# MANAGEMENT OF THE ECONOMIC SECURITY OF THE STATE: MODERN TRENDS IN THE DEVELOPMENT OF INNOVATIONS IN THE DIGITAL ECONOMY

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***Abstract.*** *The implementation of the digital economy, especially against the background of the full-scale invasion of Russia into Ukraine (when as a result of the actions of the aggressor, the domestic infrastructure was destroyed: civil, military, social, etc. and the economy suffered significant losses in the amount of at least 700 billion US dollars) is a factor that has a significant impact on the level of economic security of the state in all its components, such as: macroeconomic, financial, foreign economic, investment, scientific and technological, energy, production, demographic, social, food security. In this context, it is advisable to consider the digitalization of the economy through the prism of economic security, taking into account the feasibility of ensuring the sustainable development of the state, which is relevant, taking into account the need to take into account possible resources of various types when studying security as a category, the presence of which in sufficient quantity will allow to achieve such a state, according to which will be provided with an appropriate level of security in order to be able to counteract external and internal threats). Purpose consists in the study, substantiation and development of theoretical approaches to the in-depth study of the digital economy in the context of managing the economic security of the state in the conditions of its reconstruction in the post-war period for the transition of the state and its regions to sustainable development. During the research, a set of methods was used to achieve the goal and solve the tasks set in the work, which ensured the conceptual integrity of the research, in particular: historical and logical; monographic; theoretical generalization; analysis; synthesis; induction, deduction; comparative and statistical analysis; graphic; abstract and logical. Taking into account the modern realities of the functioning of the economy of Ukraine in order to ensure a sustainable trend of economic growth of the state and increase the level of its economic security in the context of its management, which is possible in particular due to the activation of the use of the innovative component of economic development for the transition of the state and its regions to sustainable development. The essence of the digital economy is considered, which, in turn, affects the level of economic security of the state in the context of its management and actualizes the need to consider the digital economy through the prism of its relationship with the economic security of the state, taking into account the innovative component of economic development - an important component of economic growth state. Special attention is paid to the research of the theory of innovations and the main factors affecting innovative activity and problems that lead to the slowdown of the economic growth of the state.*

***Keywords:*** *digital economy, innovation, innovation triad, innovation theory, economic growth, economic security, paradigm, sustainable development.*

The digital economy can become an important prerequisite for ensuring and increasing the level of economic security, and in the future, an independent element of security. Taking into account the problems of the research, it should be noted that, according to The Good Country Index 2022 [3], Ukraine took first place among 169 countries in the category "Science and technology" in terms of the number of foreign students studying in the country (according to UNESCO) relative to the size economy (the top five countries also include Hungary (2nd place), Great Britain (3rd place), the Czech Republic (4th place) and Latvia (5th place).

In general, Ukraine positions itself as one of the largest global exporters of IT services, the revenue from which is about 5 billion dollars. for a year. 185,000 specialists work in the industry (in 2018), this figure increased to 220,000 in 2020. More than 4,000 technology companies work in Ukraine, of which 1,600 are involved in software development. 100 Fortune 500 companies are clients of the Ukrainian IT industry. 13 Ukrainian companies from the list have opened new offices around the world. This means that the image of a third world country is gradually changing, and we see a technological and strong Ukraine with the potential to take its place among the leading countries [4].

The mass introduction of information and software technologies, the creation of artificial intelligence, the emergence of cryptocurrency and blockchain, virtual reality, etc. - all this precedes the introduction into everyday life of such a phenomenon as the digital economy [5], contributes to increasing the technological, digital and even social level of development of society, which, in turn, it affects the level of economic security of the state in the context of its management and actualizes the need to consider the digital economy through the prism of its relationship with the economic security of the state, taking into account the innovative component of economic development - an important component of the economic growth of the state. The objective reasons for this are as follows: innovations are a basic element of an effective investment and innovation policy of the state; innovations are an important tool for creating and supporting competitive business entities and the state in the domestic and international markets of innovative

products; the role of higher education institutions in the development of national and European strategic ecosystems is important, in particular using the ASAP model (with components: human potential, effective administrative structures, adapted strategies) as a model of cooperation between academic and university science and business, which provides recommendations for raising the level interaction between them at the level of regions [6] for the transition of the state and its regions to sustainable development.

In general, it should be noted that the results of scientific research by many authors are fragmentary and do not contain tools for a comprehensive solution to the problem. Certain aspects were considered in the works of scientists, in particular, certain components of the research are related to the concept of management of separate spatial objects that form an ecosystem (such as cities and urban space) with the use of smart technologies (5G network, RFID transponders, cloud infrastructure, the Internet of Things as the main "disruptive" innovations that ensure an increase in the level of security through the control of possible risks and their prevention were considered in the works of the authors ( Antonyuk I.V., Koshova S.P. [7], Pawlowicz B., Salach M. ., Trybus B., Roman K. [8-9]); analysis of the interrelationships between the development of innovative infrastructure and the processes of economic diversification with the corresponding development of recommendations to ensure favorable conditions for the development and functioning of effective innovative infrastructure (Kublikova T., Kuznetsova I. [ 10]). However, the generalization of the results of scientific work shows that they are reference points for achieving the research goal (such as: using the ASAP model ( Hirsikoski A., Koski A., Prause G. [6]); focusing on the achievement of a short-term goal (improvement of security) does not contribute to the full recovery of the economy in the post-war period, to contribute to the formation of the so-called "reconstruction zones " in order to serve as a means of replacing foreign investments in order to avoid dependence on aid ( Graciana Del Castillo [11]), use negative experience of partner relationships and the construction of an effective network innovation structure (Belderbos R., Gilsing V., Lokshin B., Carree M., Sastre, JF [12], (Fernandez-Esquinas M., Pinto H., Yruela MP, Pereira TS [13]), taking into account knowledge transfer flows during the

interaction of the university and industry in peripheral innovation systems [13], experience and capabilities of start-up projects (Mansoori Y., Karlsson T., Lundqvist M. [14]).

In modern conditions, innovations play a decisive role in the development of the world economy. The innovative nature of production is determined by the processes of constant introduction of new technologies and products, search for new ways of combining production factors. The consequence of such processes is a radical restructuring of the structure of the economy, a significant increase in the role of science-intensive industries in the functioning of the national and world economy.

Innovative processes in modern economic conditions ensure the development of productive forces and improvement of the system of industrial relations.

According to the theory of J. Schumpeter, who first introduced the term "innovation" into the scientific lexicon, it becomes the source of development and profit of both the enterprise and society as a whole. He considered innovation as a new function of production, "a new combination thereof" [15 ]. In the 60s of the XX century. J. Schumpeter defined the innovative "triad": "invention-innovation-diffusion", which was later transformed into an innovation chain: "research and development works (R&DKR) - invention-innovation diffusion-economic growth" [15-16 ].

There are many interpretations of the term "innovation", while it should be noted that most researchers do not distinguish between the concepts of "innovation" and "innovation". P. Lelon made an attempt to make a clear distinction between these concepts, who claimed that innovation is a new type of product, method, technology, and innovation is the introduction of innovation into the economic production cycle [17].

The modern methodology of the systematic description of innovations is based on international standards. To coordinate the collection, processing and analysis of information about science and innovation within the framework of the Organization for Economic Cooperation and Development, a group of experts developed a document called the "Frascati Guidelines" - this is "Proposed standard practice for the

examination of research and experimental development. The last edition of the "Frascati Guidelines" was adopted in 1993, it defines the main concepts related to scientific research and development, their composition and limits. The methodology for collecting data on technological innovation is based on the recommendations adopted in Oslo in 1992 and is called the "Oslo Guidelines". According to these international standards, innovation is defined as the final result of innovative activity, embodied in the form of a new or improved product or technological process, which is used in practical activities or in a new approach to social services [18]. A necessary sign of innovation is scientific and technical novelty and its industrial purpose.

The basis of the research of innovation theory is an attempt to identify the main factors that influence innovative development and to determine and thus measure the impact of each of them. He first noticed cyclical development in the middle of the 19th century. the Englishman H. Clark [18 ]when he drew attention to the gap of 54 years between two economic crises, but he could not determine the driving forces of this phenomenon. Later, this was addressed by K. Marx [18 ], who concluded that the basis of crises lies in the overaccumulation of capital. M. Tugan-Baranovsky [18 ], in particular, claimed that the cyclicality of economic development is determined by the limitation of loan capital and the peculiarities of its investment in capital goods. The beginning of the development of this theory was laid by M. Kondratiev, who is rightfully considered its founder, and managed to determine the impact of scientific and technical progress on the development of the world economy [19 ]. M. Kondratiev put forward a hypothesis about the mechanism of long cycles (big economic cycles), which he connected, in addition to price dynamics, to the process of capital accumulation, production growth rates, and the dynamics of innovations.

This concept was developed in the 1930s by the famous Austrian economist J. Schumpeter [14-15]. He emphasized that the main role in the mechanism of long cycles is played by innovations and fluctuations in the innovative activity of enterprises. Such an idea was proclaimed earlier (including van Gelderen and M. Kondratiev), but it was Schumpeter who put it at the center of his theory of long cycles and consistently developed it, he can rightly be considered the founder of

innovative theories of Western economists in the following period. One postulate of his innovation theory is also worthy of attention, that "the driving force of progress in the form of cyclical development is not any investment in production, but only investment in innovation" [20].

Until the beginning of the 20th century. most researchers assumed that there is one economic cycle in the economy - "industrial" or "business". The existence of this cycle (with a duration of 8-10 years) was first demonstrated by the French economist K. Zhuglyar in the middle of the 19th century. In the 20s of the XIX century. the thesis of the unity of the cycle has been questioned, both at the empirical and theoretical levels. American economist J. Kitchin demonstrated the presence of fluctuations in the American economy with an average duration of 3.5 years. Around the same time, M. Kondratiev empirically substantiated the existence of long fluctuations lasting about 50 years [21].

Declining rates of economic growth in the 1970s. stimulated the search for a connection between this phenomenon and long cycles. More and more attention began to be paid to the problem of unevenness of economic development over time, alternating periods of high and low rates of economic growth.

The concept of long cycles has played an important role in such a field of research as the role of scientific and technological progress (STP) in the economy. And it was the supporters of this concept, M. Kondratiev and J. Schumpeter, who first raised the question of the role of NTP in long-term economic development, and also drew attention to the problem of unevenness of technical progress (both in time and in economic space).

In the 40s and 50s of the XX century. the concept of economic growth came to the fore, within which NTP was considered as an important but sustainable factor of development. But already in the 60s of the XX century. the idea of non-uniformity of the NTP again gained some popularity, mainly thanks to the works of J. Shmukler. Finally, in the 70s and 80s of the XX century. in the writings of H. Mensch, K. Freeman, A. Kleinknecht and other supporters of the concept of long cycles, the idea of non-uniformity of the NTP took on a relatively complete form. It was in this area

that the greatest progress was made in the development of the theory of long cycles.

There are three possible approaches to solving the problem of measuring NTP and its contribution to economic growth. The first two approaches are related to the attempt of direct, and the third - indirect measurement of long-term fluctuations of NTP [21].

1. Patent statistics. These data allow, at least tentatively, to assess the flow of new knowledge, primarily practice-oriented. Comparing Great Britain and the USA, it can be noted that if general economic indicators had relatively stable temporal relationships, then the dynamics of issued patents in the 19th century. progressed almost in antiphase, and in the 20th century. - approximately synchronously (with a slight advance of Great Britain relative to the USA). Thus, patent statistics clearly do not indicate the presence of stable connections between long-term fluctuations in NTP and economic growth.

2. Statistics of innovations. Only 5 different registers of the most important innovations are known, while only three cover the 19th century, and all end in the 60s of the 20th century. All periods of peaks in the number of basic innovations (1820-1825, 1880-1889, 1930-1949) fall on the depression phases of the world's long cycle. However, the lists of the most important innovations are very conditional and there is no certainty that they were not shifted from the very beginning in favor of the a priori given scheme of the long cycle.

3. Aggregate factor productivity. Here we are talking about the estimation of the production function and the detection of fluctuations in the contribution of NTP to economic growth. Even R. Solow, in his work, which was devoted to the estimation of the production function in the period 1909-1949, noted that there is certain evidence that in 1909-1929 the growth rate of NTP was lower than in 1930-1949. In the work of Hartman and Wheeler, an attempt was made to estimate the long-term fluctuations of the NTP in Great Britain and the United States on the basis of two simple production functions. GNP at constant prices was used as indicators of output for the USA, GDP at constant prices and the volume of industrial production for Great Britain.

Technological complexity has conditioned the coexistence of sectors with different competitiveness in the economy of Ukraine. The competitiveness of industries and technologies for the production of consumer goods is low, however, on the other hand, Ukraine has significant scientific and technical potential in the defense-industrial complex and a number of other science-intensive industries. Therefore, it is important for Ukraine to make the most complete use of its economic potential based on an innovative economic development strategy [15].

In modern conditions, possession of high technologies is of strategic importance for the competitiveness of the countries of the world. Today, the world market for science-intensive products is estimated at 2.3-3 trillion dollars. USA. The process of knowledge-intensive production is provided by approximately 50 macro-technologies. Seven leading countries, which possess 46 macro technologies, control more than 80% of the market of science-intensive products: the USA receives 700 billion dollars from the export of these products. USA annually, Germany - 530, Japan - 400 billion dollars. USA respectively. Ukraine is one of the five countries that possess advanced aerospace technologies: it possesses 17 of the 22 basic technologies of the rocket and space sphere. The share of domestic science-intensive products in the world market of high-tech products is 0.05-0.1% [22].

Today, the signs of the 6th and 7th technological systems are becoming increasingly visible [23] - the 6th gives impetus to a new stage in the development of medicine and biotechnology, the 7th - to the creation of technologies of "cold thermonuclear fusion", which should fundamentally change the energy the potential of earthly civilization.

In the economy of Ukraine, the share of products of higher technological levels is [22]: 4% – for the 5th and 0.1% – for the 6th. GDP growth due to the introduction of new technologies in Ukraine is estimated at only 0.7%, while in developed countries this indicator reaches 60% and even 90%.

**Table 1.1. The main factors affecting innovative activity**

| Groups of factors | Factors restraining innovative activity | Factors contributing to the implementation of innovative activities |
|---|---|---|
| Technical and economic | Lack of funding sources; weakness of the material, technical and scientific base; dominance of the interests of existing production; high economic risk; lack of demand for products; lack of information about markets; complication and increase in the price of scientific and research developments; low scientific and innovative potential of the state and regions | Availability of a reserve of financial and material and technical measures, as well as the necessary economic and scientific and technical infrastructure; development of competition and shortening of the life cycle of science-intensive goods; preservation of scientific and technical potential and state support for innovative activities |
| Organizational and managerial | Permanent organizational structures, excessive centralization, conservatism of hierarchical principles of organization construction, preference for vertical flows of information; organizational closed-mindedness, difficulties in inter-branch interactions; focus on established markets, focus on short-term payback; lack of scientific and innovative organizational structures; insufficient international scientific and technical cooperation | Flexibility of organizational structures, democratic style of management, advantage of horizontal flows of information; indicative planning, assumption of adjustments, decentralization, autonomy, formation of target problem groups; international scientific and technical cooperation; creation of innovative infrastructure (technology parks, business incubators) |
| Legal | The imperfection of the innovative base on the issues of innovative activity, protection of intellectual property | Legislative measures (special benefits, laws) that encourage innovative activity ensure intellectual property |
| Social and psychological | Resistance to changes that can cause such consequences as a change in status; the need for new activities, changing stereotypes of behavior, existing traditions; fear of uncertainty, fear of responsibility for a mistake; opposition to everything new that comes ("syndrome of someone else's invention"); low professional status of an innovator, lack of material incentives and conditions for creative work; the outflow of scientific personnel | Susceptibility to changes, innovations; moral reward, social recognition; the possibility of self-realization, the development of conditions for creative work, material incentives |

*Source: [18; 26-27 ]*

The theory of acceleration, or, in other words, the theory of innovative entrepreneurship, also deserves special attention. It is also based, like most innovative theories, on the theory of long waves and is based on the development of entrepreneurship according to the US model, that is, it is associated with the Silicon Valley effect. It is known that only the USA focuses entirely on the pioneering type of innovation: most patents were developed there; on process innovations that

contribute to the rapid renewal of old branches of the economy and the emergence of new ones, in particular, the production of computers, office equipment, software development, cultural products (games, visual effects, etc.) [24].

The experience of the USA, according to the authors of innovation theories, in particular - the theory of acceleration, is a confirmation of the high connection between innovative activity and entrepreneurship, high return on investments in the innovation sphere [25]. Thus, it is possible to claim with full responsibility that innovation and technological leadership is the basis not only of the economic development of the country, but also the guarantee of its well-being in the future.

They can be considered a generalization of the factors of innovative development that have been studied for many years [18].

The following factors deserve special attention: state support for innovative activities and shortening the life cycle of science-intensive products.

The main problems that lead to a slowdown in innovative development of the state include [28, p. 13-14]:

1. The paradigm of "closed innovation", within which enterprises must generate their ideas, then develop and release corresponding products based on them. The concentration of the leading sectors of the economy on the model of "closed innovations" led to the emergence of critical situations at large enterprises and to the liquidation of some industrial enterprises.

2. Weak motivation for innovative activity in the real sector of Ukraine's economy. The problem of low economic demand for innovation is related to the lack of an effective state innovation policy and the state of competition in the country.

3. Emigration of leading specialists and scientists. Negative trends of "intellectual bleeding" of enterprises, institutions of higher education, scientific institutions through the emigration of specialists from Ukraine as a result of the influence of a number of negative factors, in particular such as: low innovation favorability of the industry of Ukraine, lack of cooperation, interconnected complexes of the production sphere and institutions of higher education, scientific institutions.

4. Absence of a competitive progressive system of training specialists from various branches of the economy and the possibility of realizing intellectual potential in Ukraine. One of the important conditions of innovative development is the presence of a progressive system of training specialists from various branches of the economy in institutions of higher education [29].

5. Weak systems of intellectual property protection and effective management. The experience of innovative development in leading countries shows the expediency of the legislative reflection of the procedure for obtaining patent rights by scientific institutions, the transfer of rights to the state in the event of their inefficient use.

6. Lack of mechanisms for stimulating and encouraging innovative activity. The commercialization of inventions in Ukraine does not take place at a rapid pace due to the insufficiently oriented tax system on innovative development, contradictions in legislation, etc.

In general, it can be stated that currently there is an urgent need to develop measures adequate to modern conditions for the support and development of the state on an innovative basis [29-33], which will provide an opportunity to ensure the economic growth of the state and increase the level of its economic security in the future. Technologies for working with data, such as blockchain technologies, artificial intelligence, authentication and identification technologies, mathematical modeling, will allow creating conditions for healthy competition, will create new forms of trade, mediation, and will become factors in the prevention, avoidance or mitigation of crisis situations. Technological directions based on previous concepts include the following:

- transition to robotic production, where an employee (person) controls and ensures the operation of the enterprise;

- transition to other sources of information storage with a high level of security ("cloud technologies");

- creation of a general information system, unification of production and management;

- transition to electronic media ("paperless technologies");

- the use of remote production control devices, with the possibility of monitoring (in particular, through mobile phones) [5].

Taking into account the above, it should be noted that digitalization of the economy is one of the tools that make it possible to achieve sustainable development.

In this context, it should be noted that ensuring sustainable economic development is possible on the condition of achieving a high level of competitiveness of the state's economy, its place in the market of high-tech products. Ukraine's place in it depends on its ability to compete with the world's leading countries in this field. The main condition for the dynamic development of Ukraine is to increase the competitiveness of its products, especially on the foreign market. But the position, in terms of competitiveness, in which our manufacturer is located, not only facilitates the penetration of imported consumer goods and high-tech products into the domestic market of Ukraine, but also leads to the atrophy of scientific and technical research and industrial branches of production. The biggest threat is the low competitiveness of the products of Ukrainian enterprises, which leads not only to a decrease in the main socio-economic indicators of the Ukrainian economy, but also to the so-called "system gap" from the group of leading countries due to the incompatibility of technologies, the low capacity of the economy for investments and innovations, as well as structural, sectoral and institutional incompatibility [34].

The most promising in modern conditions is the model of sustainable economic development. Its components include: socialization, state regulation, social responsibility, environmental friendliness, security, informatization, ownership, corporate system, market regulation, resource allocation, intellectualization, transnationalization. They act not only as static, but primarily as dynamic mechanisms of organization and functioning of the national, regional and world economy, the combination or mutual influence of which in a certain way allows to determine the content and structure of the model [35, p. 35]. History shows that in 2000 attempts were made to build an efficient economy in Ukraine. The Government developed an Action Program, which included a number of decisive steps. Among which the following were the main ones:

- reforming the system of state regulation: ending state interference in the direct activity of enterprises, removing regulatory obstacles to doing business;
- optimization of production due to systematic restructuring of the industry;
- increasing the competitiveness of products due to the reduction of production costs;
- structural restructuring of the machine-building complex and increasing the volume of production of science-intensive products;
- formation of closed and semi-closed technological cycles of production of final products.

However, until 2003, the Government's attempts were not successful, the same trend continues to this day, the reasons for which are mainly the significant restraining effect on Ukrainian exports of a complex of endogenous and exogenous factors, in particular the following [36]:

- low competitiveness of domestic industrial products;
- difficult financial condition of a large number of enterprises;
- insufficient development of domestic systems of certification and quality control of export products against the background of significant strengthening of requirements for consumer and environmental characteristics, as well as for the safety of products that are sold on the markets of industrially developed countries;
- lack of special knowledge and work experience in the field of export among most Ukrainian entrepreneurs, as well as insufficient coordination of their activities on foreign markets;
- Ukraine's global reliability rating for loans and investments is not high enough, which makes it difficult to use foreign financial resources to develop the country's export potential.

The listed trends indicate a gradual modification of the export structure in the direction of increasing the share of innovative goods. But these trends are still very weak and require comprehensive support from the state. "Therefore, the strategic task facing our state is to take a worthy place in the international division of labor for the production of high-tech industries" [37, p. 143].

Under the current conditions, when the initial shifts have already occurred, it is necessary to use all the chances as fully as possible to accelerate the reformation of the national industry and economy in general. The effectiveness of the further development of the export potential of the machine-building industry of Ukraine depends on its competitiveness, determined by the general industrial and innovation policy. And an important tool for achieving success in this matter is the national system of technological regulation, an important component of which is the state systems of standardization, metrology, licensing and certification of products, as well as quality control systems and compliance with mandatory standards.

In the conditions of intensifying international technological competition, the processes of cooperation and cooperation are becoming more and more widespread. The transformation of competition into coordination, and then into cooperation, reflects modern processes of informatization of society. In particular, one of the largest companies, General Motors, found it expedient to join forces with its competitor, Toyota. Joint ventures are one way of guaranteeing cooperation. Products and services are becoming increasingly knowledge-based and information-intensive. New products and services, as a rule, cover the entire portfolio of technologies, and not just one main one. Increasingly, firms that compete in the best way are those that find innovative ways to cooperate and cooperate, often even with the strongest rivals [38].

Determining the strategy for the development of competition involves taking into account a complex of factors, while the choice of such transformations that meet the tasks of ensuring the sustainable development of the state and increasing the level of its economic security becomes especially important. In particular, competitive policy should ensure the effective use of available resources, optimization of investment processes, acceleration of structural restructuring, implementation of scientific and technical progress, it should provide for the preservation and development of integrated industrial and economic complexes capable of producing products competitive on the global and domestic markets [39].

Taking into account the above, it is expedient to state that under modern

realities, in the conditions of war and in the post-war period, the importance of the implementation of the digital economy is beyond doubt. Its development will contribute to improving the quality of economic management at all levels and eradicating corruption in society. Consolidation and unification of efforts at different levels of management in this direction will contribute to increasing the level of economic security not only of individual elements of the socio-economic system, but also of the state as a whole and will contribute to the transition of the state and its regions to sustainable development.

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