

# Management of Rights to the Results of Scientific Activity: In Search of an Effective Model

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## ABSTRACT

The article is devoted to global problems associated with the low efficiency of systems within which the results of scientific activities are created and used. The article also shows a specific reflection of these problems in Russian law and practice. The general problem of the inefficiency of using scientific achievements and managing the rights to the results of scientific activity is decomposed into components that allow us to build a system of performance indicators as a means of measuring efficiency in the field of scientific activity. The author of the article uses these indicators to analyze the efforts being made in Russia today to increase efficiency in the field of scientific activity. The researcher concludes that the measures taken are obviously insufficient, moreover: two factors hinder a real increase in efficiency – they are the lack of a single concept and an attempt to build a system on an administrative basis. The author suggests paying attention to the model of network organization of scientific activity and considering the latest Russian practice of decentralized management of content rights as an example of a successful implementation of this kind of concept. The main result of the study is a proposed concept of effective use of scientific achievements as an optimal ratio of at least three indicators – scale, completeness and prospects for obtaining new scientific knowledge. It is also important to note that a key element of the methodology of scientific achievement efficiency evaluation is not a ratio of outputs and inputs, but the use of scientific advances to the needs and values of society. The results of the study are intended to serve as a foundation for the creation of a methodology for assessing the efficiency of using the results of scientific activity as an integral part and a necessary element of an effective system for managing the rights to scientific achievements that would meet the needs of modern society.

**Keywords:** science, law, research findings, results of intellectual activity, efficiency, performance indicators, performance management, decentralization, network organization of science

## 1. INTRODUCTION

Even the most brilliant scientific discovery can be useless if it remains unrealized or is implemented inefficiently (not optimally). This fact is not a secret.

The achievements of science should be used as effectively as possible, that is, optimally. This is very important both for individual States and for humanity as a whole. It may even become a question of the survival of our civilization at some point. Recent events underscore this. However, a review of research on the subject of the article shows that there is no comprehensive approach to the study of efficiency in science.

The methodological foundations for the study of efficiency were laid back at the end of the 19th century, in particular, in the works of V. Pareto [1]. Classic definitions of efficiency exist mainly in economics, see, for example, the works of Tikhomirov, Nanba, Raizberg, Lozovsky, Starodubtseva [2, 3], and in the study of labor relations, see, for example, the work of Zelenevsky [4]. As applied to science, they are refracted into attempts to assess the

efficiency of the activities of scientific organizations, teams, individual scientists. See on this subject Koroleva, Vasiliev, Torzhkov [5], Petrov [6], Stepanenko [7], Yeo [8] and etc. The works of domestic and foreign authors testify to the understanding of the fact that the approach to efficiency in science needs to be changed. However, the researchers propose to do this mainly through the introduction of certain organizational forms. This is indicated, for example, by Parfenova [9], Pomortsev [10], Didikin [11], Novoselova [12], Vitol, Tyulyaev [13] and other scientists. It is much less often that we are talking about general methodological principles, and such questions are raised by Mathews, Stone [14] and Murzin [15], or about methods of managing rights to the results of intellectual activity, for example, in the works of Ivanova [16]. For the most part, the ideas about efficiency and ways to achieve it described in the literature are based on efficiency criteria that came from the economy (cost-benefit ratio). This approach seems to be one-sided, and the incompleteness of the approach seems to be dangerous if it is necessary to build an effective system in the field of scientific activity.

Many researchers define efficiency as the ratio of the result to the costs, that determined and ensured its receipt [3], but this understanding is not the only one. Other researchers define efficiency, in addition to the ratio of result and cost, as the ratio of result and needs, or even result and values [4]. We are talking about social needs and values in this case, if efficiency is considered in relation to human society. If we mean social relations that are not directly related to economic, then we are talking about social efficiency or optimality, more likely to be defined by V. Pareto, no matter how controversial the application of his theory outside the economy are (see, in particular, the works of Kazakov [1]). The state of the system is optimal or most effective when the improvement of each of the indicators characterizing it means the deterioration of the other, and the ability to improve any of the elements of the system without compromising the quality of others means the non-optimality (not maximum efficiency) of the system as a whole.

We believe that it is necessary to develop key performance indicators, the values of which can serve as necessary indicators for obtaining an objective assessment of the efficiency of the use of research results and rights management based on methods adopted in economics and sociology (including mathematical). An additional methodological study is also necessary to evaluate the values of indicators in units suitable for mathematical processing. We cannot provide a detailed analysis with mathematical modeling in the framework of a short article. However, in general, we can argue that when choosing relevant indicators it is possible to determine the efficiency of the use of scientific achievements and their management on their basis and propose methods for increasing such efficiency (using, in part, the Pareto rule). future research.

## **2. PROBLEM STATEMENT**

The general problem with the inefficiency of using scientific achievements and managing rights to the results of scientific activity can be considered as a set of problems:

- 1) the problem of the non-optimal allocation of resources to obtain the results of scientific activity;
- 2) the problem of insufficient awareness of the results of scientific activity;
- 3) the problem of the inefficiency of existing systems for managing rights to the results of scientific activities.

### **2.1. Research Questions**

The author sets up the following objectives for the research:

- development of objective (if possible, measurable) indicators to determine the efficiency of using scientific achievements;

- assessment of the efficiency of the existing system of managing rights to the results of scientific activities;
- identification of the reasons for the non-optimal use of the results of scientific activity;
- determination of the way to eliminate such causes or, at least, reduce their negative impact on the efficiency of the use of scientific achievements;
- determination of what means can be used to increase the efficiency of using scientific achievements.

### **2.2. Purpose of the Study**

The search for ways to increase the efficiency of using scientific achievements is the main goal of the study, including through improving the system of managing the rights to the results of scientific activities.

We develop a general concept of the efficiency of the use of scientific achievements, possible indicators of efficiency and criteria for determining the inefficiency of such use, in order to achieve the main goal of the study.

### **2.3. Research Method**

The methods used in this research are universal scientific research methods (generalization, abstraction, formalization, analysis, synthesis) as well as specific legal research methods (technical, comparative-historical, contrastive-comparative, etc.).

## **3. RESULTS**

### **3.1. Performance indicators for the use of scientific achievements**

The understanding of the fact that money is not the best (and at least not the only) indicator for measuring efficiency in science (especially in fundamental science) comes back to us after thirty years of post-Soviet oblivion. Nevertheless, the "western", that is, a rational model for determining efficiency, remains relevant. In a rational model, efficiency is determined using measurable variables [8], preferably - having a numerical expression or, in extreme cases, subordinate to the simplest binary logic, when the presence of something is equal to 1, the absence of something is equal to 0 (say, participation in federal target programs is equal to 1), or vice versa (with negative binary logic - for example, the absence of violations is equal to 1).

The system of "scientometric" performance indicators is generated precisely by a rational model. It is this system that is used in one form or another in many western countries and in Russia. Specific indicators can vary greatly, but the main sections of the system remain approximately the same. Scientific results are assessed in

measurable terms (number of publications, various citation indices, the presence and number of patents, etc.), financial results (including the ratio of expenses and incomes - the idea of a profitable science is still an ideal for many), human potential (the number and categories of personnel involved, including the involvement of foreign scientists). By the way, this indicator is significant not only in Russia, but also, for example, in Great Britain. Another thing is that when the indicator is "digitized", the Nobel Prize winner and an unknown assistant from the Kenyan hinterland often turn into the same reporting "one".

Additionally, we should note a group of indicators that can be called "variables" or "political". The indicators change depending on the conditions or goals that are set for research teams based on the scientific and technical (and partly social) policy pursued in a particular state or by one or another customer of a scientific project. For example, in the Russian Federation you can find such indicators as "the share of work completed ... within the framework of the implementation of priority areas of development of science, technology and technique" and "the indicator of participation in the implementation of federal target programs" (Order of the Ministry of Education and Science of the Russian Federation of 12.10.2010 No. 1011 "On target performance indicators of budgetary scientific institutions, medical institutions, cultural institutions and other institutions under the jurisdiction of the Ministry of Education and Science of the Russian Federation"). This seems to be quite reasonable for the purpose of stimulating science to move along the vector of development set by the state. And in Germany, for example, the principle of equality between men and women appears among the basic principles of assessment. "It is worth mentioning that this is a political moment, because the German government is concerned with the issue of equality between men and women ..." [5].

You can argue about the reasonableness and objectivity of certain evaluation indicators or groups of indicators (similar discussions are held in Russia and abroad), but this is not the main thing. Much more important is the other: the existing system of indicators of scientific performance actually evaluates the activities of organizations engaged in science, laboratories, individual scientists or scientific schools, but not the efficiency of the use of scientific achievements.

Of course, from the point of view of a rational model, it is much easier to calculate the number of publications and citations than to calculate the degree of implementation of a particular scientific development in relation to the needs of society. From this point of view, there is simply no systematic evaluation – as a result, a researcher who sets out to evaluate the efficiency of scientific achievements has to be content with indirect data, such as the number of patents obtained as a result of a particular scientific activity, or the selling price of an innovative drug in a retail chain. But such disparate fragments, alas, do not give an objective picture.

For example, the number of patents received (especially in countries with a liberal regime for issuing them) does not

mean that these patents will be implemented or will be fully implemented. Alexey Ivanov gave an example in his speech on 11.04.2020 at the special St. Petersburg International Legal Forum 9 1/2: "The laws of coronavirus", when a large corporation bought and destroyed an innovative startup to sell its own more expensive model of artificial ventilation devices. This example is extremely significant in the light of today's situation, when the world has become particularly aware of the priority of effectively using the achievements of science to save lives over profit. Money is obviously not applicable as the main tool for measuring such use – therefore, we must look for new criteria.

We believe that it is advisable to use the following key indicators to assess the efficiency of using the results of scientific activities and managing the rights to them:

1. *The scale of application of the result of scientific activity (how widely such a result is applied, in relation to the needs of society)*

We can estimate the scale both mathematically (in absolute units) and sociological methods (for example, by determining the circle of people directly or indirectly using the result of scientific activity), or by combining these methods (for example, as a percentage of prevalence in society as a whole or in certain layers of it). For example, when we discover the means of counteracting a disease, we must determine how many people suffering from a given disease can receive treatment based on the discovery. With the insignificance of this part, the use of the discovery can hardly be considered effective, even if the treatment gives an absolute result in each case.

2. *The completeness of using the useful properties of the result of scientific activity (to what extent the potential of a particular scientific achievement is realized)*

Evaluation in this case is carried out in two stages: at the first stage, we determine the list of ways to use the scientific result. At the second stage, we assess the actual demand for a particular use method. For example, mankind has long and widely used Faraday's laws in practice for the production of a number of substances, for the application of metal coatings, and for the production of electrical energy through chemical current sources. However, the society uses these laws for wastewater treatment relatively recently and on a smaller scale.

3. *Using the result of scientific activity to obtain new scientific achievements based on it*

A scientific achievement may not have applied value in itself, but we cannot talk about inefficiency if it is used as a material or a starting point for acquiring new knowledge.

We cannot claim that the proposed scorecard is exhaustive. We believe that additional indicators can be developed or specified. In addition, it should be noted that the weight of indicators in the overall assessment can vary significantly

depending on the nature of scientific achievement (for example, for the results of theoretical studies, the prospect of further research based on them is the most important indicator). And of course, the assessment should be comprehensive (legal, economic, social, etc.) [2].

### **3.2. Inefficiency of using scientific achievements: manifestations and causes**

Inefficiency in the use of scientific achievements can be considered, in accordance with the developed performance indicators:

- insufficient application of the result of scientific activity;
  - the use by a limited circle of people of the result of scientific activity, potentially useful for many;
  - application of the result of scientific activity in an incorrect (or insufficient) way that does not allow full use of its useful properties;
  - stagnation as a lack of further research activity to obtain new scientific achievements based on existing,
- if an improvement in any of these indicators does not lead to a deterioration of all others.

A number of factors may be the cause of this inefficiency:

- lack of awareness of a wide range of potential users (not only end users, but primarily potential interested people in scientific, industrial and other circles), their lack of information about the results of scientific activity received by someone and their potential opportunities;
- suboptimal allocation of resources needed to obtain and apply scientific achievements, including lack of funding (it may also be noted that priority is given to the use of this or that unique equipment or other not universally available capabilities, such as a place for experiments aboard a space station);
- insufficient efficiency of existing systems for managing rights to the results of scientific activity, which manifests itself in different ways in different states and legal orders: from full state control and, as a result, one-sided and inflexible use of the results of scientific activity in an administrative-command system to the desire to maximize profits from owning knowledge in a capitalist society, which entails no less unpleasant consequences.

We believe that it is not necessary to talk about the optimal (most effective — or, if we turn to the theory of the same Pareto, at least 80% effective) use of the results of scientific activity in most countries of the world.

### **3.3. Possible ways to increase efficiency**

The most effective solution to these problems is based on the elimination of the causes that gave rise to them. We can name wonderful and self-evident ways to achieve this goal. This is informing potential users, optimal allocation of resources, effective management of rights to scientific achievements and providing access to them for those who need it. But how to achieve this in real life?

We believe that the solution is complex (organizational, legal, financial), but primarily lies in the organizational plane. A self-organizing network structure is an ideal model for an effective system for the production and use of scientific achievements. Such a structure has maximum flexibility and the ability to adapt to the needs of society. Indeed: the consumer himself guides the scientific community to the results he needs within the framework of such a structure. Ideally, the consumer also provides financing and, possibly, the provision of other necessary resources, the research process and the circle of specialists involved are determined flexibly, for a specific situation, and for the result you do not need to look for an application, since it immediately begins to be used. All of the above performance indicators are thus fulfilled.

There is an understanding of the prospects for such an approach in Russia [9], and some support at the state level. Thus, the development of network forms of organization of scientific, scientific-technical and innovative activity, including research, engineering and production consortia, cluster development of high-tech business [12], enshrined as directions in the Strategy of scientific and technological development of the Russian Federation, approved by presidential decree of December 1, 2016.

A specialized legal framework is being created to use the design of consortia [13], clusters [10]. New organizational forms, however, have not yet become widespread, although examples of a successful evolutionary transition to a network form of organization already exist in similar (and in many respects related) areas of human activity in Russia. For example, the innovative practice of managing rights for certain categories of intellectual property objects is becoming more widespread [17]: in fact, a new system is being born before our eyes - decentralized, flexible, technological, information-open and very effective.

Probably, such a system would partly solve the issue of financing scientific activity (as part of the problem of the non-optimal allocation of resources needed to obtain and apply scientific achievements in general). A serious legal step was taken not so long ago in Russia in the direction of increasing flexibility in raising funds for research purposes through investment platforms (Federal Law No. 259 dated 08.08.2019, which is often referred to as the “crowdfunding law”).

It is obvious, however, that instruments of this kind are not suitable as the main source of funding for a number of scientific research, especially fundamental research (here specialized funds still play and will play a large role), and some applied research is too resource-intensive for independent financing. Therefore, such a means of attracting financing as a public-private partnership is of serious interest, and work is also being carried out in our country [11].

Other financing options are also possible, their development has been going on in the world with varying success for more than a hundred years (recall, for example, the work of the Commission on Intellectual Cooperation, created by the Council of the League of Nations, and the International Institute of Intellectual Cooperation in the first quarter of the 20th century) [18].

Finally, the problem of the insufficient efficiency of existing systems for managing rights to the results of scientific activities (with the exception of perhaps certain “closed” topics, for example, defense) is also ideally solved by creating a network scientific platform or a number of platforms combining the functions of attracting investments, organizing the research process and management of the implementation of the results. Here we can recall, by analogy, a new effective Russian practice of managing rights to content with its characteristic features: self-regulation, interaction of the consumer and the content provider with a minimum number of intermediaries (and at all stages, from ordering content to settlements). However, there is a concern that legal regulation in the scientific field will go a different way.

In any case, the Recommendations on the management of rights to the results of intellectual activity in organizations (approved by the Ministry of Economic Development of the Russian Federation on October 3, 2017) suggest such an idea, with their classical ideology of centralized management of rights and their protection, no matter what is said about “vertical and horizontal integration” as a means of increasing efficiency [16]. Now it is very important for us to evade making a mistake in choosing what to regulate: the process of scientific activity or, nevertheless, the relations associated with the creation and protection of the results of scientific activity. It is important not to slip into an administrative routine with a mechanical calculation of the number of publications and patent applications [15].

#### 4. CONCLUSION

Ways to improve the efficiency of the process of creating and using the results of scientific activities, including in Russia, are identified in this article. Unfortunately, we must state that both measures and regulations suffer from a common “disease” – fragmentation, lack of a unified vision, and this despite the positive dynamics in domestic legal regulation. For example, mention of clusters is available in more than three hundred Russian regulations of the federal level, but, alas, without a single understanding of the term “cluster” [10] and without a single conceptual approach.

The tendency to administrative and legal regulation of relations in the field of science is the second dangerous trend, in addition to the lack of a single concept [6], while even supporters of this type of regulation note the “undeveloped” nature of its mechanism [7]. Meanwhile, researchers note, not for the first time, that excessive legal intervention should be avoided in order to achieve maximum efficiency of such systems [14], it is important to create a framework and environment, but not to regulate the process.

We believe that the prerequisites for creating an effective network system for obtaining and using scientific achievements (ideally, global) exist both in Russia and in the world, and there are examples of building similar systems based on the principles of decentralization and

self-regulation. We have every opportunity to create a self-organizing flexible network structure, informationally open, attractive investment and able to receive resources, with a smart management system – that is, effective. Normative prerequisites for this are being laid now, however, it is necessary to develop a unity of concepts and concepts, and if possible, minimize administrative regulation.

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