

# INNOVATIVE FACTORS OF STRENGTHENING THE COMPETITIVENESS OF THE NATIONAL ECONOMY IN TERMS OF COMBATING THE HYBRID WAR

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*External* military aggression has become a significant negative factor influencing on the state of Ukraine's innovation-technological potential, as a result of which the state lost part of production-technological infrastructure and research potential, it was weakened the investment attractiveness of the economy and intensified the processes of intellectual emigration. The combination of systemic problems and the destructive effect of hybrid aggression caused the deterioration of the state of Ukraine's innovation security in 2005–2015, estimated using the method of the main components. In 2005–2015 the integral value of Ukraine's innovation security decreased from 0.166 to 0.127. In conditions of external aggression, the main reasons that hinder the effective use of domestic innovation potential and the development of innovations as a factor of providing Ukraine's innovative security are the following: the inconsistency of the state policy of stimulating the development of innovation activity, the lack of funding of science is reinforced by the irrational distribution of budget support for scientific works, the low level of diversification of markets and innovation cooperation, the slowness of the implementation of international standards of production quality at domestic enterprises. At the same time, the hybrid conflict with the Russian Federation forced Ukraine to rethink old and identify new strategic priorities for socio-economic development, which should be based on the effective implementation of the strategy of innovation development as an instrument for combating hybrid threats. The purpose of the article is to substantiate the innovative factors of strengthening the competitiveness of the national economy in a hybrid war. Counteraction of the consequences of hybrid aggression in the innovation-technological sphere should be based on the activation of innovation activity of business entities, expansion of the directions of international scientific-technological and industrial cooperation, reduction of economic dependence of the national economy on the Russian market, creation of an effective system of commercialization of intellectual property objects, improvement business climate and increase of investment attractiveness of innovation sphere.

**Keywords:** innovation activity, innovation security, competitiveness of the national economy, hybrid war, strategic priorities.

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ІННОВАЦІЙНІ ФАКТОРИ ЗМІЦНЕННЯ КОНКУРЕНТОСПРОМОЖНОСТІ  
НАЦІОНАЛЬНОЇ ЕКОНОМІКИ В УМОВАХ ГІБРИДНОЇ ВІЙНИ

*Значним* негативним чинником впливу на стан інноваційно-технологічного потенціалу України стала зовнішня воєнна агресія, унаслідок якої держава втратила частину виробничо-технологічної інфраструктури та науково-дослідного потенціалу, знизилася інвестиційна привабливість економіки, активізувалися процеси інтелектуальної еміграції. Сукупність системних проблем та деструктивний вплив гібридної агресії спричинили погіршення стану інноваційної безпеки нашої країни. У період 2005–2015 рр., інтегральне значення інноваційної безпеки України зменшилося з 0,166 до 0,127.

Основними причинами, що в нинішніх умовах перешкоджають ефективному використанню вітчизняного інноваційного потенціалу та розвитку інновацій як чинника забезпечення інноваційної безпеки України, є непослідовність державної політики стимулювання розвитку інноваційної діяльності, недостатнє фінансування науки, посилене нераціональним розподілом бюджетної підтримки

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наукових та науково-технічних робіт, низький рівень диверсифікації ринків збуту та інноваційного співробітництва, повільність процесів упровадження міжнародних стандартів якості виробництва на вітчизняних підприємствах. Водночас гібридний конфлікт з РФ змусив Україну переосмислити старі та визначити нові стратегічні пріоритети соціально-економічного розвитку як інструмент протидії гібридним загрозам.

Метою статті є обґрунтування інноваційних чинників зміцнення конкурентоспроможності національної економіки в умовах гібридної війни. Протидія наслідкам гібридної агресії в інноваційно-технологічній сфері має ґрунтуватися на активізації інноваційної діяльності суб'єктів господарювання, розширенні напрямів міжнародного науково-технологічного та виробничого співробітництва, зниженні економічної залежності національної економіки від російського ринку, створенні ефективної системи комерціалізації об'єктів інтелектуальної власності, поліпшенні бізнес-клімату та підвищенні інвестиційної привабливості інноваційної сфери.

**Ключові слова:** інноваційна діяльність, інноваційна безпека, конкурентоспроможність національної економіки, гібридна війна, стратегічні пріоритети.

The hybrid war of the Russian Federation against Ukraine has become a long-term factor affecting not only on military but also political, social and economic spheres. In the conditions of termination of cooperation with the Russian Federation, the need to enter new, more complex markets and the low efficiency of traditional growth factors, it becomes urgent to build a new model of development based on high-tech, science-intensive and energy-efficient industries, deep integration of research and production sphere with the purpose of activating innovation activity as the most effective way to increase the competitiveness of the national economy and strengthen the state's economic security.

Ukraine has a significant potential for the development of scientific-technological and innovation activities, capable of strengthening the competitiveness of domestic production and the structural transformation of the national economy. In particular, Ukraine is included to the eight countries in the world with the necessary scientific-technological potential for the creation of aerospace technology, and to the top-ten shipbuilding countries in the world [1]; ranked ninth place among the largest arms exporters in 2011–2015 [2]. According to IT Outsourcing News, in 2015 Ukraine ranked first place in Europe in the field of IT outsourcing [3].

At the same time, the basis of the national economy is the low-tech "old industrial" industries with a focus on the production of products of the III–IV technological processes and the structure of exports with a predominantly raw material nature and a high proportion of products with low added value, indicating the ineffectiveness of the use of existing domestic technological and innovation potential and incapacity new competitive innovation drivers development. Prolonged reproduction of such a model of economic development can lead to a deepening of the crisis in the economy and an increase in technological lagging behind developed countries.

The issue of activating the development of scientific-technological and innovation activity as a factor of ensuring the state's innovative security is actualized in the scientific works of O. Amosha, Y. Bazhal,

V. Heyets, V. Nowicki, A. Halchynskiy, M. Hvesyk, V. Semynozhenko, O. Sobkevych, A. Sukhorukov, L. Fedulova, Z. Varnalii, T. Vasylytsiv, O. Vlasiuk. At the same time, there are still insufficiently developed aspects related to the investigation of new threats and challenges to the country's economic security, which is primarily due to external aggression and partial loss of innovation and scientific-technological potential due to military actions in the Donbass and the annexation of of the Autonomous Republic of Crimea.

The purpose of the article is to substantiate the innovative factors of strengthening the competitiveness of the national economy in hybrid war.

The situation is greatly complicated by the conduct of hostilities in the east of Ukraine and the annexation of the Autonomous Republic of Crimea by the Russian Federation, which caused not only the physical destruction of production capacities but also the violation of inter-branch, interregional and international cooperative ties, which necessitates the reorientation of national production to the markets of EU countries and the world where there is a high level of competition of high-tech goods and services.

The domestic innovation sphere suffered a powerful negative influence from a fighting in the territory of Luhansk and Donetsk oblasts and the annexation of the Autonomous Republic of Crimea. So, in a hybrid war Ukraine has lost at least 20 % of its economic potential [4]. The conduct of hostilities in the Donbass led to a stop in the production of the metallurgical, machine building and chemical industries, which provided a significant portion of the domestic production of innovative products. Thus, the share of Donetsk and Luhansk regions in the total volume of sales of innovative products in Ukraine in 2015 amounted to 1,7 % and 0,2 % respectively, while in 2013–3 % and 2,1 %.

Almost a third (27 %) of the industrial potential of Donetsk and Luhansk regions were taken to the Russian Federation [5]. The dismantling and removal of equipment from enterprises of Donbass, which produced high-tech products from the aviation,

aerospace, rocket industry, radio electronics and military-industrial complex (in particular, Snizhniansky machine-building plant, Luhansk cartridge factory, "Topaz", "Yunist" and "Tochmash" plants) were recorded [6].

As a result of the annexation of the Autonomous Republic of Crimea by the Russian Federation, Ukraine has lost control over the enterprises of the high-tech shipbuilding sector, in particular FSC "More" and the "Fiolent" plant, which are included in the list of enterprises of strategic importance for the national security of Ukraine. In 2014, these enterprises were nationalized by the self-proclaimed Crimean authorities.

A serious challenge to the Ukrainian economy was the collapse of cooperative relations with the Russian Federation in the field of innovation and science. It is primarily about Ukrainian-Russian cooperation in the machine-building, rocket-space and aviation industries, in the field of military-industrial complex. Traditionally, in the Russian Federation, 20–25 % of the volume of Ukrainian armed exports was directed. The denunciation of a number of military-technical cooperation agreements with the Russian Federation was the first practical step that witnessed the transition from declarations of termination of cooperative ties with the Russian Federation to the actual adoption of the relevant regulations [7]. Among the military-technical cooperation directions, in which Ukraine objectively refused to cooperate with Russia, it is worth to highlight the maintenance of the status of Russian intercontinental ballistic missiles, cooperation in the field of development and production of new aircraft, the supply of Ukrainian engines for Russian helicopters.

It should be noted that the domestic engineering industry suffered almost the greatest losses from the closure of the Russian market, since Russia was the largest importing country of Ukrainian goods in the mechanical engineering industry – its share in the export of Ukrainian goods in the machine-building industry was more than 50 %. In such a situation, the weak diversification of the markets for the production of machine-building enterprises in the region poses a significant threat to the recovery of the industry in the face of closing Russian markets.

As a result of the annexation of the Autonomous Republic of Crimea, about 100 scientific institutions which carried out unique fundamental researches in the field of marine sciences and technologies (Marine Hydrophysical Institute, The Institute of Biology of the Southern Seas, etc.) remained at the uncontrolled territory of Ukraine [8]. A significant loss for Ukrainian science is the Crimean Astrophysical Observatory, which is equipped with highly effective scientific and technological equipment – the only one in Ukraine radio telescope RT-22, one of the three

largest telescopes in CIS – a reflecting telescope with a mirror diameter of 2,6 m, a large solar telescope and other equipment. The control over the objects of space infrastructure owned by the State Space Agency of Ukraine of the National Space and Space Management Center, which has one of the most powerful radio telescopes in the world on the balance sheet – the Radio Telescope RT-70 and the Center for Outer Space Control, which is used for remote sensing of the Earth, has been lost [9].

The conduct of hostilities in Donbass also caused significant losses to Ukrainian science. Some of the scientific institutions remained on the temporarily uncontrolled territory of Ukraine, part of it was destroyed or damaged, only 10 scientific institutions were evacuated, about 12 thousand scientists and university lecturers emigrated. At the same time, due to the loss of specialized technological equipment, the possibilities for conducting experimental research were substantially limited.

Extremely negative consequences for Ukraine's innovation security has the intensive emigration of highly skilled personnel, which takes place throughout the period of Ukraine's independence, and only during the period of foreign aggression has intensified. According to the World Economic Forum, in 2016 Ukraine occupies only 132 place in ability to retain talent among 138 countries, which confirms the ineffective state's policy on the formation and implementation of human resources. The number of researchers in Ukraine in 1991–2016 has decreased threefold. The annual outflow of specialists abroad in the field of computer technologies makes from 2,5 to 6 thousand people, and the material losses of the state from this annually are from 37,5 to 90 million UAH. During 2015–2016 about 10 thousand IT-specialists left Ukraine to work abroad, at the same time, mostly certified highly skilled specialists leave Ukraine.

At the same time, the effective using of the potential of Ukraine's scientific-technological and innovation development is compounded not only by the negative factors of the hybrid war, but also by the systemic deficiencies in the functioning of innovation and scientific activities. It includes, in particular, the low level and inappropriate allocation of costs for the implementation of scientific and technical works, and the lack of their adequate budget support; small volumes of performance of scientific and technical works, low practical feasibility of research; worsening of intellectual and personnel provision of innovation activity; a small number of innovative active industrial enterprises; insignificant volumes and low efficiency of implementation of innovative products in the manufacturing sector of the economy; low activity of enterprises in creation and use of advanced technologies and objects of intellectual property rights; a small number of patent applications and the lack of their implementation in the national economy.

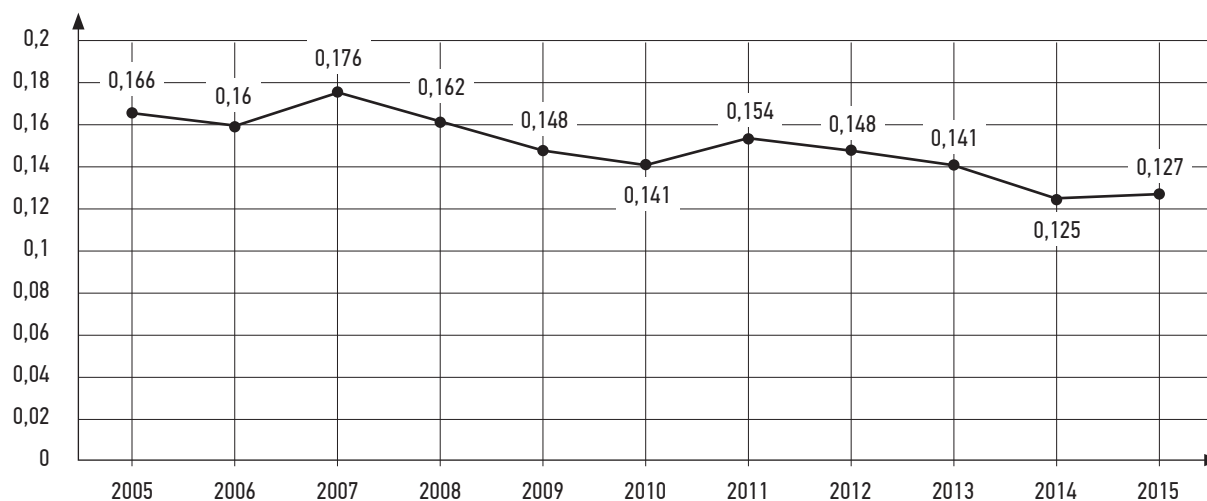


Fig. Integral indices of innovation security of Ukraine in 2005–2015

Origin: compiled according [10].

The combination of systemic problems and the destructive impact of hybrid aggression caused the deterioration of the state of Ukraine's innovation security in 2005–2015, estimated using the main components method. In 2005–2015 the integral value of Ukraine's innovation security has decreased from 0,166 to 0,127 (Figure).

The main reasons that in conditions of external aggression impede the effective use of domestic innovation potential and the development of innovation as a factor of providing Ukraine's innovation security, are as follows:

- a lack of effective (with specific quantitative and qualitative results) state policy of the development of innovation activity and the use of its achievements in the socio-economic sphere, including organizational work on the creation of operating elements of innovation infrastructure and "platforms" of cooperation between research sphere, enterprises, innovation firms and investors. The government's declaration of an innovative development model throughout the period of independence has not been confirmed by systematic measures of a long-term nature;
- a low efficiency of economic instruments stimulating the innovation activity of enterprises. Despite the fact that there is no alternative to the transition of the country's economy to the innovative model of development in the context of the technological backwardness of the domestic industrial complex and the pressure of external aggression, the state innovation policy is characterized by a number of organizational and financial deficiencies. State support for innovation in the form of direct financing has significant budget constraints and is not consistent with the priorities of innovation development. Much of the budget allocations is provided to mining enterprises, low and

medium-tech manufacturing, which does not contribute to the progressive structural change in the economy. At the same time, the range of tax incentives for innovation has repeatedly undergone changes and narrowed. In addition, in our country there are no effective economic incentives to attract domestic and foreign investors to innovative processes;

- a low level of sales diversification and innovation cooperation. Prior to external aggression, the main importing country of Ukrainian high-tech products (40,5 % of total exports) remained the Russian Federation, while the largest share was occupied by products of the aerospace industry (56,6 %) and instrument manufacture (42,3 %). Due to the deterioration of the performance of the main export-oriented industries located in the Donbass, as well as the introduction of restrictions on the Russian market, in 2014 there was a significant drop in high-tech exports of Ukraine, primarily for products of the aerospace complex (1,6 times), instrumentation (1,3 times). The structural and dynamic analysis of imports of high-tech goods also captures the significant dependence of the national economy on the import of products from the machine-building and instrument-making industries. The share of imports of this product in total amounts is about 30 %. The deformations of Ukraine's foreign trade are also manifested in the significant predominance of imports over exports of high-tech goods (the export-import coverage ratio for these groups of goods in 2014 was 0,61);
- inhibition of the processes of implementation of international standards of production quality at enterprises, which restrain the technical and technological modernization of production processes, creates technical barriers in foreign trade, complicates the access of Ukrainian products to European markets and poses a significant threat to economic



security in the conditions of the closure of Russian markets. An important event for Ukraine was the signing of the Association Agreement and an in-depth and comprehensive free trade area between Ukraine and the EU, which opens up new opportunities for the domestic economy to stimulate modernization and structural transformations on an innovative basis. At the same time, with the removal of tariff barriers, the access of Ukrainian products to the European market remains complicated due to the existence of non-tariff barriers that, due to the technologically outdated production base of Ukraine, virtually eliminate the possibility of full-scale entry into the EU market. In addition, many domestic enterprises produce products in accordance with technical regulations approved at the time of the USSR. Thus, the structural indicators of Ukraine's trade cooperation with the EU confirm the medium and low-tech specialization of export supplies. Thus, medium-high-tech products account for 15,0 % of export deliveries in 2014 and 14,9 % in 2015, while average high-tech products in 2014 accounted for 32,6 % of imports and 32,4 % in 2015.

### Conclusion

In order to mitigate the risks and negative impact of the hybrid war on domestic innovation potential, it is necessary to first develop a comprehensive Strategy of Ukraine's Innovation Development aimed at ensuring the transition of the state to an innovative model of development through the expansion of the high-tech sector of the economy, taking into account the actual threats and challenges of innovation security in the context of hybrid warfare, and also partial loss of innovation and scientific and technological potential due to military actions in the Donbass and annexation of the Autonomous Republic of Crimea.

In the near future, it is advisable to develop a methodology for assessing losses in the scientific, technological and innovation spheres that were caused to Ukraine as a result of the temporary occupation of its territory. At the same time, it is expedient to put in the basis of the size of the incurred losses the potentially lost income from the maximum possible effective use of the lost asset, discounted to the present moment.

It is important to ensure the preparation and filing of lawsuits to international arbitration institutions regarding the return of funds spent from the State Budget of Ukraine for the maintenance of scientific institutions and the payment of wages to scientific workers, as well as funds for lost unique research equipment. In addition, in the international arena it should be initiated the process of levying from Russia in court the losses of Ukraine after the cessation of scientific and technological cooperation as a result of the freezing of a number of joint projects in

the field of transport aviation (An-124-100 and An-124-100M), rocket-space industry (maintaining the status of Russian intercontinental ballistic missiles R-36), as well as it should be initiated international sanctions against the Russian Federation in the field of education, innovation, research and technology, including the temporary cessation of cooperation on the issuance of security documents in the field of intellectual property.

It is also objectively feasible to intensify the work on expanding the areas of international scientific-technological and industrial cooperation in the rocket space and aviation sectors, in the field of military-industrial complex, in the high-tech industries of the mechanical engineering, the chemical and pharmaceutical industry in order to enter into the global markets and develop import-replacement high-tech industries in conditions of termination of cooperation with the Russian Federation.

We will also emphasize the need to increase the effectiveness of state policy on stimulating entrepreneurial activity in the innovation sector. It is about development of financial, organizational, institutional and legal instruments for the commercialization of intellectual property in order to overcome the inertia of innovation, as well as a system of preferences for encouraging entrepreneurs to use the latest advances in the domestic scientific field in the production. It is also advisable to form institutional conditions for the development of innovation infrastructure of small innovative business in order to integrate research and production activities by simplifying the order of creation of organizational and economic institutions for production and introduction of innovations.

Another effective tool for stimulation innovation activity is to launch the practice of functioning of a single center for the coordination of the results of domestic research and development in order to ensure the consistency and effectiveness of the implementation of all stages of the innovation process from R&D to commercialization and market introduction of new high value added products.

It should be noted that only a complex combination and implementation of the proposed mechanisms and tools at all levels of the system hierarchy of innovation security management will enable to ensure the growth and effective use of innovative and scientific-technological potential in order to enhance the development of innovation as an effective tool for combating the hybrid war.

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