

Using information technology to manage intellectual property

Uso de la tecnología de información para gestionar propiedad intelectual

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ABSTRACT:

The paper considers the use of information technology for solving problems of managing intellectual property objects through economic and mathematical modelling. An algorithm of the model of functioning and management of intellectual property of the Russian Federation is proposed. Proceeding from the goal of modelling the functioning of intellectual property, problems are posed that can be solved with the help of it: proving the interrelation of the factors of influence, reflecting the qualitative and quantitative relationship between the parameters and the model variables, constructing the predicted values of the functioning of intellectual property in the Russian Federation. Building a model is impossible without constructing a system of factors that shape and influence the functioning of intellectual property. The identification of factors and the relationship between them will allow us to construct a conceptual model for the functioning of the entire intellectual property management system of the Russian Federation. The use of a set of input and output data is proposed. A modelling algorithm is constructed to develop a conceptual model of a set of parameters and the relationships between them for managing intellectual property objects.

Keywords: Intellectual property, control algorithm, simulation

RESUMEN:

El documento considera el uso de la tecnología de la información para resolver problemas de gestión de objetos de propiedad intelectual a través de modelos económicos y matemáticos. Se propone un algoritmo del modelo de funcionamiento y gestión de la propiedad intelectual de la Federación de Rusia. Partiendo del objetivo de modelar el funcionamiento de la propiedad intelectual, se plantean problemas que pueden ser resueltos con la ayuda de la misma: probando la interrelación de los factores de influencia, reflejando la relación cualitativa y cuantitativa entre los parámetros y las variables del modelo, construyendo los valores pronosticados del funcionamiento de la propiedad intelectual en la Federación de Rusia. Construir un modelo es imposible sin construir un sistema de factores que molde e influya en el funcionamiento de la propiedad intelectual. La identificación de los factores y la relación entre ellos nos permitirá construir un modelo conceptual para el funcionamiento de todo el sistema de gestión de la propiedad intelectual de la Federación de Rusia. Se propone el uso de un conjunto de datos de entrada y salida. Un algoritmo de modelado se construye para desarrollar un modelo conceptual de un conjunto de parámetros y las relaciones entre ellos para gestionar objetos de propiedad intelectual.

Palabras clave: propiedad intelectual, algoritmo de control, simulación

1. Introduction

Today, more and more companies of various forms of ownership and types of activities introduce innovative methods and developments into their work. This allows them to best solving the strategic tasks of developing their activities. The world around us is dynamic. It is constantly changing: new solutions appear in various fields of science and technology. Technical progress does not stand still, and a company will not remain competitive unless it implements innovations (Arnold, 2015).

The main criterion for the successful operation of economic entities under conditions of a market economy, currently, is the competitiveness of the goods they produce, which is achieved primarily through a high level of technical and technological solutions embodied in the product, the successful implementation of which is related to protection against violations of intellectual property rights. Intellectual property rights are one of the most important factors for ensuring the stable financial and market positions of enterprises and organizations, and a reliable protection and effective use of these rights is an indispensable condition for their further prosperity. To carry out activities on the world market successfully, economic entities need competitive products in which two factors are of particular importance: novelty of the product and patent purity. At the present stage of economic development, intellectual property, as a progressive component of intellectual capital, is one of the most competitive goods, which, with skilful use, can bring the highest profits in the modern market.

To include the results of intellectual activity in the economic circulation, it is necessary to observe the two conditions:

first, to have legal grounds to own concrete results of intellectual creative activity and use them;

second, to formalize their rights to an object or objects of intellectual property in accordance with the requirements of the law (Management of...).

Intellectual property management allows:

- Effective management of innovation activities.
- Increase in the effectiveness of the introduction of innovative technologies to the market through the commercialization of research and development results.
- Obtaining financial benefits from the intangible assets of research institutes and innovative enterprises.

The importance of intellectual property management is that at present most of the most successful companies in the market derive more benefit from managing intellectual property (parts of intangible assets) than from managing tangible assets. Intellectual property can be a source of significant income for research institutes and innovative enterprises - owners of intellectual property (Kvashnin, 2006).

Experience shows that the active use of information technology in the society is today a strategic factor in its development, and allow obtaining savings of various types of resources, including human resources. The development of the information society civilization is due to the universal use, analysis of a large body of information and the acquisition of new data on its basis. Increasingly, information technologies are used for interaction between people, which contributes to the development of the education system and to the enhancement of the intellectual level of society. By accumulating, classifying and distributing scientific and technical information, new methods are replacing traditional methods of informational support of scientific research, which are based on the emerging opportunities for informational support of fundamental and applied science (Information Technology...).

2. Subjects and Methods

The transition from the rejection of intellectual property to its recognition as an important corporate asset of the company is a trend that is characteristic not only of the foreign but

also of the Russian economy. The intellectual property strategy is one of the main components of the marketing policy of firms. Interest in intellectual property, first of all, is connected with the possibility of obtaining additional income from the exclusive use of new technologies or sale of patents and licenses.

Intellectual property of companies is becoming an increasingly expensive asset, the real value of which cannot always reflect the principles of accounting. This is especially true for those industries where the key role is played not so much by buildings and equipment as by the profitability of patents, trademarks, copyrights, and other so-called "intangible" assets. Therefore, the object of research is the processes of managing intellectual property (Fomicheva et al., 2017).

In the process of research, general scientific methods of cognition were used: system approach, analysis and synthesis approach, methods of structural and comparative analysis.

In the market economy, the main source of success is the amount of knowledge that the company owns, where the main component is intellectual property (IP). That is, it is not the raw materials, labour force or even finance that determine the well-being of the company or enterprise. Thus, IP becomes an important resource, and it, like any resource, must be managed (The Federal Intellectual...). More precisely, it is necessary to control, not so much the resource itself, as the process of its creation, attraction, use, and protection.

Therefore, management of intellectual property can be viewed in three planes.

First, it is a process, that is, the transformation of one result of creative activity into another. For example, the transformation of an idea into a result of the research work, the result of the research work - into an invention, an invention - into technology and the like.

Second, it is a function - a purposeful informational impact on people (first of all, on the creators of IP) in order to direct their actions and get the desired results.

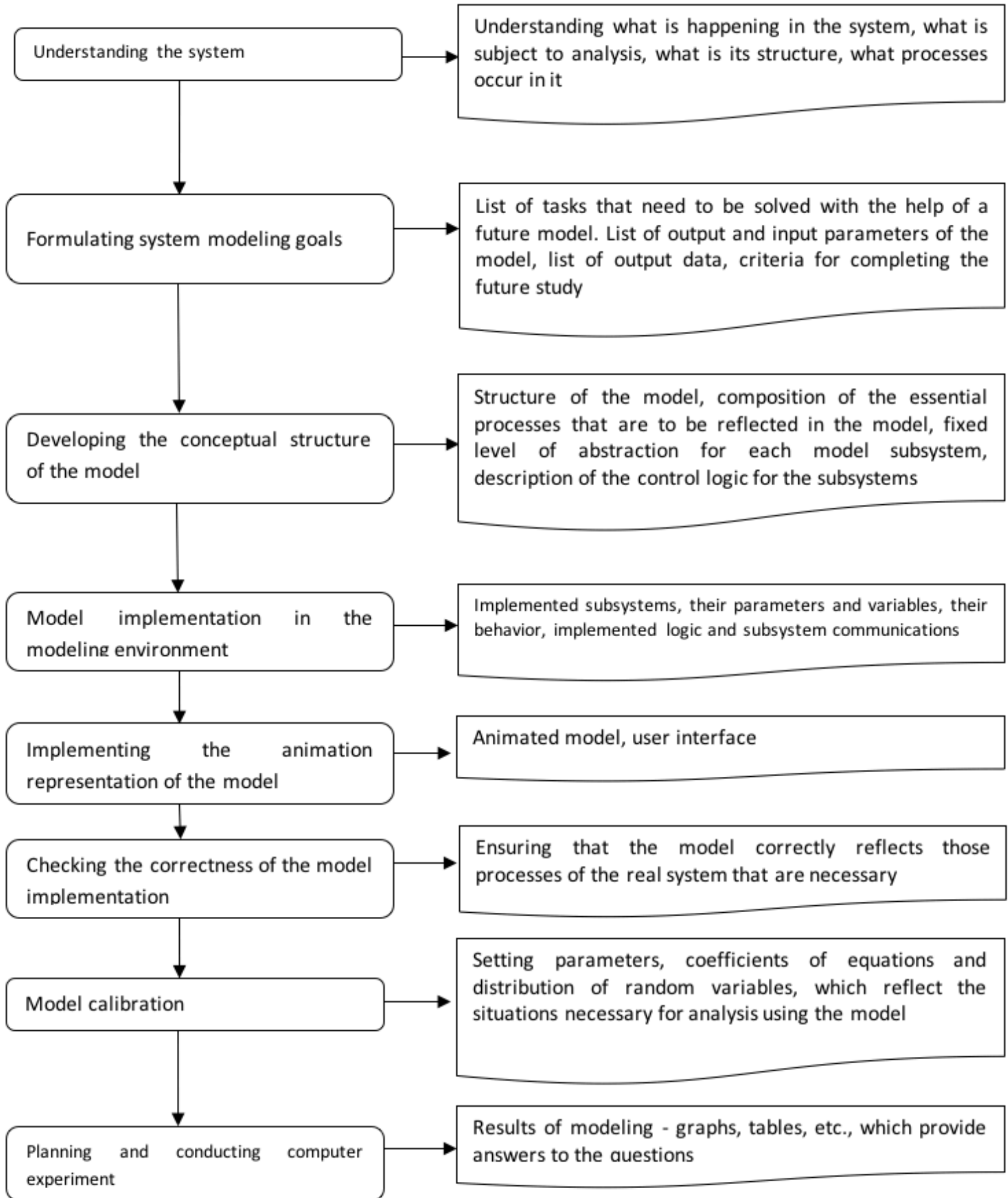
Third, it is the management of a structure (for example, an enterprise) that develops and (or) uses intellectual property rights objects (IPRO).

Ambiguity and inconsistency of the factors influencing the process of intellectual property management require the latest approaches due to the use of the mathematical apparatus, namely the construction of dynamic models. Therefore, it can be argued that in modern conditions, effective management and obtaining maximum profit at the state level to overcome the crisis in the country is topical.

The methodology of system dynamics, which was founded by groups of scientists led by Forrester (Tsybulov, 2005; Forester, 1974) and Meadows (Forester, 2003; Meadows, 1994) is now increasingly used in the economy. Since in the economy all processes are very dynamic in time and influenced by many variables. The construction of adequate models and the development of effective management methods are progressive and expedient in the current economic conditions (Meadows, 1991). Methods of system dynamics can be unchanged during long-term prediction of the behaviour of complex systems (Systems simulation...).

The construction of a model for the functioning and management of intellectual property of the Russian Federation is possible only when certain procedures are performed: the actual construction of the model and the forecasting of indicators. Let us construct an algorithm for modelling the system, note the features of each of the stages and solve them. The universal algorithm for constructing the model is shown in Figure 1.

Figure 1
Simulation algorithm



The first stage of the simulation algorithm is "understanding the system," that is, there is a need for identifying the state, the basic provisions for the functioning and management of intellectual property in the Russian Federation.

The next stage is "setting modelling goal", this is a fundamental stage without which the simulation procedure is impossible, its value is difficult to underestimate. Let us define the goals and tasks that are planned on solve using the modelling method.

The purpose of modeling the functioning of the intellectual property of the Russian Federation is to demonstrate the ability to manage a system of factors that are related to each other by means of impact parameters.

Proceeding from the goal of modeling the functioning of intellectual property in the Russian Federation, problems are posed that can be solved with its help: to prove the interrelation of impact factors, to reflect the qualitative and quantitative relationship between the parameters and model variables, to construct the predicted values of the functioning of intellectual property in the Russian Federation.

Building a model is impossible without constructing a system of factors that shape and influence the functioning of intellectual property. The identification of factors and the relationship between them will help to build a conceptual model for the functioning of the entire intellectual property management system of the Russian Federation.

The initial indicators of the model is the system of intellectual property indicators by objects of ownership, namely [2]:

1. Inventions;
2. Useful models;
3. Industrial designs;
4. Trademarks and service marks;
5. IC layout designs;
6. Computer programs;
7. Literary and artistic works.

Each of the objects of property rights has the following characteristics:

1. Submitted applications per year;
2. Acquired rights to the object of intellectual property.

By these characteristics, it becomes clear that applying for the registration of an intellectual product does not mean that it will be registered. The relevant document (patent) will be issued for certain reasons, such as non-compliance with the requirements of the submitted documentation, the existence of developmental analogies, and for other reasoned or bureaucratic reasons you can get a refusal.

The leading hypothesis of modeling and the formation of the concept of the functioning of the intellectual property system are the intellectual property indicators that form the economic activity of the Russian Federation.

Therefore, the input categories of a system of factors are the following groups of factors:

1. Sources of financing of innovative activity of enterprises;
2. Regions of innovative activity in the Russian Federation;
3. Types of enterprises and institutions by type of activity.

From the above categories, it is necessary to deepen the modeling hypothesis - state indicators of intellectual property depend on the innovation activity of the institutions of the Russian Federation, that is, the feedback system is formed, namely: the institutions of the Russian Federation, in their economic and creative activities, produce a certain intellectual product that is sold on the market (external or internal) or by means of which they improve their competitive position in the market. At the discretion of the management of enterprises and institutions, in part or in full, these developments are protected by the right of ownership for their use in the market environment, which at this stage also forms the output - the resultant indicators of the system of functioning of intellectual property. The impetus for innovation and protection of property rights for intellectual products are various types of financing. Cash flow and innovative activity make it possible to form analytics by regions of the country, that is, it is possible to determine the level of financial support and activation of innovation activity by geographic features.

An extended hypothesis needs to be expanded and the criteria and factors that are used must be determined. Firstly, as the sources of financing the system of functioning of innovation activities in the Russian Federation, we note the following:

1. State budget funds;

2. Local budget funds;
3. Extrabudgetary funds;
4. Own funds of enterprises;
5. Loan proceeds;
6. Foreign investments;
7. Domestic investments;
8. Other income.

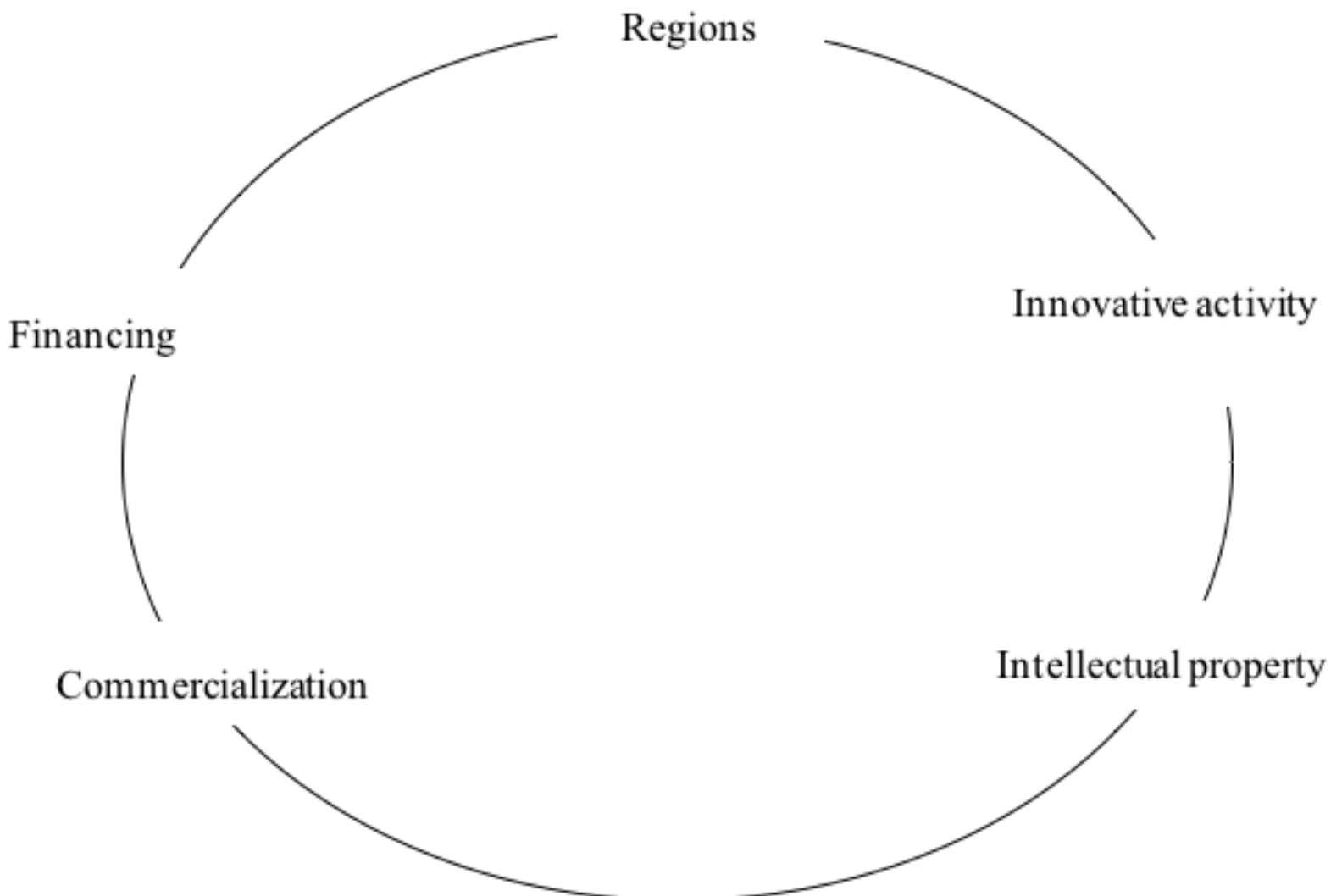
The above sources of financing innovative activities are distributed across the regions of the country, which makes it possible to more evenly develop intellectual capital in the country's space. Summarizing the above, for a more understandable representation of the essence of the interaction of the elements of the system, Fig. 2 shows the totality of the groups of variables indicated above.

Figure 2
An ordered set of particular elements of a conceptual model



The system of indicators would not be complete without reflecting indicators that provide feedback, that is, to the existing connection of "financing - regions - innovative activity - intellectual property" commercialization of innovation activity should be added. That is, the return of money to the system, then the simplified system will look like: financing - regions - innovative activity - intellectual property-commercialization, which is shown in Fig. 3, which will return money to the system and provide feedback in the system of indicators.

Figure 3
The relationship between the elements of the conceptual model



A careful analysis of the indicators of intellectual property objects and the costs of innovative

activity allowed (as the next stage of the analysis) analyzing the components of the indicators of the conceptual model, namely, highlighting the specifics and the principle of grouping of innovatively active economic entities by types of economic activity [2]:

1. Industry:
 - a. extractive;
 - b. Manufacturing;
 - c. Production.
 2. Services:
 - a. Wholesale and retail distribution;
 - b. Transport and communications;
 - c. Financial activity;
 - d. Informatization activities;
 - e. Publishing activities.
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3. Conclusion

The analysis allows using this model in software products for the purpose of realizing simulation and deepening the study of the impact factors.

These factors of the conceptual model and the relationship between them make it possible to consolidate the parameters and construct a conceptual model for the management and functioning of intellectual property in the Russian Federation.

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