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**COMPARATIVE ANALYSIS OF BUSINESS SOPHISTICATION OF DIGITAL
ENTREPRENEURSHIP: INNOVATIVE AND INCLUSIVE ASPECT**

Ukraine in the rating of the global index of innovations shows a deterioration of indicators both in general and in terms of sub-indices. The reasons for this in 2023 were martial law; the outflow of qualified personnel due to the war, loss of housing, job; increased level of danger; deterioration of the ecological condition in the country. The reasons for the deterioration can be considered martial law; the outflow of qualified personnel due to the war, loss of housing, job; increased level of danger; deterioration of the ecological situation in the country. The article analyzes the number of Internet, cellular and social network users among the population of Ukraine from 2019 to 2023. The authors argue that the technologies already available in the country, the level of business innovation, access to the Internet, and cellular coverage will have a significant impact on the post-war recovery of Ukraine's economy. It is the quality of the Internet and access to it that is the foundation for the formation of digital entrepreneurship and the development of virtual businesses. The authors are convinced that a country's tendency to be competitive depends on a number of determinants, in particular, the mechanisms of intellectual property rights used, the interaction between the use of intellectual property rights and the size and innovation of companies, available human capital, and the intensity of research and development.

Keywords: *inclusiveness, accessibility, barrier-free, creative results, intelligent technologies, patents, high-tech production, knowledge results.*

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КОМПАРАТИВНИЙ АНАЛІЗ ДІЛОВОЇ ВИТОНЧЕНОСТІ ЦИФРОВОГО ПІДПРИЄМНИЦТВА: АСПЕКТ ІННОВАЦІЙНОСТІ ТА ІНКЛЮЗИВНОСТІ

Вступ. Останнім часом Україна у рейтингу глобального індексу інновацій демонструє погіршення показників як в цілому, так і в розрізі субіндексів. Причинами цього у 2023 році стали воєнний стан; вплив кваліфікованих кадрів з причин війни, втрати житла, роботи; підвищений рівень небезпеки; погіршення екологічного стану в країні.

Мета. Метою статті є представлення загальної характеристики ділової витонченості цифрового підприємництва крізь призму створених знань і технологій.

Методи. Проаналізувавши наукові здобутки в частині інклюзивності, стійкості інтелектуальних технологій, з'ясування рейтингових показників щодо створення знань і технологій, вважаємо, що невивченими в повній мірі залишаються питання впливу наявних знань, технологій та інновацій на ділову витонченість підприємництва, його інклюзивність та відцифрованість бізнес-процесів. На основі графічного, системного методів та порівняльного аналізу зроблено спробу представити зміни в динаміці кількості користувачів Інтернету, адже швидкість розповсюдження знань, технологій та винаходів здійснює потужний вплив на пришвидшене становлення цифрового підприємництва і його інклюзивності.

Результати. Дослідження засвідчило, що в Україні простежується погіршення в рейтингу за субіндексом «Високотехнологічний експорт» на 2 сходинки в 2023 році в порівнянні з 2022 р.. Причинами погіршення можна вважати воєнний стан; вплив кваліфікованих кадрів з причин війни, втрати житла, роботи; підвищений рівень небезпеки; погіршення екологічного стану в країні. У статті здійснено аналіз кількості користувачів Інтернет, стільникового зв'язку та соціальних мереж серед населення України з 2019 по 2023 рр.. Аргументовано, що на повосне відновлення економіки України вагомий вплив матимуть вже наявні в країні технології, рівень інноваційності бізнесу, доступ до Інтернету, покриття стільникового зв'язку. Якість Інтернету та доступ до нього є фундаментом для становлення цифрового підприємництва і розвитку віртуального бізнесу.

Висновки. Схильність країни до конкурентоспроможності залежить від низки детермінант, зокрема, наявних механізмів прав інтелектуальної власності, взаємодії між використанням прав інтелектуальної власності та інноваційністю компаній, наявного людського капіталу, інтенсивності досліджень і розробок.

Ключові слова: інклюзивність; доступність; безбар'єрність; творчі результати; інтелектуальні технології; патенти; високотехнологічне виробництво; результати знань.

Jel Classification: O32; O33; O34

Statement of the problem. The democratization and humanization of Ukrainian society, as well as social, political and economic changes require a review of people's attitude to the realities of modern life [1, p. 99]. «Before the full-scale invasion, there were 1.9 million micro, small and medium-sized enterprises (MSMEs) in Ukraine, which played a key role in the economy. However, as a result of the war, 65% of these enterprises were forced to temporarily or completely stop their activities. Although many of them have resumed work, their production capacity has significantly decreased – from 72.4% to 45.7%. This significant drop highlights the urgent need for further support to MSMEs from the government and international partners to restore and develop the sector» [2].

The document of the UN General Assembly «Transforming our world: Agenda for sustainable development until 2030» emphasizes the need to form a fair and inclusive development of society, «to create conditions for sustainable, inclusive and sustainable economic growth at the level of national development of each country» [3, p. 3]. But if we talk about the current situation in Ukraine, then according to the basic scenario of the IMF, the economy slowed down in the fourth quarter of 2024. The reason for this was the energy deficit, which was growing due to the increase in demand during the heating season. According to the IMF's baseline forecast for 2025, real GDP recovery is expected to be slower due to war and high business risks. «Overall, the updated baseline forecast assumes a cumulative loss of real GDP of 2% by 2027 (and 2.7% by 2033) relative to the June forecast» [4]. It is becoming obvious that the government of Ukraine will

have to work more actively on possible models of post-war recovery of the country's economy simultaneously on the basis of innovation and inclusiveness.

Analysis of recent research and publications and identification of part of the previously unsolved problem. The report on the economic freedom of the world in 2024 [5], presented by a team of scientists, gives an idea of the economic opportunities for business, entrepreneurship and people from different countries through the prism of freedom of free trade, regulation, fast and accessible finance, the legal system, a quality institution of property, and the institutionalization of economic relations. Ukrainian researcher O. Ptashchenko concluded in her research that «the financial component of economic inclusion refers to all financial aspects and efforts aimed at ensuring economic stability and development of all layers of society, including vulnerable population groups and less developed regions» [6, p. 103].

Valuable in the scientific sense are the research by A. Magableh, A. Audeh, L. Ghraibeh, M. Akour, A. Albahri, which is devoted to the analysis of the reasons for the stability of information systems through the prism of the formation of smart business [7]. Researchers emphasize that the rapid expansion of the information technology sector in various industries has led to the need to develop reliable management methods for the integration of technologies. This is due to the fact that enterprises increasingly rely on advanced information systems, and it is important to ensure that these technologies are environmentally reliable regardless of time [7, p. 2].

The monograph «Digital inclusion and accessibility: social digitalization» by G. Davydenko deserves scientific attention [8]. The researcher analyzed the Ukrainian experience of implementing digital accessibility and existing inclusive educational innovations and carried out a scientific review of international web accessibility practices [8, pp. 35–58; 145–150]. According to G. Davydenko «inclusion is a general phenomenon of social integration... with different opportunities, needs and social sensitivity... includes digital accessibility as the most important... way of communication, socialization, education and integration into society in general» [8, p. 30].

Ukrainian scientist A. Zhukovska defines inclusive entrepreneurship as «an innovative tool for overcoming negative trends in the socio-economic development of countries, an effective mechanism for solving those social problems of society that cannot be solved by the state and are ignored by entrepreneurs» [9, p. 113]. The researcher emphasizes the fact that «inclusive enterprises necessarily conduct environmentally responsible activities: they effectively use natural resources, do not pollute the environment, create and use renewable energy and materials; are responsible for the environmental consequences of their activities» [9, p. 116].

The research products of the implemented international project «Teaching digital entrepreneurship» are interesting in a scientific sense [10; 11; 12; 13]. The project participants developed educational materials with the aim of speeding up the process of becoming a digital entrepreneur. The materials present the stages, mechanisms, and tools of starting a digital business, and include a number of global examples of successful functioning of digital entrepreneurship and virtual business.

At one time, we also conducted several in-depth studies on the development of digital entrepreneurship in Ukraine [14; 15]. We tried to present the peculiarities of the formation of social entrepreneurship in the conditions of martial law through the prism of social innovations [16]. Pursuing the goal of a rapid post-war recovery of Ukraine's economy, we analyzed the institutional aspects and features of the digitalization of financial inclusion in the national economy [17].

At the same time, a comparative analysis of the creation of technologies and knowledge for the business sophistication of digital entrepreneurship in the times of war and post-war recovery remains little studied. In addition, there is no clear understanding of the role of the impact of knowledge, its dissemination, and assimilation in increasing high-tech exports and income from intellectual property in the national economy.

The purpose of the article is to present an analysis of the dynamics of the population of Ukraine from 2019 to 2023, and to determine the reasons for the change in Internet, cellular and social network users among the population through the prism of inclusiveness; comparison of the indicators of the rating of the Global Innovation Index by indices in order to understand the prospects of business sophistication of national digital entrepreneurship on the basis of this knowledge; analysis of the understanding of the content of inclusive entrepreneurship and inclusion; provision of proposals of a recommendatory nature in terms of

qualitative assimilation of knowledge and technologies for the purpose of innovative development, and increase of high-tech production in Ukraine.

Methodology and methods. The methodological basis of the scientific research was the selection, review, and study of existing developments in publications of highly cited scientific journals, in particular those indexed in the Scopus database. This scientometric database of scientific publications by researchers from different countries of the world is distinguished by its openness, ease of use, convenience of downloading materials, and reliability of citation, which is a significant criterion for maintaining the methodological accuracy of our scientific research.

Given the need to conduct a qualitative and thorough comparative analysis of the business sophistication of digital entrepreneurship, we have outlined clear spatial and temporal frameworks for the study. Thus, the time frame of our bibliographic study and monitoring of analytics covers the period from 2017 to 2024 with the aim of focusing our attention on the most relevant aspects of digital transformations in entrepreneurship under the influence of technical and technological changes in production processes, the features of innovative business development in the digital era, the need to expand accessibility and barrier-free access to important goods and services for all members of modern society. Some information used in our work contains forecast indicators until 2030 regarding transformations in economic spheres in order to achieve sustainable development of countries.

The theoretical materials on which we rely in arguing our scientific views are presented by researchers from different countries of the world, in particular the USA, Spain, Italy, Austria, Saudi Arabia, Australia, Portugal, Ukraine, etc., which fully allows us to outline the prospects for the business sophistication of digital entrepreneurship in Ukraine and provide recommendations on the high-quality assimilation of knowledge and technologies for the innovative development of the country and the expansion of its high-tech production.

The source of analytical data for our study was the materials of «Digital: Ukraine» for 2020–2024, which allowed us to analyze the dynamics of changes in the number of active users of the Internet, cellular communications, and social networks among the population of Ukraine and identify the influence of these trends on the development of digital entrepreneurship. In addition, the reporting data of the World Intellectual Property Organization (WIPO), namely «Global Innovation Index 2023: Innovation in the face of uncertainty», was used to identify and assess Ukraine's place in the innovation rankings, in particular according to the indices «Knowledge and Technology Results: Knowledge Creation», «Creative Results», «Business Sophistication: Knowledge Acquisition», «Knowledge and Technology Results: Knowledge Impact» and «Knowledge and Technology Results: Knowledge Dissemination». The data processed during the scientific study provide an idea of Ukraine's readiness for innovative development, the presence of an institutional and business basis, and scientific and technological potential for digital transformations in the economy and business.

To achieve the goal outlined in the article, the following scientific methods were used: a comprehensive and systematic approach to review and analyze Ukraine's rating positions in terms of innovation indices and sub-indices; a grouping method to summarize economic indicators that characterize Ukraine's innovative capacity in technology, creativity, business, science, and education; a comparison method to compare the indicators of the number of Internet users, mobile communications, and social networks among the population of Ukraine from 2019 to 2023; methods of analysis and synthesis to understand the content of inclusive entrepreneurship and inclusion; a method of concretization to provide author's proposals for the assimilation of knowledge and technologies for the purpose of innovative development and increasing high-tech production in Ukraine; a comparative method to analyze business sophistication and capacity of digital entrepreneurship; a graphical method to visually present the dynamics of changes in Ukraine's rating positions according to the Global Innovation Index 2023.

Presentation of the main material. «Inclusion is a process of increasing the degree of participation of all citizens in society, including people with disabilities and other less mobile population groups (elderly people, pregnant women, veterans). In order to implement the principles of inclusiveness and protection of the rights of persons with disabilities, on December 13, 2006, the UN General Assembly adopted the Convention on the Rights of Persons with Disabilities. It was signed and ratified by almost all countries of the world, including Ukraine. Coordination of activities carried out by central and local bodies of executive power, local self-government bodies, enterprises, institutions and organizations regarding the implementation and implementation of the Convention is ensured by the Ministry of Social Policy of Ukraine» [18].

Equality (inclusive planning, gender equality, social rejection, accessibility, inclusion) and immediate barrier-freeness (disability, tolerance, non-discrimination, overcoming stereotypes, inclusion in education, comprehensive gender approach) should be mentioned among the components of barrier-freeness [19]. «Enterprises become agents of positive social changes» [7, p. 13] partial implementation of inclusive business practices.

The population of Ukraine in 2023 was 37.42 million people, which is 6.44 million less than in 2019 (Fig. 1). Such population reduction is caused by the state of war in Ukraine, a high level of danger to life, a decrease in the standard of living in the country, a deterioration in the quality of life, a difficult situation on the labor market, business closures, and tax increases.

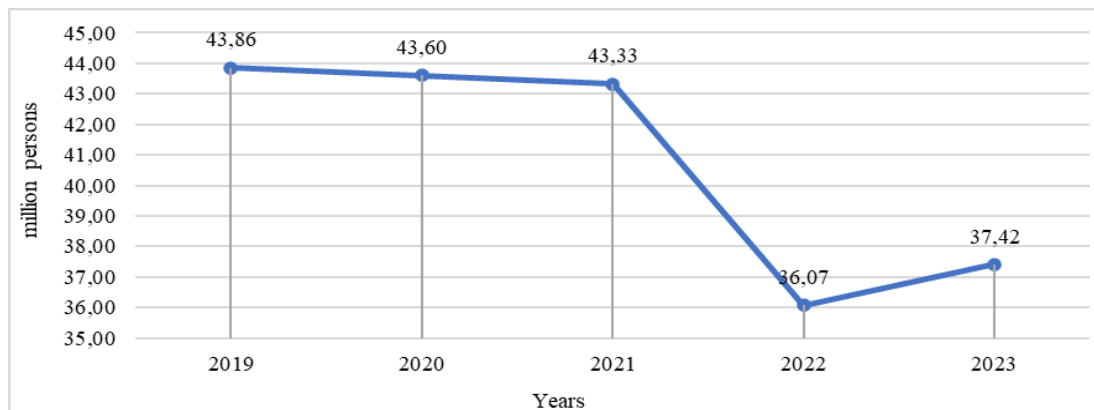


Fig. 1. The population of Ukraine from 2019 to 2023

*Built on the basis of data [20, pp. 15, 20, 22, 24–25; 21, pp. 17, 36; 22, pp. 16, 22; 23, pp. 17, 22; 24, p. 16].

«The main problem faced by MSMEs in Ukraine is the shortage of human capital, which has worsened due to the war. Currently, 8.4% of MSMEs operate with less than 40% of the required number of staff. As a result, 80% of companies plan to increase wages by 10–30% by the end of 2024. Despite these challenges, 76% of MSMEs managed to maintain their human resources as of March 2024, demonstrating resilience in the face of economic challenges» [2].

Technologies already available in the country, the level of business innovation, access to the Internet, and cellular coverage will have a significant impact on the post-war recovery of Ukraine's economy. It is the quality of the Internet and access to it that is the foundation for the formation of digital entrepreneurship and the development of virtual businesses. The possibility of virtualization of business processes is determined by the quality of the Internet connection.

From Fig. 2, we can see that from 2021, the number of cellular users, social networks, and Internet users in general is showing a negative trend. The reasons can be considered the war on the territory of Ukraine, the decrease in the number of the population in the country as a result of migration processes, the decrease in the income of the population, the destruction of infrastructure facilities as a result of shelling, and frequent power outages.

However, it is important to develop social factors related to the perception of the new virtual reality that the Internet provides, the growing use and need for new technologies, and to understand why some people do not accept certain technologies, even when the innovation itself has an increasing number of users and access to the Internet nextline [25, p. 46]. Currently, support for «integrated systems that enable enterprises to monitor and optimize the use of resources, directing them to sustainable consumption models» is relevant [7, p. 14]. Bridging the disconnect will require technologies to bring together sparse populations in a cost-effective way [26].

Analyzing the indicators of Ukraine according to the rating of the GII 2023 in the section of the sub-index «Results of knowledge and technologies: creation of knowledge» from 2011 to 2023 (Fig. 3), it is worth noting that there is a systematic deterioration in the number of patents by origin, scientific and technical articles, and citations documents. The only rating indicator that remains unchanged from 2015 to 2023 is useful models by origin. Here, Ukraine holds a leading position, taking 1st place among all the

countries of the world.

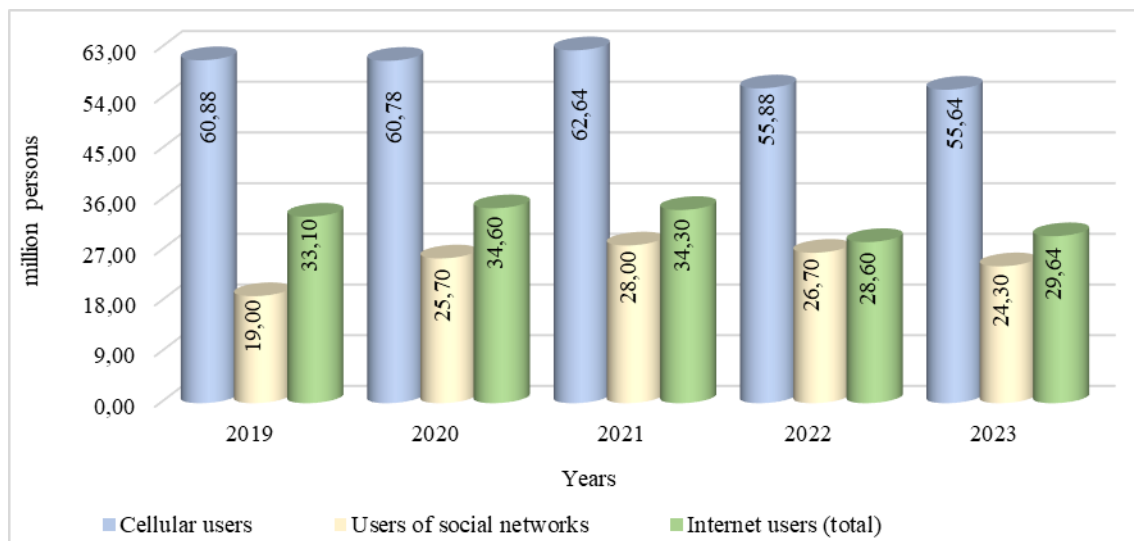


Fig. 2. Number of users of the Internet, cellular communication and social networks among the population of Ukraine from 2019 to 2023

*Built on the basis of data [20, pp. 15, 20, 22, 24–25; 21, pp. 17, 36; 22, pp. 16, 22; 23, pp. 17, 22; 24, p. 16].

With the advent of digital business methods, advanced technologies have been used to optimize the use of resources and increase the overall sustainability of technology. Available technologies complement each other in practice, so the use of several technologies becomes a more effective and reliable method in the course of digitizing business processes [7, p. 16]. The power of the utility model patent regime can be calibrated over time, and this will have a powerful impact on the technological development of the country [27, p. 52].

Pursuing the goal of innovative development, it is necessary to quickly develop national pilot projects that provide new opportunities for integrated systems, innovative decision-making tools, and smart management structures [7, p. 5]. Countries that maintain weak patenting regimes for early-stage inventions are in a constant state of catch-up and can only strengthen their patenting regimes over time. This happens when the critical potential of technological capabilities is reached. This is done in order to better facilitate technological development (including greater number and greater complexity of technology transfer, research and development, and patents). Low-income countries, and perhaps middle-income countries even more so, may purposefully adopt weak invention patenting regimes to facilitate technological learning. Legal graft and governance dynamics can also affect the strength of patent regimes [27, p. 53].

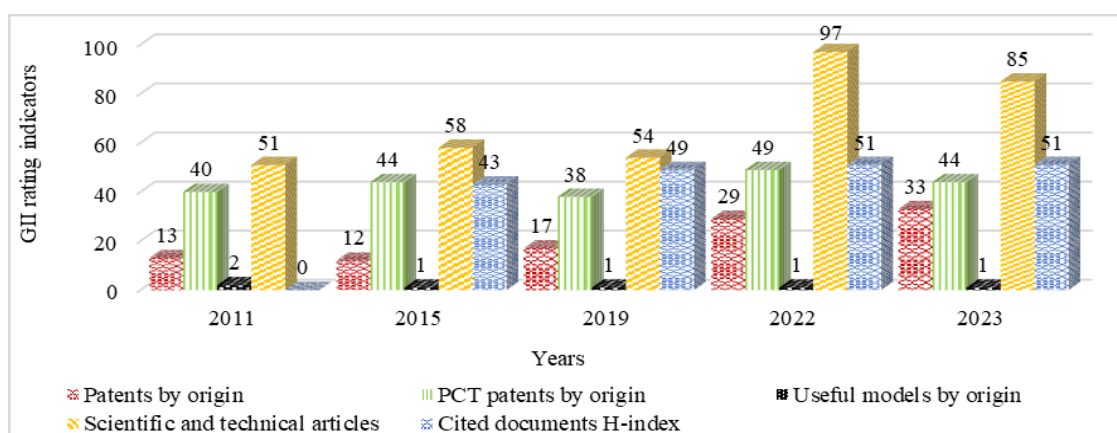


Fig. 3. Indicators of Ukraine in the GII rating according to the index «Results of knowledge and technologies: creation of knowledge» from 2011 to 2023

*Built on the basis of data [28, p. 202].

According to the index «Creative results» in Ukraine, a deterioration can be traced in 2022 and 2023 compared to 2019. Thus, according to the GII 2023, Ukraine took 16th place in the subindex «Industrial samples by origin» and 22nd in the subindex «Trademarks by origin» (Fig. 4).

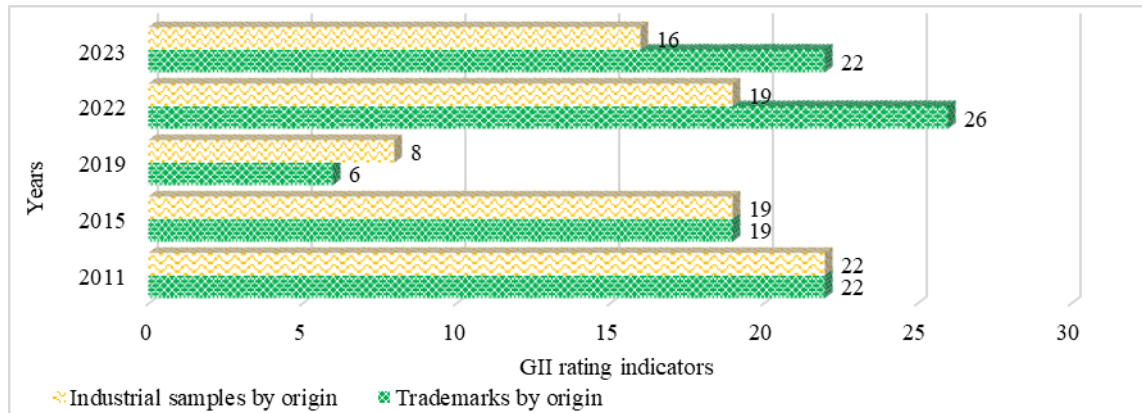


Fig. 4. Indicators of Ukraine in the GII rating according to the «Creative results» index from 2011 to 2023

*Built on the basis of data [28, p. 202].

Creative output is closely related to business acumen and knowledge acquisition. The data presented in Fig. 5 show the rating indicators for the «Payments for intellectual property» and «High-tech imports» sub-indices, which remained almost unchanged in 2022–2023. But it is worth noting that a country's tendency to be competitive depends on a number of determinants, in particular, the mechanisms of intellectual property rights used, the interaction between the use of intellectual property rights, the size and innovativeness of companies, the available human capital, the intensity of research and development, the business context of the region and sector economy [29, p. 158]. In addition, it is worth remembering that the active use of «artificial intelligence affects the restructuring of the supply chain, in terms of flexibility and speed of delivery of the latest products» [7, p. 6].

In Fig. 6–7 presents the data of the GII according to the indexes «Results of knowledge and technology: impact of knowledge» and «Results of knowledge and technology: impact of knowledge». Thus, according to the sub-index «Increasing labor productivity» in 2023, compared to 2022, the indicator dropped by 124 positions. According to the «High-tech production» subindex, the change in the indicator was 4 positions.

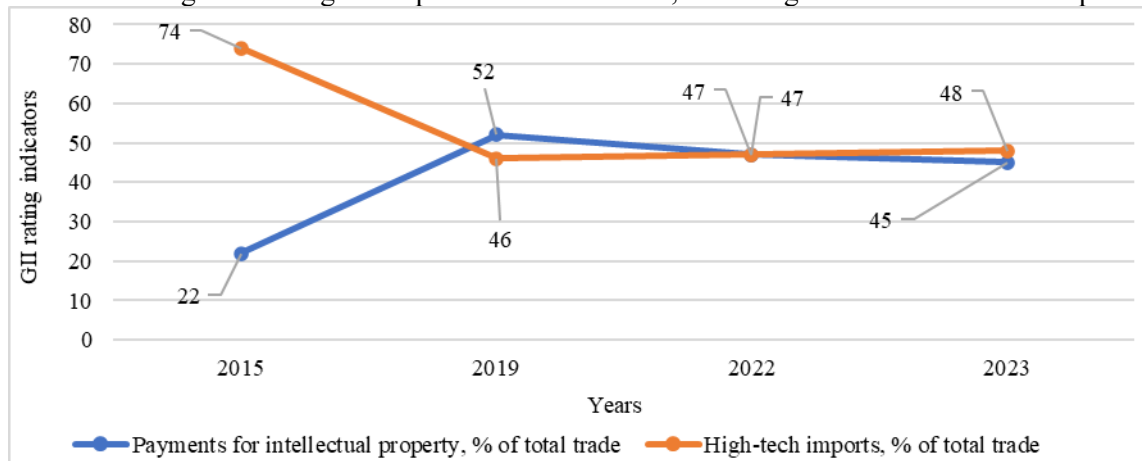


Fig. 5. Indicators of Ukraine in the GII rating according to the index «Business sophistication: assimilation of knowledge» from 2011 to 2023

*Built on the basis of data [28].

The sub-index «Revenue from intellectual property» in 2023 reached 57th place, which is 7 positions

worse than in 2022. Deterioration in the rating by 2 positions in 2023 compared to 2022 and according to the «High-tech export» sub-index. The reasons for the deterioration can be considered martial law; the outflow of qualified personnel due to the war, loss of housing, job; increased level of danger; deterioration of the ecological condition in the country.

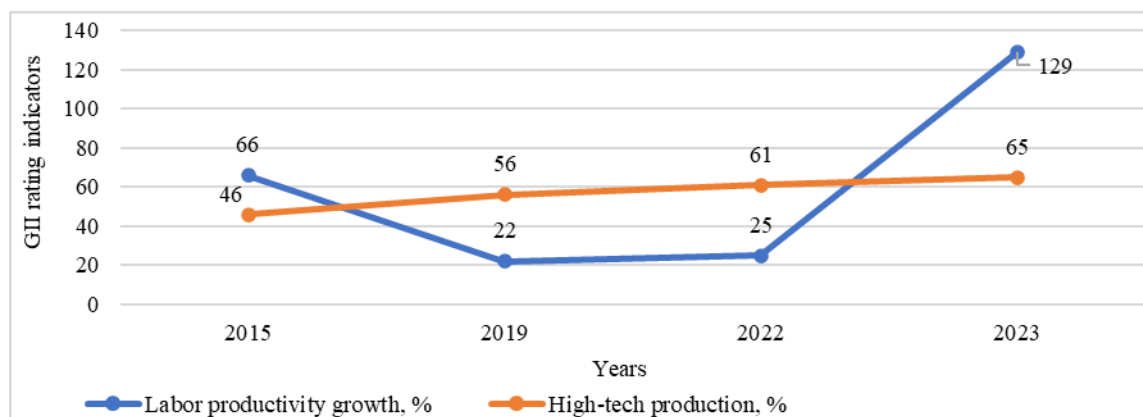


Fig. 6. Indicators of Ukraine in the GII rating according to the index «Results of knowledge and technologies: the impact of knowledge» from 2011 to 2023

*Built on the basis of data [28, p. 202].

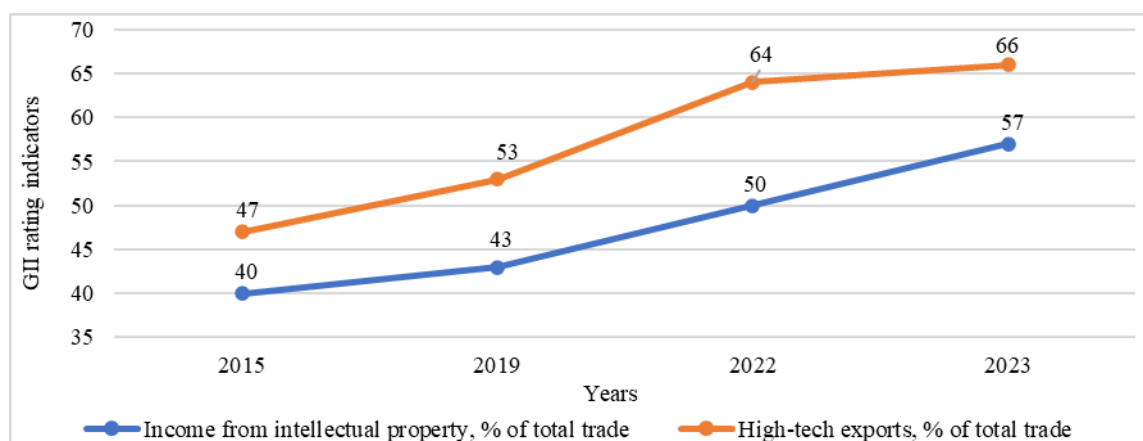


Fig. 7. Indicators of Ukraine in the GII rating according to the index «Results of knowledge and technologies: dissemination of knowledge» from 2011 to 2023

*Built on the basis of data [28, p. 202].

The most competitive are those companies with high-tech production, which attach less importance to attracting financing and investments and more importance to obtaining market power. It is important that companies with high-tech production use and commercialize the product/service, gaining a competitive advantage, protecting the innovation from imitation and exploitation by competitors, increasing competitiveness in the market, increasing market share, and entering international markets [29, p. 159].

«Sustainable intelligent technologies are quickly becoming an integral part of business around the world. For this reason, there is a need for the efficiency and environmental friendliness of the application of intelligent technologies of the new generation. Advanced technologies have the potential to revolutionize traditional business models, offering solutions that not only optimize work, but also mitigate environmental impact, achieving sustainable development» [7, p. 7].

Economic entities with high technologies must be skilled in solving innovative and technological tensions and learning at an accelerated pace [30, p. 261] in the conditions of global turbulence of the world, digitization and innovation.

Conclusions and prospects for further investigations. In the conditions of martial law, it is worth looking for mechanisms for rebuilding the economy of Ukraine and tools for filling the budget. The conviction that the business sophistication of digital entrepreneurship can become the driver of rapid socio-

economic recovery. In the course of the formation of digital entrepreneurship and virtual business, it is necessary to take into account their aspect of innovation and inclusiveness. Innovation is possible under the condition of the constant creation of knowledge and technologies, which produce novelties and innovations in various sectors of the economy.

Inclusivity and accessibility become important because of the consequences of war for every member of society and especially for war veterans. Especially since Ukraine set a world record – 3 seconds for opening a FOP with the e-Entrepreneur service. Currently, it is possible to register a sole proprietorship with one application. The registration process takes 20 minutes, and previously it took 53 days for the entire paper organization. E-Entrepreneur combines 10 services – from opening a commercial enterprise to a fire declaration and opening a bank account. That is, these are requested services that are needed to start or scale a business. Therefore, without exaggeration, it can be assumed that the digitalization of the country's economy plays not the last «violin», because it accelerates the possibility of quick access to information in parts of opening one's own business case.

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