated list of S&P 500 companies showed that 50% of all the most innovative companies in the world are registered in the United States. Despite the pandemic challenges, some economies have not suffered significant losses due to quarantine restrictions. Since the level of innovative development of the national economy is a total (integrated) expression of the whole complex of innovative products created by companies of such a country, the initial elements are the creation of favorable regulatory and state support for developers of innovative products, tax benefits and incentives, export support for innovative products and so on. In order to assess these achievements, international organizations have developed appropriate methods for measuring the index of innovation development, namely: Global Innovation Index (GII) (WIPO and Cornell University), Bloomberg Innovation Index (BII) (Bloomberg), Global Competitiveness Index (World Economic Forum), World Competitiveness Index (IMD World Competitiveness Center). Studies have shown that against the background of the flagship countries (Switzerland, Sweden, Singapore, USA, Germany, China, etc.), Ukraine is constantly losing its position in the rankings, which is an objective reason for deindustrialization of the economy and denationalization and privatization of strategic enterprises of national importance. Today, Ukraine ranks 45th (GII) and 56th (BII), respectively, and belongs to the group of countries with below-average incomes per capita. At the same time, Ukraine ranks 71st in terms of innovation spending and 37th in terms of innovation development (profit). The development of Ukraine's innovation component, according to experts and specialists, is ahead of forecast values.

Keywords: national economy, innovations, innovative development, innovative products, innovative companies, indices of innovative development, gross national income per capita.

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ІННОВАЦІЙНИЙ РОЗВИТОК ЕКОНОМІКИ УКРАЇНИ

Анотація. Розвиток світової економіки, попри бар'єри, є доволі динамічним. Драйверами зростання і стабілізації національних економік наразі виступають не сировинні галузі, і навіть не підприємства промисловості, а компанії, що генерують інноваційні продукти. До підприємств, що найбільш динамічно розвиваються і продукують інновації, належать підприємства галузі медицини і сфера IT. Оновлений список S&P 500 companies показав, що 50 % з усіх найінноваційніших компаній світу зареєстровано у США. Попри пандемічні виклики, економіки деяких країн не зазнали суттєвих втрат унаслідок карантинних обмежень. Оскільки рівень інноваційного розвитку національної економіки є сумарним (інтегрованим) вираженням усього комплексу інноваційної продукції, створеної компаніями такої країни, то вихідними елементами є створення сприятливого нормативно-правового забезпечення і державної підтримки розробників інноваційної продукції, надання податкових пільг і стимулювання, підтримка експорту інноваційної продукції тощо. З метою оцінювання зазначених досягнень міжнародними організаціями розроблені відповідні методики вимірювання індексу інноваційного розвитку, а саме: Global Innovation Index (GII) (WIPO and Cornell University), Bloomberg Innovation Index (BII) (Bloomberg), Global Competitiveness Index (World Economic Forum), World Competitiveness Index (IMD World Competitiveness Center). Проведені досліджень показали, що на фоні країн-флагманів (Швейцарія, Швеція, Сінгапур, США, Німеччина, Китай тощо) Україна постійно втрачає свої позиції в рейтингах, що є об'єктивною причиною деіндустріалізації економіки та роздержавленням і приватизацією стратегічних підприємств національного значення. На сьогодні Україна посідає 45-те (GII) і 56-те (BII) місця відповідно й належить до групи країн із рівнем доходів, нижче від середнього на одну людину. Водночас, за рівнем витрат на інновації Україна посідає 71-ше місце, а за результатами інноваційних розробок (прибутком) — 37. Розвиток інноваційної складової України, за словами експертів і фахівців, випереджає прогнозні значення.

Ключові слова: національна економіка, інновації, інноваційний розвиток, інноваційні продукція, інноваційні компанії, індекси інноваційного розвитку, валовий національний дохід на душу населення.

Формул: 0; рис.: 1; табл.: 4; бібл.: 19.

Introduction. In today's dynamic world, the economic development of the country depends on many components, among which the main role is played by innovation and competitiveness of the national economy in the international and global dimensions. The formation and development of the country's economy depends on its investment attractiveness, tax incentives for innovative developments, state support for innovative development, innovative activity of economic entities,

technological development of enterprises, the level of qualification of employees and their experience, export and import of innovative products. An important role in this area belongs to cooperation and integration of countries, with mutually beneficial economic penetration.

Analysis of research and problem statement. The unprecedented impact of innovation on the economic development of countries is reflected in the studies of Baharun et al [1], Bukreieva [2], Dubiei [3], Honcharov et al [4], Krot [5], Piliaiev [6], Porter and Stern [7], Johnson [8], Tsygankova et al [9], Wood [10] etc. The issue of cooperation and integration of countries in order to increase their competitiveness is revealed in the works of Bazaluk et al [11], Ma and Soroka [12], Svyrydenko and Stovpets [13], Ushkarenko and Soloviov [14], Yatsenko et al [15, 16].

The most appropriate from the standpoint of evaluating the results achieved is the use of data from well-known international organizations in this area, namely: World Economic Forum, World Intellectual Property Organization (WIPO) and Cornell University, IMD World Competitiveness Center, Bloomberg, etc. We used the reporting data of these organizations to achieve the goal of our study.

Unsolved aspect of the problem. The study is conducted to fill the gap on the formation of a full understanding of the state of innovative development potential and its impact on the competitiveness of countries.

The purpose of the article. The purpose of the study is to assess the achieved state of innovation potential of the Ukraines economy.

Research results. Back in 1999, Porter and Stern [7] formed the meaning of the concept of «National innovative capacity», which became an important condition for further understanding of the innovative potential of countries. They grouped this index from the following subindexes: Proportion of Scientists and Engineers Subindex, Innovation Policy Subindex, Cluster Innovation Environment Subindex and Linkages Subindex. This index reflects not only the achieved innovative level of development of an individual country, but also the preconditions that influenced its formation (investment policy, technological development, policy of government and private companies, etc.).

The national innovation system is based on the following elements: regulatory environment, business environment and innovation policy environment [17]. All these components are directly related to the construction of the following indicators and reporting data: Global Innovation Index, Bloomberg Innovation Index, Global Competitiveness Index, World Competitiveness Index, the characteristics of which are given in *Table 1*.

Table 1

Characteristics of the main tools for studying the innovative development and competitiveness of countries

The name of the tool	Developer organization	Characteristics of the tool
Global Innovation Index (GII)	WIPO and Cornell University	The GII provides detailed metrics about the innovation performance of 131 countries and economies around the world. Its 80 indicators explore a broad vision of innovation, including political environment, education, infrastructure and business sophistication
Bloomberg Innovation Index (BII)	Bloomberg	The BII analyses masses of criteria across seven metrics; research and development (R&D) spending, patent activity, tertiary efficiency, manufacturing capability, productivity, researcher concentration and the volume of high-tech public companies
Global Competitiveness Index (GCI)	World Economic Forum	The GCI integrates the macroeconomic and the micro / business aspects of competitiveness into a single index. The GCI measures the set of institutions, policies, and factors that set the sustainable current and medium-term levels of economic prosperity
World Competitiveness Index (WCI)	IMD World Competitiveness Center	It benchmarks the performance of 63 economies based on more than 330 criteria measuring different facets of competitiveness

Source: formed on the basis of data from the above organizations.

The ranking of countries by the level of innovative development is based on the level of gross national income per capita according to the World Bank (*Tables 2* and *3*).

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Table 2

Ranking of the Most Innovative Countries in the world for GII, 2020

Countries	Rank	Income Group	Innovation Input Sub-Index rankings	Innovation Output Sub-Index rankings
Switzerland	1	HI	2	1
Sweden	2	HI	3	2
United States of America	3	HI	4	5
Singapore	8	HI	1	15
China	14	UM	26	6
Hungary	35	HI	37	32
Ukraine	45	LM	71	37
India	48	LM	57	45
Qatar	70	HI	64	72

Notes: World Bank Income Group Classification (July 2020): LI = low income; LM = lower-middle income; UM = upper-middle income; and HI = high income.

Source: formed on the basis of data from https://www.wipo.int/global_innovation_index/en/.

Table 3

World Bank Income Groups, Based on Gross National Income Per Capita

	High-Income	Upper-Middle Income	Lower-Middle Income	Low Income
Income-Level Rank	> $12535	$4045 — $12535	$1036 — $4046	< $1036
Number of countries	49	37	29	16

Source: [10].

These empirical data show that among the 32 countries ranked highest in the ranking of the most innovative countries, only China has an income above average, all other countries have a high level of income per capita. If, for example, we compare the data of the Innovation capacity index 2001 (according to Porter and Stern) and the Global Innovation Index 2020, we will see that within 20 years Ukraine has fallen down from 32nd place to 45th, losing 13 steps. A similar negative trend (-24 steps) is also observed using another index — BII (*Table 4*), where Ukraine ranked 56th.

Table 4

Ranking of the Most Innovative Countries in the world for BII, 2020

Country	Rank	Changes 2020 to 2016	Intensity of research and development	Creating added value	Productivity	Density of high technologies	Effectiveness of higher education	Concentration of research	Patent activity
Germany	1	+1	8	4	18	3	26	11	3
Singapore	3	+3	12	2	4	17	1	13	5
Switzerland	4	+1	3	6	14	10	17	3	19
Sweden	5	-2	4	16	19	7	13	7	18
United States of America	9	-1	9	27	12	1	47	29	1
China	15	+6	15	14	47	11	5	39	2
Hungary	28	+2	25	13	40	18	54	30	48
India	54	-9	46	54	59	29	55	59	32
Qatar	55	-	55	26	31	-	58	52	58
Ukraine	56	-15	57	57	57	35	48	49	36

Source: https://theworldonly.org/rejting-innovatsionnyh-ekonomik-2020.

The leaders of income groups and some leading sectors are: Switzerland: First in Knowledge Creation, second in Global Brand Value; U.S.: First in Entertainment and Media, Computer Software Spending, Intellectual Property Receipts; China: First in Patents Registered; Vietnam:

Second in High-Technology Net Exports and India: First in Information and Communication Technology Services Exports [10]; Germany scored in the top five for its value-added manufacturing, high-tech density and patent activity metrics [8]. Thus, in the United States in 2018, financial support for research and development for federal large laboratories (mainly defense and medicine) and universities amounted to 129 billion dollars [17], while the total budget of Ukraine amounted to 130.9 billion dollars, i.e. had almost identical value.

The country's innovative achievements are closely correlated with its development (*Fig.*).

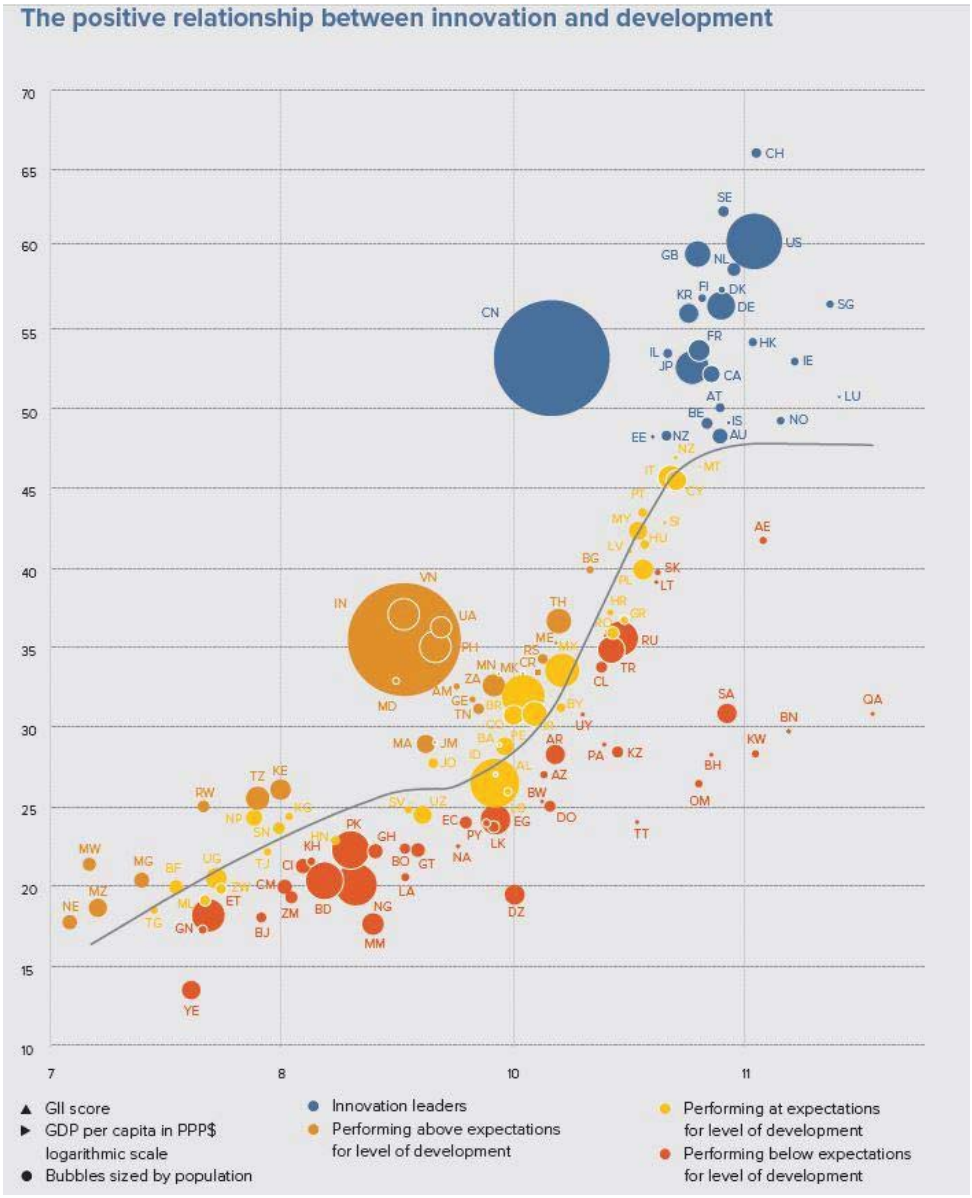

Fig. **The relationship between innovation and development of countries**

Source. [5].

Despite the rather low level of state support for innovation research (71st place), Ukraine received a fairly large profit from the implementation of innovative solutions (37th place). For example, the technology sector brings Ukraine $ 5 billion in export revenue annually [18]. Another important component, according to experts and specialists, is the advanced development of the Ukrainian economy compared to its forecast, while countries such as Lithuania, Qatar, Brunei, Saudi Arabia do not meet the forecast values [5].

The innovative level of the country is an integral indicator of the innovative development of its companies. According to the S&P 500 companies, American companies are among the 50 most

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innovative companies in the world [19]. As there is a gradual recovery during the pandemic period, and in some companies innovation development is accelerated (IT sector, medicine), the decline in innovation development of countries will not be as strong as expected.

The formation of sustainable competitive advantages of Ukraine takes place in bilateral and multilateral trade agreements, as noted in [14—16]. At present, Ukraine has a pronounced raw material character of exports, which is confirmed by the share of products of the III technological paradigm at the level of 57.9%, IV — 38%, V — 4% and VI — only 0.1%. The United States, in its turn, does not export products of the III technological paradigm, IV — 20%, V — 60% and VI — 5%. Based on these data, we conclude that the Ukrainian economy is going through hard times, if this situation does not change, the decline of the national economy and its lag behind competing countries will only deepen

Despite these ups and downs, Ukraine is struggling to maintain its current position in terms of per capita income (see *Fig*.), as countries such as Vietnam, India, and the Philippines are among the countries with incomes below the average level, which show a high rate of innovation.

Conclusions. The national economy is closely intertwined with the use of its internal innovation potential. Innovations are the driving force of economic development and affect the level of competitiveness of the economy. Today, the leaders in the ranking of the most innovative economies in the world are Europe (Switzerland, Germany, Sweden, etc.), Asia (Singapore, Japan, China, etc.) and the United States. Despite the significant impact of the COVID-19 pandemic and restrictive quarantine measures in most parts of the world, including Ukraine, the economic downturn is not as significant as expected. The drivers of the economy have been the IT sector and the fast-growing medical industry amid the decline of the industry. Due to the growing processes of deindustrialization of Ukraine's economy, falling ratings of the world's most innovative countries, a small share of exports of V and VI technological paradigms and increasing competition with countries in the group of countries with below-average incomes per person, Ukraine has to struggle hard to maintain and improve its current economic condition and the level of potential innovative development.

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