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**THE INFLUENCE OF INNOVATIONS ON THE FORMATION OF THE ECONOMIC  
COMPONENT OF NATIONAL SECURITY**

**ВПЛИВ ІННОВАЦІЙ НА ФОРМУВАННЯ ЕКОНОМІЧНОЇ СКЛАДОВОЇ  
НАЦІОНАЛЬНОЇ БЕЗПЕКИ**

*Досліджено фактори, що визначають небезпеку та ризик при здійсненні інноваційних проєктів. Окреслено чинники, які мають бути враховані для забезпечення національної безпеки. На основі аналізу статистичних даних виявлено взаємозалежність між обсягом вкладень в інновації та економічними результатами на макро- та мікрорівнях. Запропоновано методичний підхід до збалансованого оцінювання інноваційних проєктів з врахуванням інтересів всіх стейкхолдерів на засадах Індустрії 4.0 та циркулярної економіки. В основі даного підходу закладено багатокритеріальну оцінку за наступними векторами розвитку: економічний, інноваційний, соціальний, екологічний. Наведено практичні рекомендації щодо реалізації інноваційних проєктів у кризових умовах.*

**Ключові слова:** *інновації, національна безпека, економічна складова, багатокритеріальна оцінка, ризик та невизначеність.*

*The factors that determine the threats and risks in the implementation of innovative projects have been studied. The factors that must be taken into account to ensure national security are indicated. Based on the analysis of statistical data, the interdependence between the volume of investments in innovations and economic results at the macro and micro levels was revealed. A methodical approach to a*

*balanced assessment of innovative projects is proposed, taking into account the interests of all stakeholders, based on Industry 4.0 and the circular economy. This approach is based on a multi-criteria assessment of the following development vectors: economic, innovative, social, environmental. Practical recommendations for the implementation of innovative projects in crisis conditions are given.*

**Keywords:** *innovation, national security, economic component, multi-criteria assessment, risk and uncertainty.*

The modern economy is characterized by a high degree of volatility and unpredictability. The dramatic events currently taking place in the world are testing the strength and viability of the existing mechanisms for ensuring peace and security, prompting the search for new mechanisms for ensuring global, regional and national security. The uncertainty and unpredictability of the situation significantly complicates the process of forming national security policy and requires the strengthening of traditional security mechanisms.

National security is understood as the protection of the vital interests of a person, society, state, which ensures the sustainable development of society, the timely detection, prevention and neutralization of real and potential threats to national interests in various fields of activity in the event of negative trends to create potential or real threats to national interests [1].

A threat is the potential cause of an unwanted incident that could harm individuals, assets, a system or organization, the environment, or society.

Threats to national security are existing and potentially possible phenomena and factors that endanger the vital national interests of the country. In particular, a threat to national security can be created by certain actions, phenomena, processes, events, situations directly aimed at undermining the state sovereignty and territorial integrity of the state or capable of damaging the life, health, property of citizens, preventing the uninterrupted provision of critical state functions to enterprises, organizations, critical infrastructure facilities, etc.

Scientists distinguish different types of threats to national security. However, to ensure a system for protecting national interests, a balance of interests of all economic agents, both the population, end consumers and producers, as well as the state as a regulatory body, must be observed. We believe that any sphere of economic activity should be considered from the point of view of a systematic approach, revealing internal relationships between the economic agents that form it [2]. Today it is impossible to consider the economy of any country in isolation from the world economy, since all countries are interconnected in the context of international trade and cooperation. To reduce and prevent the impact of external threats to the national economy, an ecosystem approach based on the circular economy can be introduced. Resource providers, processors and consumers will be connected into a single business ecosystem. At the same time, this approach will reduce the consumption of natural resources, emissions and environmental impacts through recycling.

As the analysis of statistical data shows, there is a direct relationship between the level of investment in innovation and the economic results obtained. In particular, correlation analysis confirms this (Table 1). Correlation analysis of macroeconomic indicators was carried out for a group of selected countries. The following indicators were selected: SDG index (S), economic growth (E), high-tech development (I): E1 – GDP growth (annual%), E2 – GDP (current US\$), E3 – GDP per capita (current US\$), I1 – ICT goods exports (% of total goods exports), I2 – ICT service exports (% of service exports), I3 – High-technology exports (current US\$), I4 – High-technology exports (% of manufactured exports), S1 – SDG index. The source of information was the data of the World Bank and Sustainable Development Report.

Table 1 – Correlation analysis results for a group of selected countries (calculated from the data [3, 4])

Country	E <sub>1</sub> E <sub>2</sub>	E <sub>1</sub> E <sub>3</sub>	E <sub>1</sub> I <sub>1</sub>	E <sub>1</sub> I <sub>2</sub>	E <sub>1</sub> I <sub>3</sub>	E <sub>1</sub> I <sub>4</sub>	E <sub>2</sub> E <sub>3</sub>	E <sub>2</sub> I <sub>1</sub>	E <sub>2</sub> I <sub>2</sub>
Australia	0,425	0,563	-0,191	-0,877	-0,163	-0,686	0,929	-0,658	-0,346
Austria	-0,083	0,052	0,310	-0,792	0,131	0,082	0,911	-0,381	0,275
China	-0,820	-0,820	-0,119	-0,892	-0,803	-0,308	1,000	0,085	0,958
Denmark	-0,470	-0,472	0,001	-0,200	-0,459	-0,009	0,950	0,086	0,206
Finland	-0,267	-0,259	0,198	-0,420	-0,013	0,062	0,989	0,199	-0,043

France	0,145	-0,062	0,474	-0,802	0,836	0,665	0,896	0,080	-0,182
Germany	-0,204	0,207	-0,404	-0,628	0,600	0,336	0,639	0,363	0,185
Iceland	0,072	0,200	-0,650	-0,811	-0,057	-0,185	0,988	0,439	0,346
Israel	-0,482	-0,422	-0,730	-0,794	-0,502	-0,871	0,994	0,044	0,791
Japan	0,011	-0,017	-0,223	-0,860	0,133	-0,484	0,999	0,720	-0,280
Korea, Rep.	-0,381	-0,358	-0,593	-0,731	-0,235	-0,558	0,999	0,941	0,875
Luxembourg	-0,358	-0,225	0,242	0,258	0,078	0,229	0,458	-0,696	-0,648
Netherlands	-0,306	-0,277	-0,372	-0,554	-0,366	-0,199	0,970	0,051	0,132
Norway	0,381	0,394	-0,672	-0,826	0,417	-0,222	0,995	-0,843	-0,614
Singapore	-0,422	-0,306	-0,618	-0,575	-0,732	-0,781	0,981	0,221	0,782
Ukraine	0,283	0,260	0,225	-0,112	-0,145	-0,777	0,975	0,163	-0,382
United Kingdom	0,246	0,424	0,049	-0,869	0,968	-0,114	0,911	-0,507	-0,101
United States	-0,294	-0,268	-0,485	-0,794	0,614	0,098	1,000	-0,037	0,797
<b>Country</b>	<b>E<sub>2</sub>I<sub>3</sub></b>	<b>E<sub>2</sub>I<sub>4</sub></b>	<b>E<sub>3</sub>I<sub>1</sub></b>	<b>E<sub>3</sub>I<sub>2</sub></b>	<b>E<sub>3</sub>I<sub>3</sub></b>	<b>E<sub>3</sub>I<sub>4</sub></b>	<b>I<sub>1</sub>I<sub>2</sub></b>	<b>I<sub>1</sub>I<sub>3</sub></b>	<b>I<sub>1</sub>I<sub>4</sub></b>
Australia	0,100	-0,594	-0,638	-0,596	0,002	-0,714	0,164	-0,176	0,567
Austria	-0,013	-0,530	-0,047	-0,071	0,288	-0,233	-0,693	0,896	0,943
China	0,902	0,327	0,083	0,955	0,906	0,326	0,063	0,220	0,942
Denmark	0,167	-0,544	-0,186	-0,093	0,293	-0,303	0,839	-0,231	-0,586
Finland	0,515	-0,204	0,311	-0,120	0,625	-0,103	-0,379	0,889	0,771
France	0,460	-0,263	-0,282	0,174	0,259	-0,444	-0,632	0,196	0,138
Germany	0,190	-0,716	-0,377	-0,150	0,489	-0,258	0,656	-0,593	-0,737
Iceland	0,576	0,752	0,336	0,210	0,531	0,686	0,835	0,079	0,381
Israel	0,495	0,784	-0,020	0,738	0,454	0,724	0,419	0,634	0,575
Japan	0,942	0,374	0,712	-0,246	0,934	0,371	-0,079	0,715	0,893
Korea, Rep.	0,857	0,913	0,932	0,861	0,868	0,910	0,965	0,822	0,965
Luxembourg	-0,473	-0,793	-0,264	0,359	0,077	-0,257	0,410	0,898	0,956
Netherlands	0,978	-0,191	0,097	-0,034	0,955	0,028	0,331	0,090	0,356
Norway	0,824	-0,332	-0,826	-0,614	0,842	-0,347	0,877	-0,668	0,520
Singapore	0,785	0,601	0,042	0,681	0,754	0,450	0,671	0,324	0,878
Ukraine	0,655	-0,543	0,044	-0,182	0,512	-0,580	-0,642	0,578	0,046
United Kingdom	0,268	-0,714	-0,330	-0,406	0,427	-0,558	-0,135	0,008	0,292
United States	-0,721	-0,532	-0,062	0,780	-0,711	-0,541	0,274	-0,076	0,516
<b>Country</b>	<b>I<sub>2</sub>I<sub>3</sub></b>	<b>I<sub>3</sub>I<sub>4</sub></b>	<b>S<sub>1</sub>E<sub>1</sub></b>	<b>S<sub>1</sub>E<sub>2</sub></b>	<b>S<sub>1</sub>E<sub>3</sub></b>	<b>S<sub>1</sub>I<sub>1</sub></b>	<b>S<sub>1</sub>I<sub>2</sub></b>	<b>S<sub>1</sub>I<sub>3</sub></b>	<b>S<sub>1</sub>I<sub>4</sub></b>
Australia	0,256	0,530	-0,339	-0,533	-0,545	0,153	0,019	-0,409	-0,053
Austria	-0,500	0,845	-0,166	0,383	0,340	-0,674	0,312	-0,529	-0,595
China	0,800	0,479	-0,593	0,968	0,968	0,379	0,762	0,948	0,748
Denmark	-0,160	0,564	-0,316	0,555	0,518	-0,102	0,490	0,025	-0,645
Finland	-0,337	0,617	-0,389	0,606	0,598	-0,414	0,202	0,751	-0,223
France	-0,663	0,676	-0,204	0,874	0,935	-0,640	0,218	0,055	-0,567
Germany	-0,720	0,433	0,318	0,590	0,727	0,262	-0,190	0,352	-0,574
Iceland	0,234	0,913	0,738	0,869	0,968	-0,736	-0,767	0,296	0,049
Israel	0,540	0,663	-0,870	0,410	0,313	0,878	0,965	0,652	0,909
Japan	-0,431	0,374	-0,158	0,009	0,109	0,117	0,388	0,608	0,079
Korea, Rep.	0,684	0,911	-0,544	0,822	0,782	0,880	0,900	0,559	0,721
Luxembourg	0,468	0,884	0,754	-0,632	-0,424	0,811	0,797	0,736	0,864
Netherlands	0,138	-0,109	-0,499	0,720	0,683	0,119	0,257	0,794	-0,459
Norway	-0,671	0,045	0,792	-0,051	0,042	-0,286	-0,649	-0,211	-0,468
Singapore	0,644	0,709	0,630	-0,301	-0,251	-0,125	0,041	-0,824	-0,671
Ukraine	-0,832	0,067	-0,396	0,819	0,818	-0,533	0,655	0,719	-0,747
United Kingdom	-0,879	-0,104	-0,757	0,388	0,142	-0,527	0,622	-0,601	-0,014

United States	-0,797	0,762	-0,866	0,685	0,629	0,100	0,962	-0,710	-0,248
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In addition, data analysis at the micro level also proves the presence of a cyclical relationship between the volume of innovation costs of enterprises and their economic results. As seen in fig. 1, the deterioration of the economic situation and the increase in risk conditions stimulate enterprises to intensify innovation.

We believe that the development of the economic system is possible only with the use of a balanced assessment, namely: economic agents, planning their activities, should take into account the balance of their development in four directions (economic, social, ecological and innovative). As scientists have repeatedly proven, the desire to achieve only economic goals has a negative impact on social factors and brings negative results for the environment. At the same time, the rapid development of technologies within the framework of Industry 4.0, the requirement to comply with the principles of the circular economy encourage us to pay attention to the innovative

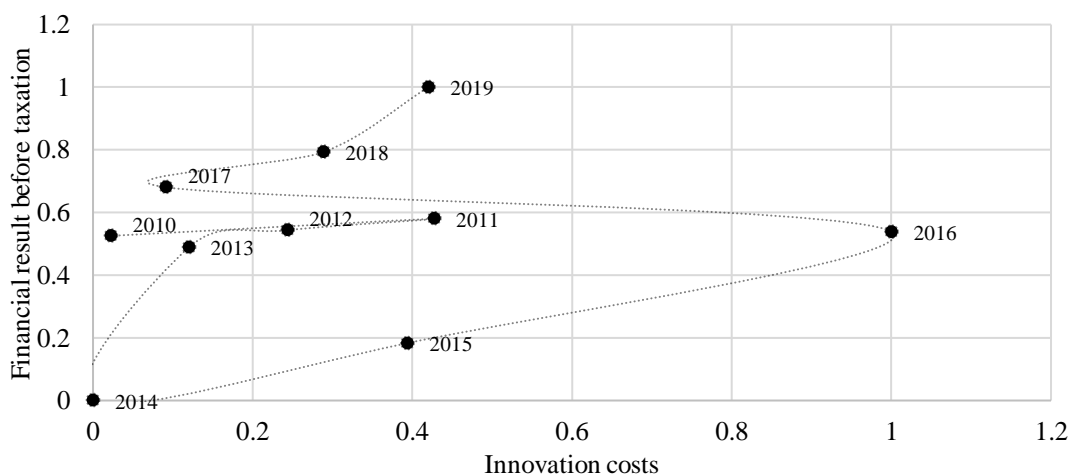


Figure 1. Relationship between enterprises spending on innovation and their financial performance (built on data [5])

component. Already at the stage of product development, the concept of the life cycle of the product, its ecological footprint, the total cost of ownership, etc., must be taken into account. Thus, we suggest using a model of balanced assessment of innovative projects, which takes into account four assessment vectors: economic, ecological, social, innovative.

For the implementation of innovative projects in the conditions of threats, we consider it expedient to implement the following measures:

1. Carrying out a preliminary assessment of the project according to four components.
2. Involvement of stakeholders in project implementation.
3. Identification of threats to the implementation of the project, taking into account international, macroeconomic, sectoral factors and the specifics of the activity of a specific economic agent. Development of a system of measures to prevent and minimize the impact of threats at the level of the business ecosystem and bring them to the attention of all subjects, taking into account the four directions of development.
4. Monitoring the implementation of the developed plan of measures and promptly making changes if necessary.

We believe that the proposed approach to the evaluation of innovative projects will increase their effectiveness, which in general will have a positive impact on the restoration and development of the national economy.

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