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THE INNOVATIVE SYSTEM OF UKRAINE AS AN OBJECT OF THE ECONOMIC AND LEGAL FRAMEWORK

The author has considered the innovative system as a separate type of systems. The author has done the analysis of current doctrinal and legislative definitions of the innovative system and its components, generalized and proposed an author's version of a respective definition to apply it in the further legislative activity of the state.

Key words: innovative system; means of economic and legal regulation; elements of a system.

Problem formulation. To create an effective innovative system in Ukraine, it is necessary to analyze it as a system phenomenon, to consider its inherent features, the hierarchy of its members, its type in order to indicate disadvantages of the current economic and legal framework and their elimination.

Analysis of recent research and publications. Issues of the contemporary innovative system in Ukraine have been researched by L. L. Antoniuk, Yu. Ye. Atamanov, O. M. Davydiuk, T. M. Pashuta, etc. Problematics of the theory of systems has been examined by V. Ye. Bakhrushyn, L. von Bertalanffy, O. M. Horban, A. I. Uiomov, R. E. Fagen, A. D. Hall, etc. Nevertheless, the scientists have not considered an innovative system from the standpoint of the theory of systems.

Formulation of objectives. The article objectives are as follows: doing analysis of the innovative system of Ukraine from the standpoint of the theory of systems; development of a substantiated definition of a concept «innovative system»; ex-

amination of components, the structure, and inherent features of the innovative system.

The main material presentation. In the period of rapid development of technologies in the world, it is important for our country to develop the economy based on innovations. To attain this goal, it is extremely necessary to provide effective functioning of the innovative system of Ukraine.

There is no single definition of a concept «system». A. D. Hall and R. E. Fagen point out that a system is a set of things and correlations between them [1, p. 38]. This definition is not enough correct, since all things in the world can be interrelated, but not all of them form a system. L. von Bertalanffy mentions that a system is a complex of interacting components or a set of elements being related to each other and to an environment to some extent [2, p. 13]. An error consists in too broad comprehension of a system, since all objects of the world are related to each other as well as to an environment. I. Kant considers a system as a unity of different knowledge joined by a single idea [3, p. 680]. That is to say, I. Kant perceives a system not as an object, but as a set of particular knowledge, i. e. a result of reflection of objective reality phenomena in human's consciousness.

A system is a certain thing or a certain phenomenon (or their set), which is purposeful and comprises separate elements related by fixed relationships and interrelations to one another and to an environment. These elements are intended for a particular aim, which is a criterion for entry of elements into a system. A certain social intention, i.e. orientation towards creation and implementation of innovations, is a criterion for an innovative system.

In compliance with the Order of the Cabinet of Ministers of Ukraine «On Approval of the Conception of Development of the National Innovative System» of 17 June 2009, an innovative system is a set of legislative, structural, and functional components (institutions) involved in the process of creation and application of scientific knowledge and technologies, which determine legal, economic, organizational, and social conditions for providing an innovative process. The innovative system does not include institutions being essential in the process of protection, consumption, and transferring scientific knowledge and technologies. Not all technologies and scientific knowledge are innovations, but only those significantly enhance the structure and quality of production and (or) a social area. Therefore, it is not appropriate to define a concept «innovations» as a process of creation and application of scientific knowledge and technologies. There is no mention of recognition of both the technology and a service or products as innovations. It is not correct to use terms «technology» and «scientific knowledge» as equal ones, since the technology is a variation of scientific knowledge. Consideration of an innovative system as a set of institutions is controversial, because each institution is

a system in turn. Particular entities and relationships should be referred to as elements of the innovative system.

Foreign experience concerning defining an innovative system concept is considered to be useful. B. Lundvall defines an innovative system as «elements and interrelations, which interact in production, distribution, and application of new and effective knowledge» [4, p. 108].

From the standpoint of systemology, an innovative system is a certain hierarchically built and legislatively determined set of entities and relations, which provide creation, transferring, application, improvement, and attraction of innovative products in an economic field for the purpose of enhancement of competitiveness of particular business entities and a national economy on the whole at the expense of output and selling of innovative products and application of innovations.

The innovative system comprises elements, components, and sub-systems.

The element is the simplest part of the system, which is considered indivisible. The component is such a constituent of the system, the indivisibility of which is disputable. The sub-system is a part, which, in turn, consists of certain components [2, p. 20–21].

Particular entities and relationships between them are proposed to be the innovative system elements. The entities should be divided into two groups: 1) acting entities, which are those ones directly creating, applying, improving, and using innovations or being a party of their transfer; 2) entities of the infrastructure, which are entities that provide the innovative activity of the acting entities, but do not create, apply, improve, and use innovations on their own and are not a party of their transfer.

As for the sub-systems, according to the Order of the Cabinet of Ministers of Ukraine «On Approval of the Conception of Development of the National Innovative System» of 17 June 2009 No. 680-r, the national innovative system includes the following sub-systems: governmental regulation; education; generation of knowledge; the innovative infrastructure; production. There is a need to specify that in contrast to particular entities, each of the above-mentioned sub-systems consists of corresponding relationships. It is not appropriate that the definition of the innovative system and its structure are presented in an executive order, but not in a law. Such a definition should be contained in the Law of Ukraine «On the Innovative Activity».

It is worth mentioning that certain entities can be a part of different sub-systems. For instance, a scientific and production enterprise can be a part of educational institutions or institution for knowledge generation as well as production. Each sub-system should have own mission and a list of entities should be infinite. A list of entities carrying out governmental regulation of the innovative system should be supplemented by institutions, which provide national technological safety. These

institutions provide the creation of (critical) innovations being important for a country and the protection of rights for innovations.

There are the following sub-systems of the innovative system: governmental and non-governmental sub-systems; sub-systems of particular regions; sub-systems of particular fields. The military and industrial complex (MIC) is a separate sub-system. Inherent features of this sub-system are as follows: closed nature; only a government is eligible for participation in this complex. Particular holding unions of economic branches are also sub-systems. Closed nature is inherent to the MICs as well as the innovative sub-systems. In contrast to the MIC, a corresponding legal entity (a holding) is a single member of the holding unions. Their specific feature is locality, i.e., the holding unions function within a considerable segment of a particular branch of the economy (sometimes, within the whole branch) controlled by the holding. The sub-system proposes to indicate clusters being groups of interrelated entities (corporations, holdings, etc.), which form a separate branch of production or providing services (for example, energetic, steel-producing clusters). Such clusters form corresponding innovative sub-systems. Government participation and locality are not inherent to the clusters (members of the clusters are non-governmental institutions), along with the separate holding unions of branches of the economy. The clusters are open sub-systems, since they contain more than one member and new members can freely join it.

In the context of nature of elements, systems are divided into abstract (there are no direct analogues in the world) and real (elements exist in the real world) ones. The innovative system is abstract, since neither entities (fictive legal entities), nor relationships do not exist in the real world. According to a feature of origin, there are artificial, natural, and mixed systems. Since the innovative system consists of, on the one hand, artificially created entities and relationships between them and, on the other hand, a natural process of creation of innovations and relationships between certain persons, it is a mixed system.

According to a period of existence, there are temporary (they exists only during a certain period) and permanent systems. The innovative system is implicitly permanent. Depending on quantity of stages of existence, there are one-stage (a one stage) and multistage (many stages) systems. Due to the fact that the innovative system can be schematically divided into stages of creation, application, implementation, transferring or consumption of innovations (providing safety of the innovative activity is a separate stage), the innovative system is multistage.

There is also a division of all systems into homogenous and heterogeneous, depending on the change of homogeneity of properties belonged to different elements of the system. If the main properties of elements of a system are similar or they change smoothly, the system is homogenous. Simultaneously, elements of

a heterogeneous system are characterized by various properties and they change **abruptly**. There are different peculiar features, which are inherent to its elements: considerable distinctions between relationships and entities; entities can be publicly owned and private ones, legal entities and individuals; the activity of entities and an area of relationships can be directed towards regulation of the innovative activity, creation, implementation in production, the very production, trade, protection of innovations and innovative products, generation of knowledge, providing educational services, etc. Moreover, development of the innovative system sometimes is **abrupt**. **For instance, after dissipation of the USSR, a legal component of the innovative system qualitatively enhanced (creation of new entities; entitling individuals and legal entities to possess personal property rights for innovations; carrying out measures regarding protection of such rights, etc.).**

Depending on complexity, systems can be simple or compound. Such a classification is to some extent schematic. The innovative system is undoubtedly compound, since it encompasses many phases and contains branched complex sub-systems and a considerable number of multi-faceted elements.

In the context of frequency of changes, systems can be classified into static (changes occur seldom) and dynamic (systems change frequently). Unfortunately, there are very slow changes within the innovative system of Ukraine. The legislation is uncomplete and hardly develops. New bodies and entities are founded rarely. Thus, the innovative system of Ukraine may be classed as a static system. However, the government activity should be aimed at transformation of it into a dynamic one.

Depending on firmness of relationships with objects of an environment, systems can be divided into autonomous (close) and open ones. Autonomous systems are weakly related to other objects. Such objects play the insignificant role for existence of autonomous systems, since these systems function on their own. In turn, open systems needs considerable interaction with other objects. The innovative system is open, since it needs close interaction with financial, political, and other social systems to maintain own functioning.

Systems are divided into integral (the interrelation within a system is closer than the interrelation between elements of the system and an environment) and summative (where such relations are equal) ones. The innovative system is integral, since all its elements are closely related and are aimed at a common goal, which is to provide innovative development. Their relationship is so firm that the innovative system cannot function without any of the elements. Depending on the structure, systems can be classed as hierarchic (elements form a certain hierarchy) and equivalent (there is no hierarchy) ones. The innovative system is hierarchic, since its sub-systems and entities form a certain hierarchy (those vested with governmen-

tal and legislative powers and those are not vested with; coordinative, controlling, productive entities, etc.). Moreover, particular sub-systems of the innovative system are also hierarchic.

At the first level of the innovative system, creation of innovations is initiated by a customer or the very researcher. At the second level, there are creators of an innovation as a particular object (in some cases, as the technology), which does not exist in the real world yet. At the third level, there are entities implementing innovation in production. The forth level consists in production of an innovative product. The fifth level is presented by entities selling the innovative product. These are the main five levels of the innovative system. Entities, which provide organizational and economic maintenance of an innovative process, can exist in the form of entities vested with authorities (both legislators, who create norms and regulate activities of all the entities of the innovative system, and controllers) as well as non-governmental entities (departments of TNCs, which control processes of development and creation of innovations by other departments). The mentioned entities form a separate level of the innovative system. These entities are closely related to the main levels of the innovative system.

Investors, who finance development, implementation in production, the very production or realization of innovations, are another level of the process. They may be not vested with rights for innovations, but creation of innovation without investors is impossible. Entities, which provide services being essential for functioning of the innovative system (formation of a market of technologies, assistance in legalization of innovations, etc.), also form a level of the process.

The consumers of an innovative product can be distinguished as a separate level. The consumers are related to all the levels due to the bilateral relationship. On the one hand, each particular level influences a product proposed to consumers. On the other hand, the very consumers, creating market tendencies, from a strategy of development of all the other levels.

It is important to research a correlation between the innovative product market and the innovative system. Since the sellers of innovative products, the consumers, and entities of the infrastructure of this market are suggested to be referred to as entities of the innovative system, relationships between them are also a part of the innovative system. Therefore, the innovative product market should be indicated as a separate sub-system.

It is worth taking peculiar notice of the MIC of the country. As functioning of the MIC does not require establishment of considerable relationships with other entities or objects, self-regulation is the most inherent character of the MIC. Such a peculiarity is stipulated by a governmental policy aimed at non-admission of non-governmental entities to development, production or trade of arms.

Inventors, which are subjects to legislative recognition, are particular elements of the innovative system. They are not included in any institutions. However, they generate innovations. Spontaneity is an inherent and distinctive feature of the inventors. Although the government can regulate legal relationships concerned with the inventors and protect their rights, the activity of the inventors cannot be prognosticated or predicted (in contrast to other entities of the innovative system).

Transnational corporations (TNC) are also particular entities of the system. Floating nature is their peculiar feature. Usually, they are simultaneously involved in many sub-systems and branches of the innovative system. Depending on their financial goals, they can occupy an innovative market of a certain country or, on the contrary, leave it. TICs are peculiar organizations, because a certain country cannot significantly influence the regulation of the TICs activity. In addition, the TICs activity is integrative. Owing to the very TICs, innovative systems of particular countries are integrated in the world innovative system.

Certain TICs extend authority over more than one nation and factually form a separate branch of the world innovative system. Thus, it is possible to consider the TIC innovative system as a separate type of a system. It is worth mentioning, the TIC innovative system is not a sub-system of an innovative system of a country, because it encompasses separate parts of innovative systems of different countries.

There is the certain hierarchy in the innovative system of a country. Depending on a branch of an economy, the hierarchy comprises the following stages: a national economy; a branch; a sub-branch; an entity. Depending on a territorial criterion, the hierarch comprises the following stages: a national economy; a regional economy; a local economy; an entity.

There is a system of forms of the innovative system. The system of forms usually coincides with stages of a particular innovative process. The first form is science (research), which can be schematically divided into fundamental science (its achievements are not directly applied in the process of creation of innovations; however, it develop basic principles, which are essential for creation of innovations) and applied science (its achievements are used in the process of creation of innovations). The second stage consists in development of an innovation as an object of intellectual property. The third form is implementation of an innovation in production. The forth form is direct production of an innovative product. Finally, the fifth form is realization of an innovative product. It is worth mentioning that there are groups of factors being inherent to each form, which can influence an innovative process negatively (absence of the contractual law framework, lack of financing, etc.) as well as can stimulate it (a high level of the scientific school, cheap labor force). Thus, it is necessary to examine all the factors for each form in order to stimulate the Ukrainian innovative system in general.

There is a need to substantiate a conception of an innovative process trajectory. The point is that different entities can be involved at each stage of the innovative process. For instance, a domestic engineering bureau develops a new type of a weapon, but foreign private producers create some elements (at this stage, the innovative process expand beyond boundaries of the domestic innovative system). Thereafter, assembly of these units can be performed at a publicly owned or at a private enterprise (i.e., an alternative exists). A government can use such an innovative product. Moreover, it can be sold abroad. Consequently, a particular entity or a group of entities matches each stage of the innovative process. In addition, some stage of the innovative process can be nonexistent. For example, a domestic enterprise may develop innovations, but may not bring up the case to production, selling ideas abroad.

A sequence of changes of the stages and respective entities are proposed to be called an innovative trajectory. There is a need to implement a concept of an innovative chain, which is a stable innovative trajectory being used for one innovative process during a considerable period. Such a chain can be stable (a trajectory does not change) and varying (a trajectory can change at a particular stage or stages; however, such changes occur permanently).

To create an effective innovative system, there is a need to take into account universal regularities of functioning of systems. O. M. Horban and B. Ye. Bakhrushyn suggest the following regularities of development and functioning of systems: historicity and self-organizing [2, p. 55]. These regularities should be adapted to the innovative system and taken into consideration in the process of its modernization. The innovative system consists of the next steps: emergence, development, prosperity, decline, degeneracy, and sometimes «death», when the innovation becomes nonviable and changes for new one. Consequently, in order to change the domestic innovative system successfully, it is necessary to study effective world innovative systems and to understand, which factors stipulated their success and which ones led to the decline.

As for self-organizing, under the absence of effective regulation (mainly, legal one), any governmental system (including, an innovative one) self-regulates in a particular way, e. g., owing to «laissez-faire» of A. Smith, creation of certain customs, etc. An ability of the innovative system to self-organizing is restricted, since particular relationships cannot emerge without corresponding legal regulation. Subsequently, the relationships will not become entities of the innovative system without providing protection of rights of process participators. Thus, in the process of the change of regulation of relationships related to the innovative system, it is necessary to analyze endeavors of system participators to self-organize such relationships.

Analyzing a particular innovative system, there is a need to determine its equifinality, i.e., margins of its opportunities. If the system cannot meet demands of a society (because these demands are beyond its margins), it is important not to modernize it, but to profoundly change a model. In a case of the choice of a new model, it is necessary to immediately determine its margins to choose a model with the highest potential.

From the legal stand point, Yu. Ye. Atamanova determines the following trends of national innovation system functioning: freedom of the intellectual activity; free circulation of intellectual activity results and free transfer of information and knowledge; direction towards practical use of knowledge and intellectual activity results; self-regulative aspects of national innovation system functioning; application of mechanisms of national innovation system governing in order to guarantee and support terms of its functioning and sustainable development as well as to satisfy public needs [5, p. 117–118].

Conclusions. The current meaning of the innovation system must be substituted by the following one: a certain hierarchic and legally regulated unity of entities and relationships that provides creation, transferring, application, improvement, involvement of innovation products in a certain industry in order to improve competitiveness of certain business entities and a national economy on the whole at the expanse of output and realization of innovation products. It is appropriate to consider the innovative system as a set of both entities and relations between them. The legal document should contain the full list of entities and their definitions. The author highlights the necessity of thorough research of the subsystems hierarchy and the entities of the innovation system in order to create optimal legal provision of their relationships. The correlation between the market of innovation products and the innovation system are indicated. The structure of innovation system in order to substantiate the role of the government in functioning of each structural element and separate sub-systems should be determined. Such procedures will lead to improvement of mechanisms of governmental legal impact on the innovative system and its more efficient functioning. Concepts of the innovative process trajectory and the innovative chain are legally substantiated.

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Стаття надійшла до редакції 22.09.2015.

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ИННОВАЦИОННАЯ СИСТЕМА УКРАИНЫ КАК ОБЪЕКТ ХОЗЯЙСТВЕННО-ПРАВОВОГО РЕГУЛИРОВАНИЯ

Рассмотрена инновационная система как отдельный вид систем. Проведен анализ существующих доктринальных и законодательных определений инновационной системы и ее составляющих, осуществлено обобщение и предложен авторский вариант соответствующей дефиниции для использования в дальнейшей законодательной деятельности государства.

Ключевые слова: инновационная система, средства хозяйственно-правового регулирования, элементы системы.

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ІННОВАЦІЙНА СИСТЕМА УКРАЇНИ ЯК ОБ'ЄКТ ГОСПОДАРСЬКО-ПРАВОВОГО РЕГУЛЮВАННЯ

Постановка проблеми. Для створення ефективно діючої інноваційної системи в Україні необхідно перш за все проаналізувати її як системне явище. Доцільно розглянути її характерні риси, ієрархію її суб'єктів, тип системи для виявлення недоліків існуючого господарсько-правового забезпечення та їх нейтралізації.

Аналіз останніх досліджень і публікацій. Проблеми сучасної інноваційної системи України досліджували Л. Л. Антонюк, Ю. Є. Атаманова, О. М. Давидюк, Т. М. Пашута та ін. Водночас проблематику теорії систем досліджували В. Є. Бахрушин, Л. фон Берталанфі, О. М. Горбань, А. І. Уємов, Р. І. Фейджин, А. Д. Холл та інші. Однак науковцями не було проведено розгляд інноваційної системи з позицій теорії систем.

Формулювання цілей. Провести аналіз інноваційної системи України з позицій теорії систем. Розробити більш правильне визначення поняття «інноваційна система», дослідити її елементи, структуру, характерні риси.

Виклад основного матеріалу. Через те, що єдиного поняття системи у теорії систем не існує, а існуючі вбачаються такими, що недостатньо підходять для дослідження інноваційної системи, запропоновано таке визначення системи — це певна річ чи певне явище (або їх сукупність), що має певну мету та складається з певних окремих елементів, які пов'язані фіксованими зв'язками та взаємозалежністю один з одним та з навколишнім середовищем та які мають певну властивість, що виступає критерієм для входження елементів до складу системи. Характерною рисою інноваційної системи є інноваційність — властивість об'єкта, що полягає в необхідності використання цього об'єкта для створення, застосування, вдосконалення, забезпечення безпеки, передачі чи споживання інновацій. Інноваційна система — сукупність суб'єктів та відносин, що забезпечують створення, застосування, вдосконалення, забезпечення безпеки, передачу чи споживання інновацій. Елементами інноваційної системи є окремі суб'єкти та відносини між ними. Інноваційна система включає підсистеми: державного регулювання; освіти; генерації знань; інноваційної інфраструктури; виробництва. Інноваційна система є складною ієрархічною системою, що складається з таких рівнів: ініціатори створення інновацій; творці інновації як окремого об'єкта; суб'єкти, що займаються впровадженням інновації у виробництво; виробники інноваційного продукту; реалізатори інноваційного продукту; контролюючі суб'єкти; інвестори; суб'єкти, що надають послуги; оборонна підсистема; споживач. Пропонується створити концепцію траєкторії інноваційного процесу та інноваційного ланцюга.

Висновки. Необхідною вбачається зміна існуючого поняття інноваційної системи та викладення його у відповідних законодавчих, а не у підзаконних актах. Також вбачається доцільним розглядати інноваційну систему як сукупність не тільки суб'єктів, а й відносин між ними. Необхідно викласти у законодавчому акті підсистеми не лише як вичерпний перелік певних суб'єктів, а надати їм визначення для можливості інтеграції нових суб'єктів та відносин у інноваційну систему. Потрібно детально дослідити ієрархію підсистем та суб'єктів інноваційної системи для надання оптимального господарсько-правового забезпечення відносинам між ними. Вбачається доцільним законодавчо закріпити концепції траєкторії інноваційного процесу та інноваційного ланцюга.

Коротка анотація до статті

Анотація. Розглянуто інноваційну систему як окремий вид систем. Проведено аналіз існуючих доктринальних та законодавчих визначень інноваційної системи та її складових, здійснено узагальнення та надано авторський варіант відповідної дефініції для використання у подальшій законодавчій діяльності держави.

Ключові слова: інноваційна система; засоби господарсько-правового регулювання; елементи системи.