

The object of this study is the existing regulatory approaches to determining the forms of technology transfer in the legal systems of economically developed countries of the world, international treaties, and agreements.

During the research and generalization of existing concepts, it was established that they are not unified and differ significantly from each other. It has been proven that this does not meet the needs of technology transfer participants and significantly destabilizes the technology transfer process. The expediency of improving the existing normative concept of determining the forms of technology transfer by fixing their single list has been substantiated. Recommendations on the list of the main forms of technology transfer have been formed based on a systematic analysis of legal acts that determine the peculiarities of the essence of technology. A classification of the main forms of technology transfer was proposed. Four main forms of technology transfer were identified as the transfer of rights to technology during its creation, within the framework of joint cooperation, within the framework of cooperation based on corporate and/or proprietary commercial principles. The expediency of dividing each form of transfer into separate subtypes was also substantiated. The need to make changes to the provisions of such international treaties and agreements as the World Trade Organization Agreements, the Recommendations of the World Organization for the Protection of Intellectual Property, the Oslo Guidelines, the UNCTAD Recommendations, and the framework program "Horizon Europe" has been proven.

The study is aimed at forming general theoretical foundations for improving the essence of regulatory techniques for identifying forms of technology transfer. The research results could be used in the formation of international normative acts, recommendations of international institutions, acts of national legislation, and serve as a basis for further scientific research into these issues

Keywords: legal regulation of technologies, forms of technology transfer, unification of forms of transfer, innovations

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DETERMINING DIRECTIONS FOR IMPROVING THE LEGAL REGULATION OF TECHNOLOGY TRANSFER FORMS

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1. Introduction

The economic development of any country depends on the amount and level of competitiveness of the public product produced on its territory. The consequence of this is that the production domain of the economic system becomes an object of strategic state interest and all prerequisites for its effective functioning are created for it. Each production process directly depends on how effective the means of production are used in it. Any business entity seeks to master the means of production that will ensure the production of more competitive products. This interest led to the initiation of information transfer processes about the order and sequence of production operations, which gradually intensified. Over time, based on such processes, technology transfer arose, which almost automatically became a guarantee of effective economic development. Under such conditions, the main task of the state has become ensuring the functioning of

normative rules for the dissemination of technological processes among commodity producers. And the globalization of the world economy has led to the formation of processes of international transfer of means and methods of production, as well as information about the technological features of their use.

Despite the high economic potential of technologies, the significant interest of business entities in the implementation of specific innovative projects based on technology transfer, regulatory regulation of these processes is imperfect. Thus, the majority of normative acts determine only the general features of forms of transfer of rights to technology. At the same time, insufficient attention is paid to the issues of regulation of algorithms, methods, mechanisms, transition of technology from one subject to another. In addition, there is a significant difference in the definition of the essence of the technology, which is recorded in individual national regulatory systems. International treaties and agreements also

do not contain generalized approaches to what technology transfer should be. Moreover, various intergovernmental entities, such as the European Union, generalizing national approaches, often recommend radically different ways of defining technology transfer. The shortcomings of the legal regulation of forms of technology transfer are extremely negatively reflected in the number of examples of technology transfer and the degree of their spread within the production domain. The general direction of the state regulation of technology transfer is not possible without the unification of the general approach to determining the forms of technology transfer.

This predetermines, on the one hand, the relevance of scientific research into this topic, and, on the other hand, leaves scientists with the task of forming proposals for improving existing constructions of the concept of technology. It is science that should form such proposals and thereby stabilize and intensify technology transfer and innovation processes.

2. Literature review and problem statement

Questions related to the definition of the essence of the forms of technology transfer were studied both in general and in terms of their individual elements. Such studies were conducted both at the level of legal systems of individual countries and within the framework of international regulatory documents.

For example, in work [1], the issue of technology transfer during the implementation of scientific and research works within the functioning of scientific and scientific and research institutions is investigated. It was concluded that the main form of technology transfer for such entities is their development and transfer to the customer. Within the scope of the work, no proposals were made to improve methods of identifying forms of technology transfer. In the work, the existence of a discrepancy between the form of transfer and the method of its identification was substantiated.

Within the framework of work [2], on the example of the law of the European Union and the legislation of the Republic of Serbia, such a form of technology transfer as a license agreement is analyzed. It was concluded that the author (developer) of the technology has no means of protecting his personal rights since he does not have the right to revoke the license, the terms of which are violated. However, within the framework of this study, no generalized proposals were formed regarding the improvement of existing forms of technology transfer. Only recommendations were offered regarding those protective clauses that the parties to the relevant license agreement should use to eliminate the identified gap in legal regulation. That is, proposals have been made to improve the internal mechanism of one form of technology transfer.

In the course of study [3], an assessment of the ability of the main regulatory approach to determining the forms of technology transfer to respond to macroeconomic events of an extraordinary nature was provided. It was concluded that the identification of forms of technology transfer with the transfer of rights to objects of intellectual property law does not meet existing needs. It is proposed to expand the boundaries of the concept of the form of technology transfer and include the transfer of experience in the use of technology, but no universal regulatory structures are proposed that could be the basis for improving existing approaches to

determining the forms of technology transfer. Also, a critical analysis of the expediency of using a single approach to determining the forms of technology transfer was not carried out, only an expansion of its content was proposed.

Work [4] reported a study of how the patent form of technology transfer affects foreign investment. In the course of the study, it was established that within the framework of technology transfer based on foreign investment, objects that are not covered by patent agreements are always transferred. Thus, attention is focused on the fact that the transfer of technology is accompanied by the transfer of experience of foreign experts, the supply of machines and other equipment. It was concluded that license and patent agreements are not able to regulate the transfer of such additional objects, which leads to the emergence of numerous organizational barriers.

Within the framework of work [5], a study of obstacles standing in the way of forms of international technology transfer was conducted. A list of reasons that negatively affect the transfer of technologies from one country to another was formed. The main ones included: lack of control over the way technology is used, lack or fragmented regulation of the status of technology in the host country. The inconsistency of the regulatory construction of license agreements with the needs of technology transfer participants and the presence of customs and tariff barriers were also identified as obstacles. At the same time, in the course of the study, no proposals were made to change the regulatory approach to determining the forms of technology transfer. The main goal of the work was only to systematize the experience of forms of international transfer of technologies and to single out the problems of their intensification.

Work [6] analyzed the reasons and conditions that stand in the way of forms of transfer of marine technologies. Within the study, it was proved that the main reason for the low level of transfer of marine technologies is the fragmentation of international regulation. It has been proven that the lack of basic concepts and categories (such as technology and technology transfer) make existing maritime technology transfer rules complex and ineffective. This, in turn, has a negative impact not only on the number of those wishing to carry out such a transfer, but also on the means of financial support provided within the framework of technology transfer. A number of proposals were made to improve the current international regulation. However, such proposals do not apply to all technologies, but only to marine technologies. There were also no suggestions for improving the essence and characteristic features of forms of technology transfer.

In the course of study [7], an assessment of the compliance of the law of the European Union from the point of view of preventing criminal activity in the field of technology transfer was provided. During the research, it was established that the legislation of the European Union does not meet the existing requirements, as it does not establish this form of technology transfer in the form of information. This leads to the fact that information about dual-purpose technologies (both military and civilian) falls into the hands of terrorist organizations, bypassing existing restrictions. It is proposed to make changes to the existing regulatory rules in order to regulate the forms of technology transfer in its information embodiment. However, no conclusions were formed regarding the improvement of regulatory structures to the generalization of forms of technology transfer.

In [8], a comparative analysis of such two forms of technology transfer as partnership based on software (local)

regulatory means and license agreements was carried out. It was concluded that partnership is a more effective form of technology transfer, as it involves more appropriate regulatory mechanisms. A longer period of interaction between the developer of the technology and its recipient, and the possibility of flexible revision of its terms were identified among the main advantages of the partnership. However, within the framework of the work, no proposals were made to improve the regulatory approach to determining the forms of technology transfer. Only the advantages and disadvantages of one form of transfer over another were formed.

All the works analyzed above [1 8] testify to the focus of scientific research on solving the issue of increasing the efficiency of certain forms of technology transfer. No works have been found within which proposals for improving the generalized regulatory constructions for determining the forms of technology transfer would have been formed. But we can talk about the presence of many problematic aspects of the implementation of methods of technology transfer and a high level of private law and public interest in this process.

All this allows us to state that it is expedient to conduct a study aimed at the formation of proposals for improving the construction of the definition of technology forms. Formed proposals should ensure a higher level of technology transfer efficiency. The conclusions formed within the scope of this study could become the basis for further scientific developments, as well as the basis for the formation of promising international and national regulatory acts.

3. The aim and objectives of the study

The purpose of our study is to justify directions for improvement of normative constructions of forms of technology transfer. The obtained achievements can be useful for changing the provisions of international acts of the UN, rules of the World Trade Organization, national rules of the member states of the European Union, and the law of the European Union.

To achieve this goal, the following tasks are defined:

- to analyze the fundamental approaches to determining the essence and characteristic features of forms of technology transfer, within the framework of the leading national legal systems, to evaluate their shortcomings and advantages;
- to formulate proposals for improving the essence of technology transfer forms.

4. The study materials and methods

The object of our study is a set of legal, regulatory, normative methods and techniques for determining the content and essence of such a category as a form of technology transfer.

The hypothesis of the study assumes that the regulatory mechanisms for identification of forms of technology transfer, which are already established in the relevant legislative acts, do not meet the needs of its participants, and therefore require improvement. When conducting this study, it was assumed that the inconsistency of the existing regulatory regulation in the identification of forms of technology transfer negatively affects the level of their transfer. The basis for this was the assessment of regulatory mechanisms under the legislation of economically developed countries of the world

and their comparison with the designation of forms of technology transfer.

During the implementation of this study, a simplification was adopted, within which the national peculiarities of the normative identification of technologies were not taken into account. The need for such use is due to the fact that most countries establish a unique regulatory regime for their use, the study of which is irrational, as it must be changed in the future.

In the course of the study, prescriptions of legal acts of UN organizations, the European Union and acts of the World Trade Organization, information from open sources were used. In addition, recommendations of leading international institutions, statistical information, and public information were used.

When conducting the research, general scientific theoretical methods were used, namely: synthesis, induction, deduction, analysis, abstraction, comparison, generalization, functional and systemic methods, modeling methods, formal and logical interpretation of the content of scientific and normative categories and concepts.

5. Results of the study of directions for improving the regulation of forms of technology transfer

5.1. Study of the main approaches to determining the essence and signs of forms of technology transfer

For the first time, technology in the modern sense was defined in work [9] as the implementation of a scientific method of processing one object into another. It is in this work that the understanding of technology as a certain means of production, a method of processing raw materials into finished products is substantiated. The product is endowed with different consumer properties than before its processing. Technology as the main investment object, which has an innovative value for updating the activity of a business entity, was defined in work [10]. The definition of technology as the main innovative object, which is at the heart of highly competitive development at the macroeconomic and microeconomic levels, was defined in work [11]. These works became the basis for the development of the concept of technology identification as a special innovative object. A generalized concept of technology understanding was presented in [12].

Since the formation of technology as a special object of economic relations, the formation of relevant regulatory rules for its circulation, turnover, transfer, and use began. For a long time, such rules were regulated by general trade customs, agreements, regulatory and legal acts. However, over time the situation has changed. In 1994 (April 15, 1994), the World Trade Organization (hereinafter referred to as "WTO") adopted the Agreement on Trade Aspects of Intellectual Property Rights ("TRIPS" agreement) [13]. This international document became the main one in regulating the status of objects of intellectual property rights between WTO member countries. This agreement defines the rules of technology transfer, which were unified with the process of transferring rights to objects of intellectual property rights [13]. After the ratification process, similar regulatory approaches to determining the essence of technology transfer were enshrined in the national legislation of most WTO member countries.

In 2005, a similar regulatory position was recorded by the World Intellectual Property Organization (hereinafter

referred to as “WIPO”). Thus, within the framework of the established recommendations, the definition of technology as a complex object of intellectual property law was recorded [14]. As the main form of technology transfer, WIPO has defined treaties and agreements regarding the transfer of rights to patents that protect intellectual property rights as part of technology.

As a result, due to the actual economic impact of these international acts, the main approach was that technology transfer began to be equated with the transfer of rights to intellectual property objects. And accordingly, the forms of technology transfer are those ways of transferring rights that were previously determined for different ways (forms) of transferring such objects.

Another, broader approach to the interpretation of the concept of technology transfer and possible forms of its transfer was formed during the functioning of a special body of the UN General Assembly – the UN Conference on Trade and Development – UNCTAD. The reason for this was that the intellectual property regime is not able to provide protection for new objects (software, biotechnological products, circuits of integrated circuits). The reason is also the abuse of the monopoly position of transnational corporations, which, imitating the conclusion of agreements on the transfer of technologies, created artificial barriers for their transfer to other countries [15]. In order to eliminate the negative economic consequences of such abuse, a number of regulatory recommendations were formed to prevent this. Among such recommendations, universal designs of various forms of technology transfer were formed, which could be used within the regulatory policy of an individual state. Thus, technology transfer was defined as the process of spreading commercial technologies, which has the form of a transaction. At the same time, it may be covered (or not covered by a legally binding contract) and which provides for the transfer of relevant knowledge to the recipient [15]. The following forms of technology transfer were also identified:

- transfer, sale, and licensing of all forms of industrial property, with the exception of trademarks, service marks, and trade names, unless they are part of technology transfer operations;
- provision of know-how and technical expertise in the form of feasibility studies, plans, schemes, models, instructions, manuals, formulas, basic or detailed engineering projects, specifications and training equipment, services;
- involvement of technical advisory and management personnel, personnel training;
- provision of technological knowledge necessary for installation, operation, and functioning of installations and equipment, as well as turnkey projects;
- provision of technological knowledge necessary for the purchase, installation and use of machines, equipment, intermediate goods and/or raw materials, which were acquired by purchase, lease, or other means;
- ensuring the technological content of agreements on industrial and technical cooperation [15].

A systematic analysis of the above provisions of the UNCTAD recommendations allows us to conclude that this international institution defines a broader approach to determining the essence of regulatory approaches to forms of technology transfer. And this way of a broader interpretation of forms of technology transfer includes previously formed concepts of their identification with the transfer of rights to objects of intellectual property law.

A similar approach to the identification of the regulatory approach to determining the essence of technologies can also be seen in the recommendations of the Organization for Economic Cooperation and Development (hereinafter referred to as “OECD”). Thus, the OECD, since 1992, has been working on the formation of recommendations on the formation, circulation, and use of innovations – the Frascati Handbooks. In 2018, an updated edition of such recommendations was issued, called the Oslo Guidelines [16]. This international document has become a kind of methodical guide on how to properly form an innovation and how to use it effectively. Given that most regulatory approaches include technology as part of innovations [10, 11, 17], the mentioned recommendations are automatically extended to them as well. Within these international recommendations, technology is interpreted as knowledge about the transformation of resources into products, which includes the practical use and application to business processes or products of technical methods, systems, devices, skills, and practices. And, accordingly, the forms of technology transfer are close to the degree of identification with those that were formed within the framework of UNCTAD activities.

A systematic analysis of regulatory approaches within the regulatory systems of the European Union (hereinafter referred to as the “EU”) and EU countries shows the lack of uniformity in the approach to understanding the essence of technology. Therefore, this leads to the absence of universal structures for the identification of forms of technology transfer within the framework of EU regulatory measures. However, the approach formed within a special type of regulatory measures with state support for innovation processes and technology transfer is very illustrative. The main regulatory act in the field of innovation support for technology transfer within the EU is the Horizon Europe Framework Program approved by the European Parliament for the period from 2021 to 2027 [18]. A systematic analysis of this regulatory document allows for the formation of the following forms of technology transfer, the support of which is allowed within the EU. They mean the following forms of technology transfer:

- within the framework of fundamental scientific research;
- when conducting applied scientific research;
- during the implementation of special interstate defense and industrial programs;
- within the framework of grant funding and cooperation;
- when conducting pre-commercial and public procurement;
- when they are created in scientific, scientific and research institutions, teams of scientists, provided the results of scientific and research and development works are available, and (or) experimental equipment in which the technology is embodied;
- as a contribution to the integral property complex of small and medium-sized enterprises, family enterprises, other business entities;
- in the functioning of other formalized (or non-formalized) associations of people or economic entities, if they have technology in the form of intellectual knowledge and developments, information about the sequence of technological operations [18];
- when creating startups that have any information about technology, in a form that suits the entity that is ready to support such a startup [19].

The generalization of the main forms of technology transfer in the EU is shown in Fig. 1.

Thus, despite the formal lack of regulatory consolidation of unified forms of technology transfer, for the purposes of financial support, the EU invests a different, broader understanding of the forms of their transfer. Despite the sectoral specification of regulatory measures to support and stimulate the innovation process and technology transfer, this approach cannot be ignored. By implementing certain measures of state support for technology transfer, the EU automatically initiates one or another form of such technology transfer. This, in turn, creates the emergence of appropriate economic and social relations with the participation of participants in technology transfer.

In any case, when studying the issue of regulating methods of identification of forms of technology transfer, one cannot also ignore conventionally traditional methods of their transfer, which are included in the general scope of powers of each subject of the economic system. This also applies if they are not identified as such when establishing a regulatory approach to determining the forms of technology transfer. We are talking about the possibility of creating and putting the technology into circulation, especially if this kind of work was not carried out by a one-person developer, but by a certain team.

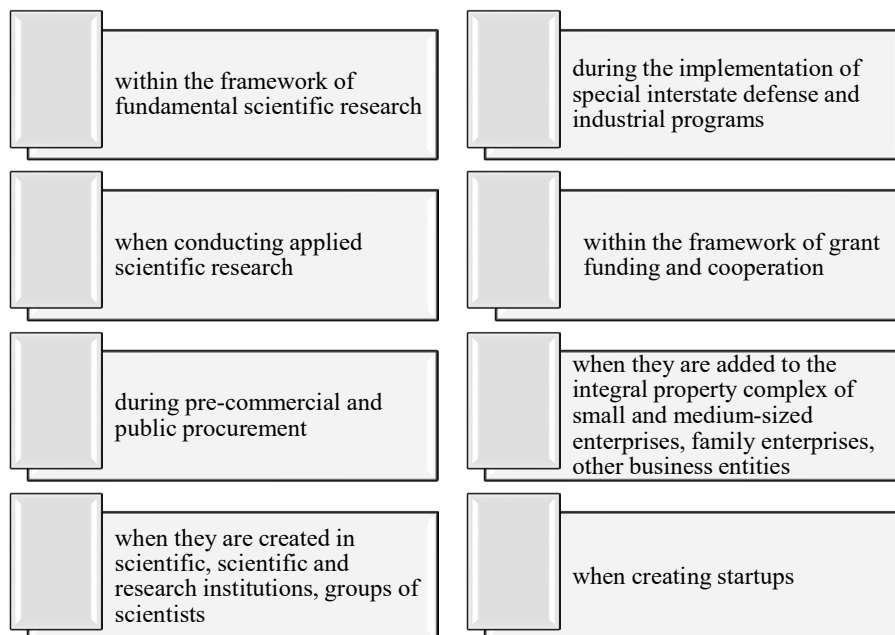


Fig. 1. Generalization of the main forms of technology transfer in the EU

The general systematization of the main forms of technology transfer is shown in Fig. 2.

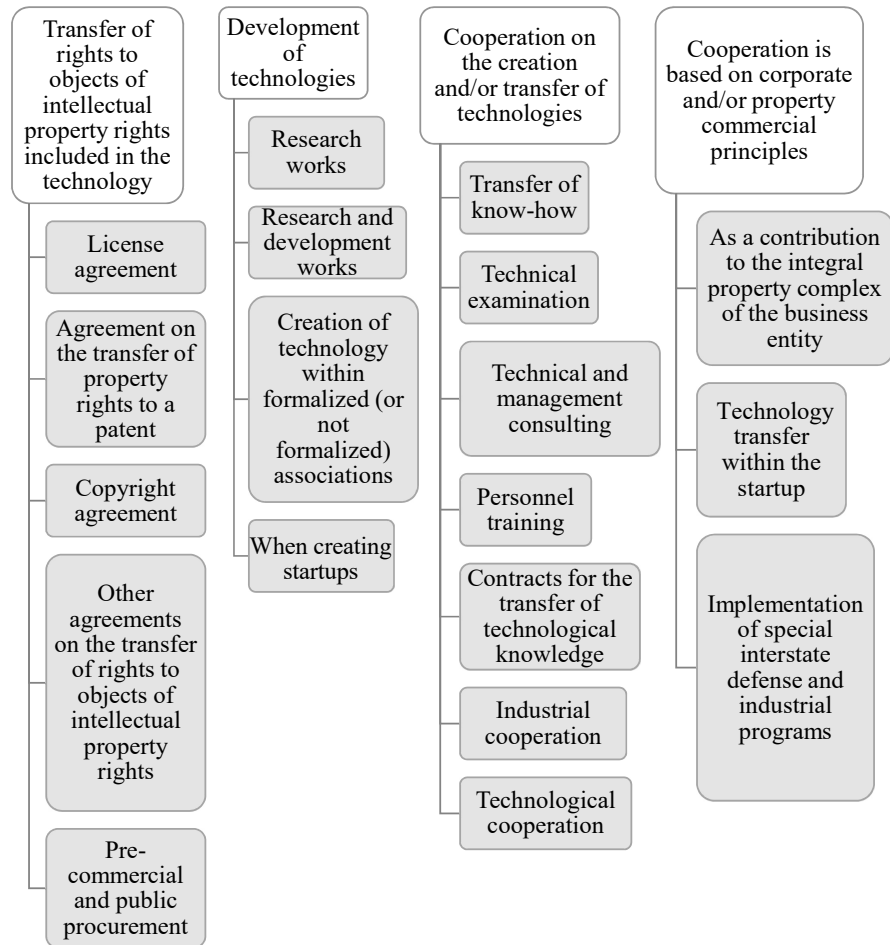


Fig. 2. Systematization of the main forms of technology transfer

Thus, it is possible to distinguish 4 (four) main forms of technology transfer, which include separate subspecies based on established methods of transferring rights to technology. Each of the specified subtypes of transfer forms is endowed with certain common features that allow them to be grouped.

5. 2. Proposals for improving the essence of technology transfer forms

Various approaches to the identification of the understanding of the essence and forms of technology transfer revealed during the research indicate the need to change the regulatory concept of their identification. The main direction of improvement of the regulatory constructions of forms of technology transfer should be based on those

shortcomings that were discovered when applying the existing approaches to the definition. The first stage (direction) of such improvement should be fixing a general list of possible forms of technology transfer. The complexity and entanglement of the existing regulatory structures in itself has a negative organizational impact on the system of relations regarding the transfer of technologies [5]. Stabilization can be achieved by fixing the list of forms of technology transfer at the level of the most influential international treaties and agreements on this issue. The following are such contracts:

- TRIPS agreement;
- WIPO recommendations;
- Oslo guidelines;
- UNCTAD recommendations;
- framework program “Horizon Europe”.

The next (second) direction of improvement of the existing regulatory constructions for determining the forms of technology transfer is the fixation of a wider list of forms of its transfer. It is advisable to form such a list at the level of UNCTAD recommendations, taking into account the actually defined forms of technology transfer defined within the Framework Program “Horizon Europe”.

Another (third) direction of improvement of regulatory ways of identifying forms of technology transfer is its structuring according to certain criteria. This kind of structuring should be carried out based on the basis of the origin and type of legal obligations between the transferor of technology rights and their recipient. As such grounds, it is considered appropriate to define the following:

- transfer of rights to objects of intellectual property rights included in the technology;
- transfer of rights to technology during its direct creation;
- transfer of rights to technology in the course of joint cooperation;
- transfer of rights to technology within the framework of cooperation based on corporate and/or property commercial principles.

6. Discussion of results of the study of directions for improving the regulation of innovative investment

Our research results and the formed approach to determining the essence of technology are explained by the need to solve the identified shortcomings of the existing approach to their role and place within economic and social relations. The proposed areas of improvement solve most of these shortcomings.

Technology is a multifaceted economic and social phenomenon and object. The ability of technology to be the basis of numerous social relations requires reflection when choosing regulatory means of identification of its transfer. At the same time, the presence of different approaches to determining the forms of technology transfer indicates the need to continue scientific research on this issue.

The approach that equates technology transfer with ways of transferring rights to objects of intellectual property law, which are part of it, no longer meets current economic requirements [2]. Scientific works [1–8] additionally confirm the ineffectiveness of such a regulatory approach, due to the inconsistency with the purpose of technology

within economic systems and the inability to ensure the interests of technology transfer participants.

The main drawback of this approach to determining forms of technology transfer is its one-sidedness. The forms do not take into account the accompanying objects that are part of the technology, especially such as information about the technology and the system of equipment and equipment in which it was already embodied [4]. Thus, the technology that was created as a result of scientific research and research and development works cannot yet receive protection as an object of intellectual property rights and may lead to their loss during the transfer [1]. The information embodiment of technologies (descriptive information and information about the technology) is not at all endowed with the features of an intellectual property object, but it contains everything necessary for the material reproduction of the technology itself. Its transfer takes place without any measures of an organizational and control nature, which already leads to the commission of criminal acts with the help of such technologies [7]. The material embodiment of technology cannot receive any legal protection at all, since the protection of the rights of objects of intellectual property law does not provide for this [5, 6].

At the same time, the main advantage of this approach is that technology transfer participants can restore their violated rights and legitimate interests within the previously created system of protection of intellectual property objects [13].

The list of forms of technology transfer provided by UNCTAD is much broader than the approach provided by WIPO. In addition to methods of transferring rights to technology as a set of objects of intellectual property law, other manifestations of it are also represented here. The main advantage of this approach is that by using it, technology transfer participants will be able to protect their interests more effectively. A larger list of forms of transfer cuts off access to a greater number of regulatory tools for the implementation of its transfer. The interpretation of the transfer of technology through a wider range of objects allows additional state guarantees to be extended to them. The main drawback of this approach is that it needs further development and improvement, since neither the norms of national legal systems nor the norms of international law contain detailed rules for their transfer. The specified UNCTAD recommendations should be considered as an indicative direction for further improvement of forms of technology transfer.

The formed list of forms of technology transfer, within the limits of EU law (Fig. 1), generally reflects the main recommendations of UNCTAD, but has several formal shortcomings. Among the main ones is the difference in the normative fixation of available forms of technology transfer, within the limits of several acts of EU law. This method of fixation plays a negative role in the formation of ways of transferring rights to technology. It does not provide the technology transfer participant with the opportunity to take into account all the rights available to him and choose the most effective way of transferring the rights to the technology. The advantages of this approach are similar to those mentioned earlier. Namely, a higher degree of effectiveness of technology rights protection; a greater number of locally legal regulatory instruments that can be used.

The proposed areas of improvement of the regulatory constructions for the identification of forms of technology transfer (Fig. 2) are formed on the basis of the identified shortcomings of existing approaches. This is expedient due to the fact that a certain fragmentary legal regulation of methods of transferring rights to technology is already present in the majority, and within the scope of this study we can only talk about the improvement of existing mechanisms. Under such conditions, it is impractical to form a completely new concept of understanding the essence of the forms of technology transfer, since the existing regulatory means were the result of the organic development of these relations.

The main advantage of the proposal to fix a generalized list of forms of technology transfer (Fig. 2) is the stabilizing effect that should occur after its implementation. In this case, the participants of technology transfer will have a pre-defined set of powers that can be used by them to execute joint business transactions. The main drawback of the proposed direction is that any list will always be narrower than the social relations that will develop in the economic system. This shortcoming should be compensated by such a technique as fixing the main list of forms of technology transfer, without rigidly fixing the possible forms of technology transfer.

A mandatory condition for the effectiveness of the implementation of the specified changes is that the list of the main forms of technology transfer must be established in the relevant international legal documents. It is expedient to include the TRIPS Agreement, WIPO Recommendations, Oslo Guidelines, UNCTAD Recommendations, and the Horizon Europe framework program. The choice of these international agreements and recommendations is determined by the status of those institutions that initiated their appearance. They include most of the world's countries, and fixation at this level will ensure the unification of forms of technology transfer at the level of most of the world's national legal systems.

The proposed directions for improvement of the normative constructions of the definition of forms of technology transfer are the author's vision of this issue. When identifying them, those manifestations of them, which are discussed in scientific research, were taken into account. In general, these areas are suitable both for use within the definition of normative rules of technology transfer and for its further scientific development.

The main advantage of this research is that its results can be used within the framework of the legal technique of forming the provisions of normative acts of international and national legislation. Further research of the outlined issues will allow obtaining scientific results of a practical orientation. If the process of improving the forms of technology transfer is formed on its basis, the proposed concept will need to be refined. However, in any case, all previous scientific studies [1–8] either did not formulate similar propositions or investigated separate aspects. Various options for solving the issue of the existing inefficient regulatory approach to determining the essence of the forms of technology transfer were proposed. However, all these results do not have signs of integrity and are not aimed at all participants of innovative relations.

In the course of our research, directions were formed, solutions to most of the actual problems that exist when defining the issue of innovative investment. The main

advantage is that they are aimed at creating conditions for more effective technology transfer. The proposed proposals offer more effective mechanisms for solving existing problems with increasing the efficiency of identification of forms of technology transfer than was proposed in the paper [1]. Also, research results solve problems formed within the framework of works [2–8], while their authors only outlined the main regularities of the existing state.

This study is subject to limitations due to the sources of the collected information. Information about existing technologies and forms of their transfer is limited in access. The most science-intensive technologies are generally protected by the legal regime of commercial secrecy. Information on dual-purpose or defense technologies, restricted by establishing a state secret. The same legal regime of limited information is established for forms of technology transfer. The lack of open access to this information leads to a too high level of abstractness of conclusions about the role and place of technology in the modern economic system.

The main drawback of the study is the episodic nature of systematized information about examples of technology transfer that have already taken place. Another drawback is that it is theoretical in nature since there is no possibility of testing the generated results experimentally. Regional methods of technology identification had a negative impact during the study. The difference of such approaches determined the essentiality of the generalization of the conclusions that were included in the research results. This shortcoming of the research must be taken into account in the case of further study of the research subject.

The results of this scientific research contain conclusions that can become the basis for the formation of official regulatory rules, prospective normative legal acts. The possibility of their implementation within the limits of official regulatory rules is their advantage over similar studies. The further development of this research may consist in the development of legal mechanisms for fixing the forms of technology transfer. On the basis of this study, it is possible to conduct further scientific research in the field of state regulation and regulatory influence. The main difficulties in the way of further development of this research will be the regional specificity of determining the essence of technologies and technology transfer and different national structures of state regulatory policy.

7. Conclusions

1. It was determined that there is no uniformity within the basic approaches to determining the essence and characteristic features of forms of technology transfer, which causes a significant destabilizing effect in the direct implementation of technology transfer.

2. Recommendations on the generalization of the main forms of technology transfer were formulated and classified:

– within the scope of the transfer of rights to objects of intellectual property rights (license agreement, agreement on the transfer of property rights to a patent, copyright agreement, other agreements on the transfer of rights to

objects of intellectual property rights, pre-commercial and state purchases);

– when transferring rights to technology during its direct creation (research and development works, research and development works, transfer of technology within formalized (or non-formalized) associations, when creating startups);

– transfer of rights to technology in the course of joint cooperation (transfer of know-how, technical expertise, technical and management consulting, personnel training, agreements on the transfer of technological knowledge, industrial and technological cooperation);

– transfer of rights to technology within the framework of cooperation based on corporate and/or property commercial principles (contribution to the integral property complex of a business entity, transfer of technology within the framework of a startup, implementation of special interstate defense and industrial programs).

The expediency of making changes to the provisions of such international treaties and agreements as the TRIPS Agreement, WIPO Recommendations, Oslo Guidelines, UNCTAD Recommendations, and the framework program “Horizon Europe” has been proven.

Conflicts of interest

The authors declare that they have no conflicts of interest in relation to the current study, including financial, personal, authorship, or any other, that could affect the study and the results reported in this paper.

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Data availability

All data are available in the main text of the manuscript.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the current work.

Referenses

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