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## MODEL APPROACH TO ESTIMATING THE COST OF TRANSFER OF INTEGRAL INTANGIBLE SYSTEM (TECHNOLOGY)

**Purpose.** To represent the approach to estimating the cost of commercial transfer of integral intangible system (technology) as opposed to the set of assessments of separate intellectual property right objects.

**Methodology.** To determine the estimation of the cost of integral intangible system (technology), we use the model approach involving formulas by the algorithm of investments in the development of innovative technology taking into account the cost and result reduction to the time factor, carried out and received before and after the target year (period) using the discount rate.

**Findings.** The presented model approach to estimating the cost of commercial transfer of innovative technology is regarded not as separate intellectual property right objects, but as full cost estimating where the object of estimated cost is property right to integral intangible system (technology), which essentially simplifies the calculations of cost estimating the intellectual property rights of technology transfer and creates opportunities for the implementation of innovative technical and technological project of new generation production, associated with an integral intangible system (technology) aimed at making a profit (income).

**Originality.** A new approach proposed to estimating the cost of the innovative technology commercial transfer that is an integral intangible system as a set of scientific and engineering knowledge turned into work methods and equipment, sets of production material factors, types of their combination to create a particular product or service. It leads to obtaining synergetic effect on the results of innovative product sales represented as profit (income). The important condition of the estimated cost of technology object property right is its quantitative value for the consumer, when the quantitative appraisal becomes identical (equivalent) to the value of material embodiment of technology object or a carrier presented in an objective form i.e. available for perception by others.

**Practical value.** The proposed model approach to estimating the cost of the property rights to integral intangible system (technology) simplifies the calculation of the value of the developed or implemented innovative technology (-ies) aimed at creating and implementing new generation production in the real economics sector that will increase efficiency and lead to pumping up the country's budget.

**Keywords:** *innovative technology, commercial technology transfer, valuation, property rights, integral intangible system*

**Introduction.** Within the conditions of absence or underdevelopment of innovation environment, transparent mechanisms of innovative technology implementation at the innovative product market, the development of technology commercial transfer is of particular importance as it involves the transfer and extension of cost-effective scientific, technical and technological knowledge, which is the final product of the creative developments of scientists, inventors and technicians. Technology in content is considered as a complex concept that includes methods, techniques, mode of operation, sequence of operations and actions that are closely related to the used material resources. We emphasize that the technology innovation depends not only on the implemented invention(s), but also on other technology components that are interconnected into an integral intangible system (technology), which is considered as the creation and implementation of a new generation production. The synergistic effect is achieved on the results of innovative product sales represented as a profit (income). Creation, implementation and realization of an integral intangible system (technology) consistently includes the entire material system, and its final result is the innovative production manufacture, which after its implementation by the business entity allows making a profit (income) after covering expenses.

While implementing technology commercial transfer, cost estimating property rights becomes essential which is incomplete if we consider the assessment of technology value as separate objects of intellectual property rights to inventions, utility models, industrial models, and so on. The model approach to using formulas of cost estimating the property rights

to technology as an integral intangible system (technology) becomes topical, which significantly expands the possibility of innovative technology transfer in the real economics sector. The transfer also includes innovative technology under the license agreement, for which the license price is calculated taking into account the license fee paid within the terms set by the agreement.

**Literature review.** “Technology” as a concept is associated with Johann Beckmann (1739–1811), naming the scientific discipline he taught in German University of Göttingen since 1772 year. Later, in the five-volume work “Essays on History of Inventions” (1780–1805) he developed this concept.

Technology and technology transfer today are quite complex and they are new objects of scientific research. Theoretical and practical issues of technology formation and transfer, development trends, specifics and modifications are reflected in the scientific publications of national scientists, such as G. O. Androshchuk, S. I. Bay, O. Yu. Bilous, D. S. Butenko, V. G. Zinov, Yu. M. Kapitsa, A. O. Kasich, T. K. Kvascha, O. S. Kichuk, I. M. Kornilova, I. B. Kulko-Labintseva, A. A. Mazaraki, I. V. Molchanova, O. F. Paladchenko, P. G. Pererva, I. V. Rodionova, Ye. O. Rudenko, V. P. Solovyov, I. I. Tkachuk, I. I. Khomenko, P. M. Tsibulov, V. P. Chebotarev, G. O. Shvets, T. V. Yaroshevskaya and in separate publications of foreign scientists such as Boh W. F., DeHaan U., Strom R., Link A. N., Siegel D. S., Bozeman B., Kocziszky G., Szakály D., Somosi Veres M., Suini Yu.

It should be noted that some issues remain debatable. In each research, the technology is considered in terms of content independently, and in relation to commercial and non-commercial relations, the technology transfer is considered without taking into account intellectual property rights.

For example, the scientist Belous O. Yu. [1] believes that the category of “knowledge” is broader than “technology”, which is only one type of knowledge. If “knowledge transfer” is quite a wide category and includes the transfer of both explicit and implicit knowledge, both commercial and non-commercial activities, then compared to it, “technology transfer” is a narrower category. Therefore, she believes the technology transfer policy should be replaced by a more modern knowledge transfer policy, which will promote the intensification of innovation processes in Ukraine. In our opinion, the knowledge transfer here is a too generalized category in relation to knowledge, which reproduces the person’s intellectual activity, substantive communication, knowledge accumulation and in no way relates to the economic relations of economic entities regarding the technology transfer.

According to scientists T. K. Kvasha, O. F. Paladchenko and I. V. Molchanov, it is important that the state regulatory policy in the field of technology transfer be aimed at ensuring the effective use of scientific, technical and intellectual potential of Ukraine, production adaptability to manufacture, protection of property rights to national technologies. Technology transfer is an important and integral part of innovation and involves the process of technology transfer, created according to the results of scientific and technical activities, a set of systematized scientific knowledge, technical, organizational and other solutions [2].

The most important factors, I. V. Kulko-Labintseva says, influencing the development of technology transfer within the state, remain the state policy on industry innovative development, state policy on financing the innovative development of the country, so it is important to take measures to stimulate and encourage technology transfer, simplify legislation, correlate Ukrainian legislation in the field of technology transfer to the international one [3].

It should be noted that the concept of “technology transfer” appeared in the domestic science only in 1995, although in the world it has been studied since the 70s. Therefore, trying to clarify the essence of the concept of “technology transfer”, scientists are faced with other similar categories: knowledge transfer, scientific and technical transfer, technology commercialization, technology transfer, which are used to describe the same judgment, but not to take into account the technology object, which is associated with intellectual property rights [4–6].

Today, technology in content is a complex concept that includes methods, techniques, operation mode, sequence of operations and actions that are closely connected with the used means, equipment, tools, and materials. According to paragraph 11 item 1 Article 1 of the Law of Ukraine “On state regulation of activities in the field of technology transfer” (hereinafter – Law 143-V) the legislators consider the technology as the result of scientific and technical activities, a set of systematized scientific knowledge, technical, organizational and other decisions on the list, term, order and sequence of operations, the production process and/or product sale and storage, services.

The legislator distinguishes between “technology component” and “technology object”. According to paragraph 6 item 1 Article 1 of Law 143-V legislators define technology as a scientific and technical result, intellectual property right objects (inventions, utility models, works of scientific, technical nature, computer programs, know-how or a combination thereof), which reflect the list, term, procedure and operation sequence, production process and/or product sale and storage, which the legislator refers to the intangible asset as a whole as well as individual objects of intellectual property rights, which are reflected in the entity accounting. According to paragraph 10 item 1 of Article 1 of Law 143-V, the legislator understands a technology component as a technology part which reflects certain elements of technology in the form of scientific and applied research results, objects of intellectual property law, know-how.

According to the methodology of the United Nations technology is considered: either technology in its pure form, including methods and techniques of goods production and services (dissembled technology); or embodied technology, including machines, equipment, entire production systems and products with high technical and economic parameters (embodied technology).

According to the technology classification, there are production technologies which can be classified either in a certain production branch, or in certain materials and methods of their production or processing. The latest and most advanced technologies of today are high technology (high-tech). In paragraph 1, item 1 Article 1 of Law 143-V high technologies include technologies developed on the basis of the latest scientific knowledge, which in their technological level exceed the best domestic and foreign counterparts and are competitive at the world market of knowledge-intensive products.

Innovative technologies, as a kind of high technology name, are considered as a set of methods and tools that support the stages of innovation implementation, taking into account the objects of intellectual property rights, which are within view of intellectual property. Scientist G. O. Shvets fairly believes that today technology transfer aims at transforming knowledge and scientific abilities into innovative technology. Users, recipients as well as end innovation users should take part in this process. Technology transfer is impossible to implement without the participation of two innovation subjects that are the recipient and the technology source [7]. At the same time, T. V. Yaroshevka notes that innovation developers and potential Ukrainian technology buyers face a number of problems, from incorrect, incomplete interpretation of legislation in the field of design and stages of technology transfer [8]; O. S. Kichuk notes that in Ukraine, under conditions of economic uncertainty, a stable crisis, it is also difficult to predict an increase in the state interest in innovation, as there are now other current issues [9].

At the present level, scientists distinguish between types of innovative technologies which include: implementation (commercialization under different usage conditions); training (staff training and small business incubation); consulting (consulting activities, management consulting); transfer (the operation of transferring persons, objects, values, documents, and so on (depending on the context) from one owner or consumer to another); engineering (branch of human intellectual activity). According to the life cycle, technologies have the relevant stages of technological life, which in the process are considered as a set of stages from the formation of technological innovations to their routinization, which take place in five stages: latest technology; advanced technology; modern technology; not new technology; old technology. This significantly affects the technology classification as innovative (pioneering technologies, high technologies, the latest technologies, advanced technologies), whose essential features are protected by intellectual property rights (patents for inventions, utility models, industrial designs, and so on).

Thus, scientists in the above scientific papers in various areas generalize the term “technology”, but the content of technology transfer, which is associated with the transfer object and legal relations taking into account intellectual property rights, is out of consideration.

According to paragraph 13 item 1 Article 1 of Law 143-V, the legislators consider technology transfer as technology delivery, which is formalized by concluding a bilateral or multilateral agreement between individuals and/or legal entities, which establishes, changes or terminates property rights and obligations in relation to technology and/or its components. According to multilateral agreement, the technology transfer is based on the system of intellectual property right protection, assessment of intellectual property right value, based on the condition that the technology acquires intellectual property rights in accordance with the fourth book of the Civil Code of

Ukraine, where intellectual property right objects, the order of their interaction and the basic conditions of intellectual property rights are defined [10]. Consideration of technology transfer from the point of assessing the intellectual property right value as a problem is a debatable issue, as evidenced by the ambiguity of scholars on the approach to solving this problem.

For example, I. M. Kornilova and E. A. Rudenko [11] in the process of studying methodological support to the technology transfer, offer to estimate the technology to be transferred according to the adapted TAMETM (Technology Assessment and Market Evaluation) system, taking into account the specifics due to a factor combination. The result of the methodology strengthens the diagnostic basis of the technology transfer process in the context of the possibility, feasibility and effectiveness of its implementation. The TAMETM system was founded and implemented by “Iambic Innovation” to provide a structured approach to technology assessment and market research. It is a tool of systematic invention evaluation or a tool for comprehensive evaluation of technological objects and their commercial potential. This methodology considers five main evaluation criteria (blocks): strength and capabilities of intellectual property rights, technology nature, technology implementation problems, support problems, commercial problems. Each of these blocks is studied with the help of analytical tables where the parameter list obtains a score from 1 to 5, where 5 is the best result and 1 is the worst. The total maximum score amount for each block and a comprehensive assessment of technology is determined depending on the number of parameters selected for parameter analysis. While applying the adapted TAMETM system, a weighting factor for the evaluation criteria (blocks) is introduced, it allows taking into account the specifics of a concrete transfer object. The result is a weighted score (maximum 20 points). Based on the evaluation results of the TAMETM system, a decision on technology practicability and particularity is taken. The following results of a balanced assessment are possible: 1–5 – technology transfer will not lead to a positive result; 6–10 – low probability of successful transfer; 10–15 – transfer is possible under the condition of balanced risk minimization; 15–20 – technology transfer is very desirable [12]. Unfortunately, the disadvantage of technology scoring is that it is more suitable for the selection of technology objects and their commercial potential, which is far from determining the technology cost price.

In their monograph “Technology transfer” scientists Pererva P. G., Kocziszky G., Szakály D., Somosi Veres M. while constructing economic and mathematical model of technology price determination offer to transform the medium weight method and bring it closer to the method, which the authors call the “method of interval values”. This method involves the sequential approximation of the interval values of the technology cost to their final (most accurate) value. The interval in which you find a market valuation of the object of technology transfer (OTT) is determined with a two-stage procedure with a solution at each stage of the lower and upper price limits, between which is its true value. The lower price limit is determined in terms of the least utility for developers (owner, seller), at which they are able to recoup their costs and make a profit. The upper limit of the OTT price determines the equal interest of the consumer where there are several options for solving their problem, the increase in which becomes unprofitable for the buyer. The original model of the approach to estimating the value of OTT proposed by scientists uses complex multi-step calculations that require detailed technological, marketing or market information, which is associated with determining the general and specific factors influencing the value of intellectual property, which at the time of transfer may be absent, and in some cases the calculations are too complex for their practical use.

**Unsolved aspects of the problem.** Assessing the value of property rights to innovative technologies in their transfer is a complex and not yet sufficiently studied economic and legal phenomenon, which is considered from the point of legal and

economic science. Thus, according to paragraph 13 item 1 Article 1 of Law 143-V, the legislator clearly defined that while transferring the counterparties of the innovative technology market are taking legal action to enter into a bilateral or multi-lateral agreement in writing in accordance with current legislation of Ukraine, where the agreement subject is technology transfer that defines the right to gain technology transfer object and economic actions, where the technical and technological content and useful value of innovative technology is important, which affects the assessment of the value of the transfer object property right, taking into account the economic methodology. From the standpoint of economists, the technology transfer is a set of economic relations arising in the use of new knowledge about production, the process application or service between its owner and customer – residents, i.e. persons permanently residing in one country, and in the case of international technology transfer – residents and non-residents, i.e. persons permanently residing abroad. At the same time, post-contractual relations are important in the process of technology transfer, they include technical service delivery, warranty service, engineering services, as well as control over the technology use by the recipient of the transferred intellectual property object, prevention of unfair use and, if necessary, protection of rights to this object.

Based on this, the innovation promotion through technology transfer is carried out in the form of knowledge, experience, scientific and technical information, or in materials, machines, equipment. From an economic point of view, scientists consider two forms of technology transfer: commercial and non-commercial. Commercial transfer involves the process of transferring information, technology, results of scientific and technical research from the owner (who may or may not be the developer) to the consumer (buyer), resulting in commercial benefits in one form or another, in accordance with the contract terms. Non-commercial transfer is used in the field of foundational, basic, scientific research, technological inventions or in cases where the owner of scientific and technical knowledge does not realize, has no opportunity or is not interested in commercialization or transition to other counterparties. It is sometimes accompanied by small costs and can be supported by both the state and individuals. Note that this division, in our opinion, is conditional, as technology transfer is interesting for its customer who gains the corresponding profit in future.

To the commercial transfer, scientists refer: 1) the technology sale in material form; 2) technology transfer in direct and portfolio investments; 3) patent sale; 4) sale of licenses for all types of patented industrial property, except for trademarks, service marks, and so on; 5) sale of licenses for non-patented types of industrial property – know-how, production secrets, technological experience, instructions, schemes, specifications, and others. However, from our point of view, these components of commercial transfer do not create an integral system of the technology transfer object and do not reflect the intellectual property rights of the integral system.

Here, scientists should focus on the legal difference between transfer and commercialization, which is as follows: 1) technology commercialization involves required profit and not necessarily associated with involving third parties (except for the technology source and the end user); 2) technology transfer involves the required technology transfer to the recipient, who carries out its industrial development, but it is not necessarily associated with profit as a technology source and its recipient (in particular, this applies to environmental technologies).

Note that this difference is artificial, as the technology commercialization (economic action) demands its sale to another counterparty under a technology transfer agreement, and technology transfer (legal action) is one of the commercialization stages with the conclusion of a technology transfer agreement with the recipient.

Technology commercialization (economic actions) requires determining the value of intellectual property rights.

To determine really the value of property rights object of technology is possible only in relation to a particular technology. The value of the property right of the technology object becomes quantitative when it is identical (equivalent) to the value of the material embodiment of technology object or a carrier presented in an objective form, i.e. available for perception by others. The value of the property right of the technology object is an abstract value, which is set at the discretion of the technology owner. Definitely, there is a question – what should the innovative technology owners rely on in determining the value of property rights to technology transfer? To do this, we propose to use a model approach in the form of formulas to determine the near reality of the abstract value of property rights to innovative technology; the given approach is more simplified if to take into account the final decision of market counterparties.

The problem is complicated by the fact that the property rights to innovative technology in their content are considered separately for each object of intellectual property (patent, utility model, and so on), which was used while creating the technology. Other components of the technology (as a technology part, which reflects certain technology elements in the form of scientific and applied results, intellectual property right objects, know-how) were not taken into account, which does not reproduce the cost of material embodiment of technology object, close to the real (actual costs).

**The purpose** of the article is identifying the approach to estimating the value of a commercial transfer of integral intangible system (technology) in contrast to the set of assessments of separate intellectual property right objects.

**Methods.** In contrast to the above approach, we propose to consider innovative technology from the standpoint of an integral intangible system, as a set of scientific and engineering knowledge embodied in labor methods and means, sets of material production factors, types of their combination to create a particular product or service that reproduces already known knowledge and new knowledge, which include set of methods and tools that support the stages of innovations implementation, taking into account the objects of intellectual property rights. It should be kept in mind that scientists advance demands to modern innovative technology; they are the following:

- 1) a high degree of process division into stages (phases);
- 2) systemic completeness (integrity) of the process, which must include the whole set of elements that ensure the necessary completeness of human actions in achieving the goal;
- 3) the process regularity and the unambiguity of its phases, which allows using averages in characterizing these phases, and hence their standardization and unification;
- 4) technology is inextricably linked with the process – with a set of actions that are performed over time;
- 5) the technological process is carried out in artificial systems designed to meet certain needs. Therefore, the value of the property right of the technology object becomes quantitative when it is close to the identical (equivalent) value of the material embodiment of technology object.

**Results.** It should be noted that the technology innovation, depending on the complexity of integral intangible system, for the most part is not fully reproduced in the invention patent (utility model) or in the number of corresponding patents (utility models), which corresponds to paragraph 4 Article 1 of Law 143-V- it is “the result of intellectual, creative human activity in any technology field”. The value of invention patent (utility model) or the number of relevant patents (utility models) used in innovative technology is determined by its/their impact on the overall economic result in the form of obtained innovative products as a result of the innovative technology introduction, allowing specifically for each invention (utility model) to determine the value of property rights using known

valuation methods: cost (investment), market (analog), income (financial).

The technology originality or innovation also depends not only on the implemented invention(s), but also on other technology components that are interconnected into an integral intangible system (technology). Here, a synergistic effect is achieved; it is based on the results of innovative product sales in the form of profit (income). The reality of the obtained result is achieved while implementing technological process into production with the appropriate technical and technological material and resource support, which are an active component of the business entity, generating income in the process of constant turnover. The implementation of the technological process by scientists is characterized by the general process division into internal interconnected states, phases, operations that provide optimal or close to optimal process dynamics, as well as determine the rational requirements for personnel working with this technology; coordination and step-by-step implementation of actions and operations aimed at achieving the desired result, and the action sequence is based on the operation logic and development of a particular process; unambiguous execution of procedures and operations available in technology, which is an essential and crucial condition for achieving results according to the established norms and standards. Hence, innovative technology should be considered as the creation and implementation of a new production generation, where during this period the property rights on the invention (utility model) or on the number of corresponding inventions (utility models) used or implemented in innovative technology are issued in the prescribed manner. This is significant because such an integral intangible system (technology) is new, where a significant proportion of its value is often determined by an invention (utility model) patent or a number of relevant patents (utility models). There may be no invention (utility model) or number of relevant inventions (utility models), as well as an analogue of an integral intangible system (technology) or something similar on a sectoral basis.

While determining the value of intellectual property rights of integral intangible system (technology) its usefulness and value cannot be considered in the absence of protection document(s) on patent(s) or utility model(s). While determining the valuation of integral intangible system (technology), it is necessary to consider the target amount of investment (for the whole period), which is aimed at the development and implementation of an innovative technical and technological project of new generation production, its material and resource support, development and design of invention(s) or utility model(s), patent(s) for the management, organizational, marketing and marketing costs for the purpose of promotion of new high-tech products on the market under the conditions of established resource limitations. In any case, this is a commercial innovative technical and technological project of new generation production, associated with an integral intangible system (technology), aimed at making a profit (income).

Creation, implementation and realization of an integral intangible system (technology) consistently includes the entire material system, and its result is entity’s innovative products, which after its implementation by the entity receives a profit (income) after covering costs. Thus, target corresponding investments for all usage period are directed at creation and introduction of integral material system (new generation production) which are considered while defining the size of integral intangible system (technology) cost. Without loss estimate (the investment amount) to create an integral intangible system (technology) and the production of a new generation on this basis for the future buyer, it loses the subject of economic interest; therefore, such a technology object cannot act as a real material carrier of technology. It should be noted that the material carrier of an integral intangible system (technology)

can be the innovative technical and technological project of new generation production without further material implementation, as an independent completed stage. Of course, the value of such technology at this stage (research, experimental, engineering, and so on) will be minimal in the implementation of its commercialization.

Based on this, target investments for the entire period of development, which were aimed at creating and implementing an integral intangible system (technology), often include the cost of obtaining research results and engineering knowledge, inventions, engineering and technological proposals embodied in methods and means of labor, sets of material production factors, types of their combination to create a particular product or service that reproduces a set of methods and tools that support the stages of innovation implementation, taking into account the relevant objects of intellectual property rights and other measures depending on the complexity of the creation, implementation and realization of innovative technology.

Model approach using formulas or algorithm of determining valuation of intellectual property rights of integral intangible system (technology), reproduces the creation of an integral intangible system (technology) of new generation production. Target investments for the entire development period, which are invested in the creation, implementation and realization of innovative technology, bring costs and results obtained taking into account the time factor according to the relevant economic methodology to the calculation period, the results carried out and obtained before and after the target year (period).

Model approach using formulas of defining valuation of intellectual property rights of integral intangible system (technology) has the following calculation sequence:

1. Costs and results implemented and obtained before the target year (period) of integral intangible system (technology) creation and use, are multiplied by the reduction factor and summed up

$$K_{cid} = \sum_{n=1}^T K_{iy} \cdot (1 + E_n)^{T-n}, \quad (1)$$

where  $K_{cid}$  is total target investments made and led to the target year (period), hryvnias;  $K_{iy}$  is investments of the year  $T$ , UAH;  $E_n$  is investment efficiency factor;  $n$  is calculation period.

2. The costs and results implemented and obtained after the start of integral intangible system (technology) usage and the new generation production, are divided by the reduction factor and summed up

$$K_{cip} = \sum_{n=1}^T K_{iy} / (1 + E_n)^{T-n}, \quad (2)$$

where  $K_{cip}$  is total target investments made and brought after the beginning of the target year (period), hryvnias.

3. Taking into account (1, 2) the total amount of target investments  $K_{ciz}$ , reduced to the target year (period)

$$K_{ciz} = K_{cid} + K_{cip}.$$

Note that in formulas (1, 2) the same investments ( $K_{iy}$ ) are used in the appropriate direction under the condition of a constant calculation period, which in practice may change. The investment efficiency factor  $E_n$  may or may not coincide with the discount rate while estimating the forecast result flows at future stages of technology development and implementation. The investment estimate may be reduced due to incomplete information, which affects the ability to obtain an objective calculation of investment costs associated with the implementation of an integral intangible system (technology).

As a result of using a integral intangible system (technology) and introducing new generation production, innovative products are sold with appropriate profitability, which can be

accepted at the average level in the industry, or at the enterprise where the technology is implemented, or at a regulatory profit of not more than 25 percent of unit cost of innovative products without value added tax. In addition, half of the actually obtained profitability can be taken as royalty rate for the licensor while transferring innovative technology under the license agreement.

4. Assessing the value of the property right commercial worth of integral intangible system (technology) ( $C_{techn}$ ) is equivalent ( $\approx$ ) for the seller and will be the value taking into account the estimated period of product manufacture and marketing years of market efficiency of innovative products from the standpoint of its purchaser, which is determined by using a discount rate ( $R$ )

$$C_{tecn} \approx \sum_{i=1}^T \sum_{j=1}^n P_i (1 + R)^{T-i} = \sum_{i=T}^n B_{techni}, \quad (3)$$

where  $B_{techni} = \sum_{i=1}^T \sum_{j=1}^n \Pi_i (1 + R)^{T-i}$  is the present value of the commercial value of the property right of integral intangible system (technology) for the evaluation period;  $i = 1, 2, 3, \dots, n$  is period, years;  $T$  is assessment period, year;  $R$  is the discount rate (interest rate) that is determined  $R = 1/(1 + i)^t$ ;  $P_i = K_{ciz} \cdot E_{n_i}$  is profit in the  $i^{th}$  period;  $K_{ciz}$  is the total amount of target investments, reduced to the target year (period);  $E_{n_i}$  is investment efficiency factor in the  $i^{th}$  period.

It is possible to take into account the risk-free rate of investment return, the amount of the premium for the risks associated with the investing of the assessed integral intangible system (technology), rates of investment return, similar in level of investment risk.

Methodically the discount rate (discounting rate, cut-off rate) is the coefficient used to determine the present value based on cash flows forecasted for the future, by condition of their change during forecasting periods. The discount rate characterizes the return rate on the invested money amount and the return rate in the post-forecast period, according to which on the valuation date the buyer can invest in the acquisition of the valuation object, taking into account all its risks associated with investing.

In case of transferring innovative technology under the license agreement, the licensee shall pay the license fee within the terms established in the agreement. The most common license fee is a royalty, which indicates the real profit received by the licensee as a result of transferring innovative technology and rights from its use, for which they pay the share of the licensee's profit established in the contract (at the level of half of the standard profit per unit of innovative products without value added tax or other).

Assessment of the value of the property right commercial worth of integral intangible system (technology) is performed under the transfer agreement, which provides license relationship, then the estimated license price ( $C_{techn license}$ ) is equivalent to the licensee's profit ( $\approx$ ) from using the license subject in the new generation production) multiplied by the royalty rate

$$C_{tecn license} = \sum_{i=1}^T P_{il} \cdot R_i / 100,$$

where  $P_{il}$  is the licensee's profit from using the license subject in the  $i^{th}$  year, UAH;  $R_i$  is royalty rate in the  $i^{th}$  year, as a share of the licensor, %;  $T$  is evaluation period, year.

The deterrent for the licensee is the total amount of target investments, which are reduced to the target year (period), and equivalent ( $\approx$ ) to expected the licensee's profit for the entire period of using property law of integral intangible system (technology) under the transfer agreement from using the license subject, taking into account regulatory profit not exceeding 25 percent of the unit cost of innovative products without value added tax.

## Conclusions.

1. The value of the property right of the technology object becomes quantitative when it is identical (equivalent) to the value of the material embodiment of technology object or a carrier presented in an objective form, i.e. available for perception by others. Creation, implementation and realization of an integral intangible system (technology) consistently includes the entire material system, and its result is innovative products. The value of the property right of the technology object is an abstract value, which is set at the discretion of the technology owner or by agreement of market counterparties.

2. Transfer of innovative technologies according to estimated value is not considered as separate objects of intellectual property rights, but from the standpoint of comprehensive valuation, where the valuation object is property rights of integrated intangible system (technology), which significantly increases the possibilities of commercialization of intellectual property rights, implementation of innovation and investment projects, which are based on an integral intangible system (technology), on the terms of its industrial development with a profit (income).

3. The presented model approach using formulas to estimate cost of transferring innovative technology is comprehensive valuation property rights of integrated intangible system (technology), which takes into account the target investment for the entire development period, they are invested in the creation, implementation and implementation of innovative technology, which bring costs and results obtained taking into account the time factor according to the relevant economic methodology to the calculation period, the results carried out and obtained before and after the target year (period).

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## Модельний підхід до оцінки вартості трансферу цілісної нематеріальної системи (технології)

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**Мета.** Формулювання підходу до оцінки вартості комерційного трансферу цілісної нематеріальної системи (технології) на відміну від сукупності оцінок окремих об'єктів права інтелектуальної власності.

**Методика.** Для визначення оцінки вартості цілісної нематеріальної системи (технології) використовується модельний підхід із застосуванням формул за алгоритмом використання інвестицій у розробку інноваційної технології з приведенням витрат і результату до фактору часу, здійснюваних і одержуваних до та після розрахункового року (періоду) з використанням коефіцієнта дисконтування.

**Результати.** Представлений модельний підхід до оцінки вартості комерційного трансферу інноваційної технології розглядається не за окремими об'єктами права інтелектуальної власності, а як комплексна оцінка вартості, де об'єктом вартісної оцінки є майнові права цілісної нематеріальної системи (технології), що суттєво спрощує розрахунки визначення вартості майнових прав інтелектуальної власності трансферу технології та створює можливості впровадження інноваційного техніко-технологічного проекту виробництва нового покоління, пов'язаного з цілісною нематеріальною системою (технологією), спрямованої на отримання прибутку (доходу).

**Наукова новизна.** Запропоновано новий підхід до оцінки вартості комерційного трансферу інноваційної технології, якою є цілісна нематеріальна система, як сукупність наукових та інженерних знань, утілених у способах і засобах праці, наборах матеріально-речових факторів виробництва, видах їх поєднання для створення певного продукту або послуги. Це призводить до отримання синергетичного ефекту за результатами продажу інноваційної продукції у вигляді прибутку (доходу). Важливою умовою оціночної вартості майнового права об'єкта технології є її кількісне значення для споживача, коли кількісна оцінка стає тотожною (еквівалентною) вартості матеріального втілення об'єкта технології або носія, представленого в об'єктивній формі, тобто доступний для сприйняття іншими особами.

**Практична значимість.** Запропонований модельний підхід оцінки вартості майнових прав цілісної нематеріальної системи (технології) дозволяє спростити розрахунки вартості розробленої/их або впровадженої/их інноваційної/их технології/ій, спрямованої/их на створення та впровадження виробництва нового покоління в реальному секторі економіки, що сприятиме підвищенню ефективності й наповнення бюджету країни.

**Ключові слова:** інноваційна технологія, комерційний трансфер технології, оцінка вартості, майнові права, цілісна нематеріальна система

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