

**State Organization «Institute of Market and Economic&Ecological Researches
of the National Academy of Sciences of Ukraine»**

**Summary of scientific novelty for the research
«Transformation of the theoretical foundations of the development of the
market of innovative technologies in Ukraine»**

*(Registration No. 0119U002418, performance period: III quarter 2019 –
IV quarter 2021)*

The scientific novelty of the research results is as follows:

In scientific and methodological terms:

The theoretical and methodological foundations of the development of the market of innovative technologies (MIT) in Ukraine are substantiated, which are based on the identification of the properties of innovative technology as a product (its production is impossible without obtaining new knowledge; the consumer does not become the owner of new knowledge embodied in technology, but has the right to appropriate profits from its implementation), allocation of a special function of MIT (non-inflationary stimulation of economic growth by reducing production costs due to the introduction of innovative technologies), identified the dual role of the state in MIT (as a regulator and as a market entity that orders and finances the creation of new knowledge and technologies), the justification of the structural model of MIT (based on the proposed methodological principles of its construction and the definition of the category «innovative technology market» as systems of organizational and economic relationships of knowledge producers, technological entrepreneurs, business entities and the state, arising in the process of creation, development, transfer and use of innovative technologies).

The hypotheses were verified:

1) about the uneven development of MIT in the regions of Ukraine, the assumptions of which are three conditions: the level of development of the market of innovative technologies in the regions depends on the level of development of its components and is carried out in the static space-time dimension; evaluation of the development of the components of the market of innovative technologies should be based on the formation of a specific system of evaluation indicators; determining the uneven development of the market of innovative technologies in the regions of Ukraine requires the use of a complex indicator – a generalizing integral index of the level of development of the market of innovative technologies under the influence of endogenous factors;

2) about the existence of interrelationships between factors characterizing the state of the business environment and the development of the market for innovative technologies (taking into account the volume of realized high-tech products (works, services) in terms of information and communication technologies in production and services as a development criterion, production and services using high technologies and intellectually saturated market services.

A conceptual model of the sustainable development of the market of innovative technologies in Ukraine based on the transformation of the business environment has been developed, which is based on: the theory of innovative development, the proven statement that the business environment is a basic strategic variable, the transformation of which (with the help of mechanisms and tools of state regulation) is a guarantee sustainable development of the market of innovative technologies in Ukraine, the proposed system of principles of transformation of the business environment in the context of sustainable development of the market of innovative technologies based on of the identified trends that have developed in the world economy in the last decade, the identified interrelationship of factors that characterize the state of the business environment and affect the development of the market of innovative technologies, and also takes into account the probabilistic nature of the development of socio-economic processes in the world and national economies.

The methodological principles of building a model of coordination flows for calculating the synergistic effect of interaction between MIT subjects have been *developed* on the basis of economic synergy and the theory of «soft» modeling according to the following components: relevance of the problem; conceptual and categorical modeling apparatus; a conceptual approach to building a model of coordination flows for calculating the synergistic effect of interaction between MIT subjects; elements of informational interaction of participants in managerial relations; organizational-hierarchical structure of the model of coordination flows for calculating the synergistic effect of the interaction between the subjects of MIT.

The methodological approach to the transformation of the business environment in the context of the development of the market of innovative technologies in Ukraine is *substantiated*, based on the proof of the statements that: a) the task of the transformation of the business environment is to overcome such gaps between the national economy and the economy of technologically developed countries, such as: technological, i.e. parity exchange of the latest technologies occurs only between developed countries, and technologies of previous levels are transferred to the markets of other countries, which allows companies developed countries to increase profits by «stretching» the life cycle of technologies; competitiveness of product production; the quality of the structure of the business sector; degree of depreciation of fixed assets; quality of institutional factors; b) as a transformative factor, it is expedient to consider state regulation, which should cause certain changes in the economic system (which in this case is represented by the business environment).

The methodological principles on which state regulation should be based as a transformational factor are *substantiated*: systematicity as a logical sequence and continuity of measures to achieve the goal of transformation; rationality as a movement towards achieving a goal using the most effective methods; analyticity as the use of objective information and determination of real results of the transformation process using quantitative and qualitative indicators; transparency as a decision-making procedure based on objective consideration of alternatives and control of all actors of the transformation process.

A methodological approach to the transformation of the institutional component of the business environment has been developed, which is based on: a) proving the statement that the quality of institutional factors is primary, that is, other gaps

(competitiveness of production; quality of the structure of the business sector; the degree of wear and tear of fixed assets) are derived from it; b) the combination of the program-target method (the main features of which are systematicity, orientation towards the achievement of a specific goal or system of goals, the sequence and organizational separation of target programs) and the project approach, i.e., to achieve each target function, it is necessary to develop projects in the form of state target programs, on the basis of which the algorithm for the development of state target programs and their structure is proposed.

A methodical approach to the selection of factors for the development of the market of innovative technologies from the standpoint of techno-globalism and their importance for the development of small and medium-sized innovative enterprises is *substantiated*, which made it possible to propose as a classification feature the nature of their occurrence and influence on the conditions of the development of the high-tech sector in country and classify them into two groups, namely: exogenous and endogenous factors.

A methodical approach to assessing the influence of internal environmental factors on the development of the regional market of innovative technologies (hereinafter – MIT) was *developed* on the basis of integral indicators, which were built according to the principle of structure-forming factors of influence on the development of this market using a systemic and praxeological approach, which made it possible to build a database for determining indicators of influence on the level of development of the MIT of the region by such blocks as: innovative personnel potential of the regional MIT; the business environment of the regional MIT; the financial environment of MIT structures at the meso level; patent activity in the region; the methodology of its integral assessment, the use of which makes it possible to determine the potential and real opportunities of the region in the context of the formation and development of MIT at the meso level.

The conceptual-categorical apparatus of market theory has been *improved* by providing a definition of concepts:

«market of innovative technologies», which is understood as a system of organizational and economic relationships of knowledge producers, technological entrepreneurs, business entities and the state, arising in the process of creation, development, transfer and use of innovative technologies;

«business environment», which is understood as a dynamic socio-economic system consisting of interconnected elements, which in each certain period of time can be characterized by a set of factors that directly or indirectly affect the functioning of business structures;

«regional market of innovative technologies» as a set of economic relations that: 1) form the demand and supply of innovative technologies, their transfer, use and distribution in the region; 2) are supported by relevant institutes for the purpose of technological development of the region;

«level of development of the market of innovative technologies of the region», which is understood as a point on the evaluation scale from zero to one, which reflects the influence of endogenous factors on the development of the market of innovative technologies and contributes to the justification of management decisions to improve the innovative climate of its development as a meso- and at the macro level.

The conceptual and categorical apparatus of the theory of strategic management has been *improved* in such categories as:

«strategy of motivation of the subject of entrepreneurial activity», which is defined as a component of the general strategy of the development of the subject of business, which represents a long-term program of actions aimed at using innovative determinants of the endogenous environment of the market of innovative technologies and its exogenous environment with the aim of increasing the effectiveness of innovative and scientific and technical activities of the economic entity;

«determinants of the external environment of the market of innovative technologies», which are defined as exogenous factors, both macro-environments and micro-environments, which motivate or restrain the subject of entrepreneurial activity to use, form, implement and commercialize innovative ideas, products, technologies, services, etc.;

«endogenous determinants of the subject of entrepreneurial activity» that contribute to the development of the market of innovative technologies, as existing factors of its internal environment, the improvement of which will lead to an improvement in the effectiveness of its innovative and scientific and technical activities.

The conceptual and categorical apparatus of the theory of «soft» modeling of business processes of the economic system has been improved in terms of defining concepts:

«synergistic efficiency» (a means of accounting for the overall efficiency of system functioning, which consists of combining the efficiencies of using different types of models, or the effective use of coordination flows between subjects of economic activity at different levels of management);

«coordination» (the problem of providing all management objects with a sufficient amount and quality of information necessary for decision-making, which would allow achieving the goal set for the subjects of the market of innovative technologies (further – MIT) as an economic system).

The conceptual and categorical apparatus of the theory of motivation has been *improved* in terms of defining concepts:

«motivation of business structures to develop the market of innovative technologies» from the point of view of management (as a management function, which provides for the formation for the object of the market of innovative technologies of the region of needs and incentives for the effective use of its resource and innovation potentials), process (as a result interaction between two large groups of factors: incentives and advantages) and synergistic (as a generalized process of mutual interest of all market subjects of innovative of technologies to effectively use such means of motivating business structures to the development of the market of innovative technologies, such as: innovative receptivity, provision of market subjects of innovative technologies with resources, quality of organization and communication, and innovative competence from the position of the supplier of innovative technologies with the aim of developing this market) approaches;

«an object of motivation of business structures to develop the market of innovative technologies» as subjects of the market of innovative technologies, namely: the state;

entities carrying out research and development; enterprises of the real sector of the economy and technological entrepreneurs as intermediaries between the previous two.

A methodical approach to building a structural model of motivation of entrepreneurial structures for the development of the market of innovative technologies has been improved, which, unlike the existing ones, combines the structural model of the identifier and the structural model of the classifier, which gives a synergistic effect in the form of a quantitative assessment of the level of motivation, since the first allows to obtain a general assessment the potential suitability of the entrepreneurial structures of the region for the development of the market of innovative technologies, and the second is to group motivational factors affecting object of motivation; contains a scale for assessing the influence of factors on the level of entrepreneurial structures to the development of the market for innovative technologies, which includes five groups of the level of motivation: optimal, high, medium, low and critical.

A methodical approach has been developed to: a) determination of global trends in the development of the market of innovative technologies by regional (geographical) and sectoral characteristics by forming a system of indicators of this process in four blocks: global economic development, export of high-tech goods, research and development costs, human capital; b) assessment of world trends in the development of the market of innovative technologies, which, unlike the existing ones, provides for the grouping of the countries of the world into three groups: South and North America, Europe, Southeast and East Asia and Oceania based on economic important determinants that determine structural changes in this market, namely: gross domestic product of the country, export of goods of a high technological level, costs for research and development of research and development, human capital, international technical exchange. This makes it possible to identify and substantiate the reasons that reduce the efficiency of this process.

The definition and theoretical substantiation of the range of factors of an endogenous nature, by which it is possible to assess their influence on the development of the regional MIT on a dialectical basis, has been developed, in such areas as: the activity of regulatory and legal institutes of Ukraine in the field of development of science and technology; innovative personnel potential of the regional MIT; the business environment of the regional MIT; innovative infrastructure of the regional MIT; the financial environment of MIT structures at the meso level; patent activity in the region.

A methodical approach to identifying the relationship of factors characterizing the state of the business environment with the development of the market of innovative technologies has been developed, which is based on an ecosystem approach, a graphic method of analysis, methods of analogy and logical research, and the definition of a system of factors characterizing the state of the business environment in the context of the development of the innovative technologies market.

A methodical approach to the definition and development of an innovative strategy of a business entity has been *developed* in the context of motivation to increase the effectiveness of its innovative and scientific and technical activities for the development of the market of innovative technologies, which, unlike the existing ones, takes into account the influence of exogenous determinants of the innovative

market technologies and endogenous determinants of its internal environment, which enables the subject of entrepreneurial activity to choose the appropriate option for the development of its innovative activity.

The methodological toolkit for determining the level of influence of endogenous determinants on the effectiveness of innovative and scientific and technical activities of a business entity has been further *developed*, which, unlike the existing ones, provides an opportunity to evaluate and analyze the effectiveness of the use of its financial and material and technical resources, innovative personnel abilities, innovative competitive advantages.

A developed aggregated methodical approach to the formation of the structure of strategic goals, which, unlike the existing ones, combines such methods as: «the method of ensuring the necessary conditions» – for building and formulating the goals of the 1st and 2nd levels, which will allow management to determine which exogenous determinants of the market of innovative technologies can be used to implement the chosen strategy, and the «SMART method» – to determine the target results of endogenous determinants subject of entrepreneurial activity.

In scientific and practical terms:

It has been proven that the following should be included among the leading modern trends of international technological exchange:

- the formation of a two-level structure of the world technology market is observed
- high technologies are exchanged between industrially developed countries, the transfer of low (morally obsolete) and medium (traditional) technologies goes from industrialized countries to developing countries, which consolidates the technological gap between these countries;

- there is a steady dominance on the world market of industrial technologies of developed countries: their specific weight in international scientific and technical exchange is approximately 90%;

- concentration of technological resources in a small number of countries: more than 60% of the total volume of international scientific and technological exchange is accounted for by the five most developed countries in the world - the United States, Japan, the United Kingdom, Germany and France;

- the transformation of transnational corporations into the main subjects of international technological exchange: in modern conditions, up to 2/3 of new technologies are transferred through internal corporate channels, more than 60% of license revenues of industrialized countries are also internal corporate (in the USA – 80%);

- a high level of monopolization of the world technology market (more than 90%) in comparison with other spheres of international exchange: this is connected both with the unique properties of the objects of trade and with the concentration of a significant part of scientific and technical developments in transnational corporations and their establishment of monopolistically high prices for patented products;

- growing participation in the international technological exchange of «venture» firms – small and medium-sized firms, to which big business transfers the risk of scientific research and design developments, development of new products, testing of innovations;

- increase in the specific weight of science-intensive high-tech goods in the overall

structure of world exports.

It has been proven that the main reasons that reduce the effectiveness of the process of development of technology trade in the world are:

- the absence of a mechanism for regulating foreign trade in licenses in most countries, which leads to the gratuitous loss of international intellectual resources;

- insufficient level of qualification of specialists in this new activity for most enterprises;

- characteristic of developing countries is the transfer abroad of new knowledge in its pure form without taking into account the contribution of industrial knowledge, secrets and engineering services. A characteristic feature of the modern license exchange of highly developed countries is the significant complication of access to the latest technologies and the limitation of their commercial use;

- the import of licenses and equipment from developing countries is carried out without taking into account the right possessed by the licensee company.

It has been *proven* that the following factors hinder the development of the market of innovative technologies in Ukraine:

- the legislation does not fully regulate the development of innovative activities. In particular, the conceptual apparatus, organizational, economic and financial measures, as well as the issue of intellectual property protection, have not been fully worked out. In this regard, the legal framework available today does not ensure the coordination of the interests of the state, regions, business structures and the population in the implementation of the model of innovative and technological development. It is necessary to clearly set goals and objectives, define the role and place of each of the leading economic entities in innovative development and establish effective relationships between the state, entrepreneurship, science and education;

- an unacceptable situation has developed with state funding of science and education. The share of funding for fundamental science (without which innovations that lead to a change in the technical and economic paradigm cannot appear) decreases every year. Ministry of education and science of Ukraine planned reduction in the volumes of the state order for the training of personnel in institutions of higher education directly contradicts the Government's declared goal of innovative and technological development of Ukraine;

- the functional insufficiency of the innovative infrastructure is observed. At the moment, there is no integrity, there is a «detachment» of individual elements of the innovative infrastructure from each other. In view of this, the completeness of the innovative infrastructure should be achieved through the development of a complex of technological infrastructure, personnel training infrastructure, consulting, information, financial and other types of infrastructure;

- the development of innovative activity takes place mainly at the expense of the enterprises' own funds, but the catastrophic lack of these funds does not provide an opportunity to support and develop innovative processes;

- a limited amount of funding from the state, certain difficulties in terms of taxation, rent, intellectual property provoked a loss of interest small and medium-sized enterprises to carry out innovative activities, loss of personnel potential in the scientific sphere, reduction of the volume of scientific research, destruction of

scientific infrastructure;

- there is no effective mechanism of interaction between state, regional, municipal authorities, business structures and the population. Today, the implementation of the principle of public-private partnership does not have the same effectiveness as in foreign countries, despite the fact that there are certain developments in the field of legislation on public-private partnership. Restraining factors of a legal and organizational nature do not allow the public-private partnership to become a locomotive for the implementation of innovation and investment projects of various levels.

Suggested:

Measures to solve the main problems to neutralize the effects of the identified factors that hinder the development of the market of innovative technologies in Ukraine:

1. To restore the highly developed education system, for what:
 - restore the role of the state order for highly qualified personnel as an important lever of economic development;
 - create a state system for forecasting the future need for specialists (together with employers' organizations);
 - to create a system of parallel professional training, which consists in acquiring a production profession during the last 2-3 years of schooling, by students taking practical classes at enterprises (including small ones) 2-3 days a week.
2. To develop the scientific field (especially fundamental science), for what:
 - ensure financing of scientific research (including fundamental research) at the average level for EU countries – 2% of GDP;
 - develop and implement specific programs for the diffusion of technological knowledge;
 - to form an effective system of intellectual property protection.
3. To ensure an increase in the amount of tax benefits and preferences in order to develop innovations and ensure long-term economic growth, for which to improve the tax policy in terms of:
 - 3.1. For business structures:
 - introduction of tax write-offs on means of production, namely:
 - *write-off of the first year*: enterprises will be able to claim 100% of the cost of «green» equipment – water-saving or energy-saving technologies, as well as vehicles with a low level of harmful emissions. The application can be submitted in the year of purchase of such equipment;
 - *annual investment write-offs*: each enterprise can claim a certain amount of funds from the cost of purchased equipment, which means that taxable income may be reduced by the amount of capital expenditure within the relevant limit;
 - *amortization write-off (AW)*: every enterprise has the right to claim a write-off of up to 18% of costs per unit of equipment per year. The balance of these costs is then carried over to the next financial year, when AW can be claimed again for costs for which a write-off was not granted. For example, a purchase for UAH 100,000 in 2020 will allow the company to claim 18% in 2021 and carry over 82% to the following year. Then, in the following year, the business can claim 18% of the

remaining amount, and so on, until the expense is fully written off;

- *write-off for research and development (R&D)*: capital expenditures of business structures for R&D purposes can qualify for 100% write-off of the asset value.

3.2. For the population (in order to increase purchasing power):

– establishing the non-taxable personal income tax minimum income of citizens at the level of the minimum wage.

4. In order to reduce the barriers to entering the market of enterprises and to prevent the deepening of technological backwardness and excessive energy intensity of the domestic economy, it is necessary to introduce at the legislative level the regulation of procedures and rules for joining engineering networks according to a qualitatively new model with the provision of maximum protection and guarantees for investors, producers, entrepreneurs. That is, it is necessary to comprehensively regulate the issue of connection to engineering networks (electricity, heat, water, gas supply, etc.), which will ensure the establishment of fair market relations between customers of the construction of engineering networks and subjects of natural monopolies with taking into account the best world experience.

5. Stimulate the development of innovative entrepreneurship:

5.1. Ensure that ministries and departments develop innovation-oriented public procurement plans: in order to increase demand for innovative products and services, relevant procurement plans should become an integral part of departmental commercial strategies, and departments should show exactly how these plans will promote innovation and how innovative procurement practices are implemented.

5.2. Create the Innovation Code of Ukraine (as a basic legislative act, in which not only the role of science in the field of innovation would be enshrined, but also the concepts and types of innovation, taking into account modern world trends, the mechanism of innovation activity, the order of its implementation – incentives from the state in knowledge-intensive areas of production, forms of stimulating the attraction of foreign investments to intensify the introduction of innovations in key areas for the modern economy, including information technologies), which would regulate relations regarding the implementation of innovative activities in the country, but would be a single, easy-to-use, non-controversial and scientifically based document.

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