

# Forming a Portfolio of Intellectual Property of an Enterprise

Tetiana Husakovska, Lyudmyla Shymanovska-Dianych,  
Lesia Rybalko-Rak, Valentyna Ishchenko

*Poltava University of Economics and Trade, Poltava, Ukraine*

**Abstract** - The purpose of this article is to improve the process of making managerial decisions in the course of forming a portfolio of objects within intellectual property of an enterprise. The way to improve the process of forming a portfolio of intellectual property of objects by introducing a methodical approach in order to make managerial decisions based on the method of analysis regarding the hierarchies is suggested. Factors determining the feasibility of implementing each of the alternatives are identified. The proposed methodological approach will provide an opportunity to increase the degree of economic feasibility of solutions in the process of forming a portfolio of objects of intellectual property by taking into account the criteria for choosing alternatives and their importance.

**Keywords** - intellectual property, portfolio of intellectual property, intellectual product, decision making, method of analysis of hierarchies, criteria for decision making.

## 1. Introduction

In the conditions post-industrial economy, an important component of which occupies the knowledge within economy, effective managing issues on intellectual property of an enterprise become more and more vital.

---

DOI: 10.18421/TEM91-37  
<https://doi.org/10.18421/TEM91-37>

**Corresponding author:** Tetiana Husakovska,  
*Poltava University of Economics and Trade, Poltava.*  
**Email:** [tatgus@ukr.net](mailto:tatgus@ukr.net)

*Received:* 10 January 2020.

*Revised:* 09 February 2020.

*Accepted:* 15 February 2020.

*Published:* 28 February 2020.

 © 2020 Tetiana Husakovska et al; published by UIKTEN. This work is licensed under the Creative Commons Attribution-NonCommercial-NoDerivs 3.0 License.

The article is published with Open Access at  
[www.temjournal.com](http://www.temjournal.com)

Innovative activity of enterprises is directly related to the use of such objects of intellectual property as inventions, utility models, industrial designs, and know-how. The presence of intellectual assets allows an enterprise to provide a strong competitive position, and in some cases a monopoly position in its segment. For enterprises, seeking a full return on their intellectual resources, it is necessary to take appropriate steps to develop a strategy for intellectual property and to integrate it into the overall strategy of the enterprise. This means that intellectual property has to be taken into account when developing business plans and marketing strategies. Strategic use of intellectual property assets allows to maximize profits from activity of an enterprise, to increase its competitiveness and make it more attractive to potential investors. The importance of forming an optimal portfolio of intellectual property, which will maximize the efficiency of innovation activities, should be noted.

## 2. Literature Review

Works of many scholars are devoted to researching the problems of managing intellectual assets of the enterprise. It is believed that the new term "intellectual capital" was first introduced in the scientific study by J. Galbraith in 1969, but a significant contribution to the development on the issue in terms of clarifying the content of the object of research and the allocation of its main elements, was made in the 90's of the XX century by scientists as [5], [15], [16] and others. Thus, in the 90s of the 20th century L. Edvinsson and M. Malone developed a new business strategy within the framework of the "business logic of intellectual capital" [5]. One of the results of these studies was Skandia Navigator, a system designed in order to identify not only financial indicators, but also indicators that take into account important strategic prospects by the management of the firm. The model relates the use of various aspects of the company's activities with its strategic development, and the basis of such innovative development is made by the intellectual resources of an enterprise. The model determines the

success of activities of an enterprise and its financial position as a result of managing an intellectual capital [4]. At the same time in addition to Skandia Navigator R.S. Kaplan and D.P. Norton developed the Balanced Score Card model [7], which had much in common with Navigator. The purpose of developing these models was to provide management with a tool with the help of which the current strategic position of the company for ensuring future development could be determined.

Another Swedish researcher K. E. Sveiby [16] developed a model for assessing intangible assets of the enterprise "The intangible assets monitor", indicators in which intangible assets are judged from the standpoint of growth and innovation, renewal, efficiency, and stability.

Considering intellectual property (intellectual capital) as a main source of success for the company in future, it is also characteristic to IC-Rating™ [17], which is the continuation of Skandia Navigator.

The influence of intellectual capital on the growth of the company's price was considered in the FIMA model [12]. The Tobin model, which defines intellectual capital as a difference between the market value of an enterprise and the book value of its tangible assets is also known. The main indicator characterizing the contribution of intellectual capital to the creation of company's value is the so-called Tobin coefficient – a relation between a market and book value of an enterprise [18]. It should also be noted that the Holistic Value Approach (HVA) [10] that evaluates and integrates the inputs of financial and intangible assets into the formation of the market value of the enterprise; methods for analyzing the relationship between a market and book value [17], are also worth mentioning.

Many scholars and practitioners devoted their works to various aspects of the process of managing intellectual property. Among them, the works [1], [8], [11], [20] and others pay special attention to the issues on forming a portfolio of intellectual property of the enterprise.

Casey P. August and Michael J. Cuchenhorner [1] discuss the development of the strategy of forming a portfolio of intellectual property (IP) by analyzing the factors that influence the choice of a form and extent of legal protection of intellectual products. Alexander I. Poltorak and Paul J. Lerner [11] pay special attention to forming and auditing a portfolio of intellectual property of an enterprise. In the study [20] much attention is also paid to the issues of forming a portfolio of objects regarding intellectual property (OIP), issues on expediency of legal protection of developments and forms of such protection are considered. These authors assess the feasibility of using different ways of protecting OIP in the process of forming a portfolio of intellectual

property and factors that are at the same time decisive.

O. Kosenko [9] focuses in her research on assessing the commercial potential of technology to be used in the innovation activity of a developer or potential licensee.

V. Balan and O. Chulak [2] offer a methodology for assessing the strategic attractiveness of objects of intellectual property (OIP) in terms of obtaining competitive advantages. However, the authors, proposing an assessment scheme of OIP, do not define the criteria for such an assessment.

V. Semenova [14] considers management of intellectual property from the standpoint of a process approach, on the basis which suggests justification of the feasibility when it comes to the use of basic concepts of IP management at enterprises.

In the study [3], a methodological approach is suggested for selecting directions of managing IP, which covers both the formation and commercialization of the OIP portfolio. However, in our opinion, the directions offered by the researchers are somewhat limited and do not cover all possible alternatives.

A. Volkov [19] investigates the formation of a portfolio of intellectual property objects and proposes in his research an organizational and economic mechanism for taking risks into account when forming a portfolio of OIP of an enterprise.

Thus, despite a rather thorough research of the process of forming and using a company's portfolio of IP of an enterprise, there is continues need for the development of management techniques that will ensure the efficient use of intellectual resources in the activities of an enterprise.

### 3. Methods

The research is based on the use of general methods of empirical and theoretical research and special methods, in particular:

- Analysis and synthesis – to identify the components of the process of forming an effective portfolio of objects of intellectual property and to combine the pieces of knowledge acquired in the process of research into a whole when defining existing approaches and methods of managing intellectual property;
- Induction – for the transition from partial to general knowledge of the subject of research, formulation of a conclusion on improving the process of forming the portfolio of intellectual property of the enterprise as a whole;
- Deduction – to formulate conclusions about a particular element of research based on knowledge of common features and properties of

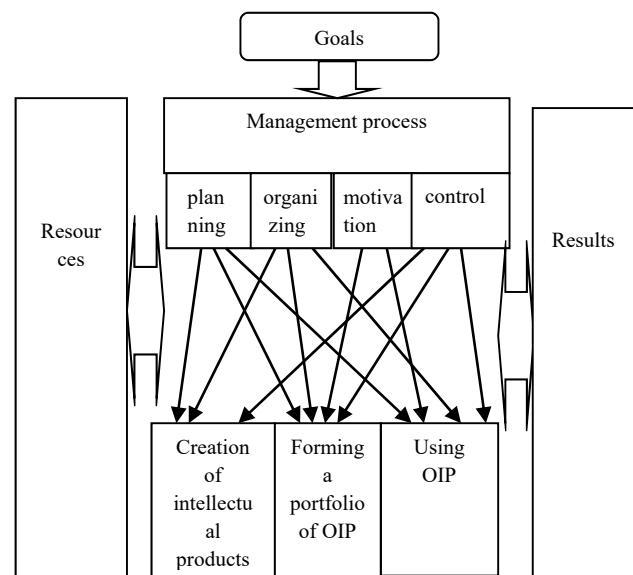
- concepts and approaches of intellectual property management;
- Comparison – to look for the different and common in the existing concepts of intellectual property management;
  - Generalization – to formulate new scientific concepts, analyze existing approaches and methods of managing intellectual property;
  - Abstraction – to establish irrelevant properties, links in the formation of the intellectual property portfolio of the enterprise; to replace the investigated object with a simplified model, which preserves the main thing in the simple; to identify alternatives in the formation of the portfolio of intellectual property, based on the purpose of its formation.
  - Axiomatic method, which in scientific research involves the evaluation of the behavior of an object as a system with all the factors that affect its functioning – to determine the factors that affect the feasibility of implementing each of the research alternatives and systematic approach as one of the main directions of methodology of special scientific knowledge – to formulate a system of criteria for decision-making based on selected factors;
  - Analyzing hierarchies as a mathematical tool for a systematic approach – to improve the process of forming the portfolio of objects of intellectual property by implementing a methodological approach to managerial decision-making; allowing to structure a complex decision-making problem in the form of a hierarchy, to compare and quantify alternative solutions;
  - Graphic visualization – as a component of the analytical system for schematic representation of decision-making process in the formation of portfolio of OIP at enterprise.

#### 4. Results and Discussions

Intellectual Property Management is a complex, multi-stage process that requires comprehensive consideration. Like any managerial process, intellectual property management involves implementation of general managerial functions – planning, organization, motivation and control. In our opinion, the main stages of this process should be: the processes of creation of intellectual products, the formation of a portfolio of OIP and the use of OIP by the enterprise. The presented scheme illustrates the main components, which the process of managing the intellectual property of an enterprise includes (Figure1).

The process of forming a portfolio of objects of intellectual property is based on the results of the analysis on the feasibility of carrying out scientific

research and creation of intellectual products, as well as the possibility of attracting external intellectual products. An enterprise can have certain developments, but for various reasons they do not use them, or vice versa, with an existing need for certain developments in order to implement innovation activities, an enterprise is not able to conduct necessary research to create them.



*Figure 1. Managing intellectual property at an enterprise*

Effective management with the aim of forming a portfolio of OIP involves:

- carrying out an audit of the developments of an enterprise;
- identifying the directions by which the company should continue research and creation of intellectual products;
- determining the needs for attracting external OIP.

Taking into account the fact that the OIP portfolio is a package of patents and security documents that protect a specific sector in which an intellectual product has been created, we can talk about a portfolio of scientific and technical products that form a scientific and technical potential of the enterprise. In this regard, it is necessary to analyze all aspects of the created intellectual product, which in one way or another can be a source of competitive advantages in a certain sector of the market. It should be noted that the analysis of a created scientific and technical products and structuring of their features is necessary at all stages of the activity associated with the creation and commercialization of new products and technologies.

The main purpose of forming a portfolio of OIP of an enterprise is to ensure implementation of the strategy taking into account the innovation development. The existence of a portfolio of

exclusive rights that allows to protect key market segments from competitors, reduces investment risks, and provides an opportunity to attract additional sources of investment for innovation. In case of violating exclusive intellectual property rights, the offender has to return the amount of lost profit to the holder of these rights and thus support high return on investment.

It should be noted that very often the management of an enterprise does not know or fully assess the volume of its intellectual property and the possibility of its practical use. Therefore, an important part in the process of managing an intellectual property of an enterprise should be its audit, which involves, first of all, the creation of a register of all intellectual property of an enterprise and identification of intellectual products that require the registration of all security documents.

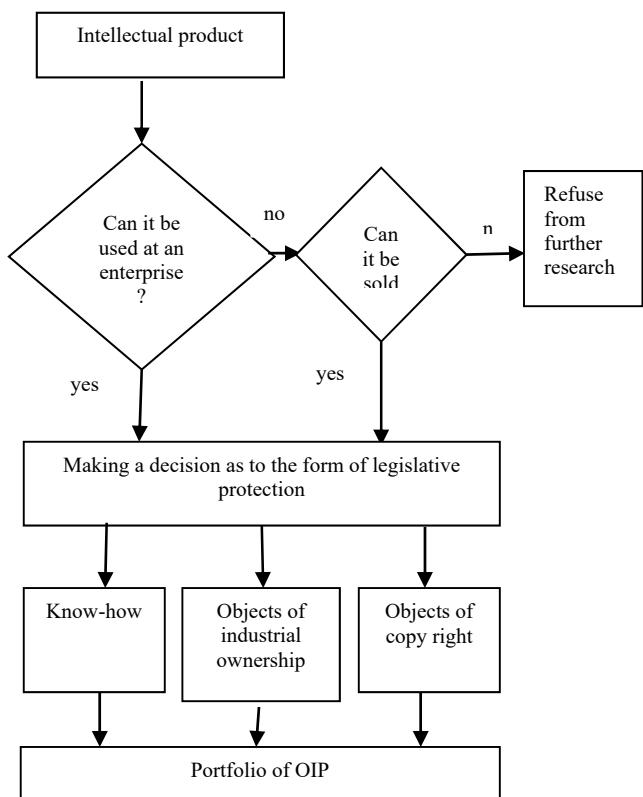
The main objective of the intellectual property audit is to gather information about which intellectual property is created or purchased and what steps have been taken to protect it. It is also necessary to analyze the procedures for documenting and protecting intellectual property used by this enterprise [11]. In addition to the recommendations concerning specific intellectual products, intellectual property audit should include recommendations regarding policy decisions and procedures of identification and protection that may be created in future [11].

Companies often tend to accumulate OIP as much as possible in their portfolios; new OIP are constantly added to the portfolio, with virtually no deletion. In other cases, companies may own designs that are not identified, have not received the necessary protection and, accordingly, are also not used to provide competitive advantages.

The formation of a portfolio of OIP includes both direct and indirect costs. For example, for patenting, direct costs are the costs of submitting an application and maintaining a patent. Less obvious, but more important, are indirect costs which include the loss of value of the secrets of production disclosed in patent applications. Indirect costs include lost opportunities – revenues not received due to the lack of licensing of patents that other companies are interested in, as well as losses due to violations of certain patents. The costs incurred for submitting patent applications and maintaining the validity of patents that are not used in business are in vain. Failure to benefit from a portfolio of objects of intellectual property also means the loss of an enterprise's assets. Effective management involves avoiding these losses.

The sources of forming a portfolio of OIP of an enterprise are their own developments and external OIP. External OIP can be used by an enterprise in case of a need to obtain intellectual property, the

creation of which is impossible or economically unprofitable for the enterprise. At the same time, when creating a portfolio of intellectual property of an enterprise, their own intellectual products, which need for objects to be systematized in order to determine the form of protecting an object and directions of its use are the most important. The process of systematization of own intellectual products involves: analysis including the possibility of commercialization of a development, determination the type of protection (copyright, patent, know-how) and registration of intellectual property rights. Its main stages can be represented in the form of a scheme (Figure 2).



*Figure 2. A scheme of decision making concerning the use of own intellectual products in the process of forming a portfolio of OIP of an enterprise*

The need to attract external OIP for innovation is determined on the basis of information about such objects in the market, and analysis of the advantages and possibilities for their implementation at this enterprise.

Thus, the process of forming a portfolio of OIP of an enterprise involves the need to make managerial decisions about the sources of attracting intellectual resources for innovation of an enterprise and the opportunities for commercialization of existing developments.

Based on the existing research of this problem, we consider it is necessary to develop a methodical approach to decision making in the process of

forming a portfolio of OIP of an enterprise based on the method which analysis the hierarchies. The use of this method was also substantiated in previous studies, including the works concerning management of IO of an enterprise [2], [3], [6], since it allows to quantify the priority of alternatives, using expert judgment.

Method of analysis of hierarchies (MAH) is combination of two approaches: the construction of a hierarchy of goals, tasks, programs, resources belonging to them, followed by an expert assessment of significance in the view of the expert-appraiser, as well as ranking the results of expert evaluation based on matrix analysis [13]. The method allows:

- to carry out a systematic analysis of the problem of decision making;
- to reduce the complexity and labor-consuming nature of the decision making process;
- to minimize the contradiction of expert conclusions;
- to conduct a synthesis of intermediate results in the process of solving the problem of decision making;
- to create ratings for groups of criteria, that makes it possible to evaluate the importance of each criterion.

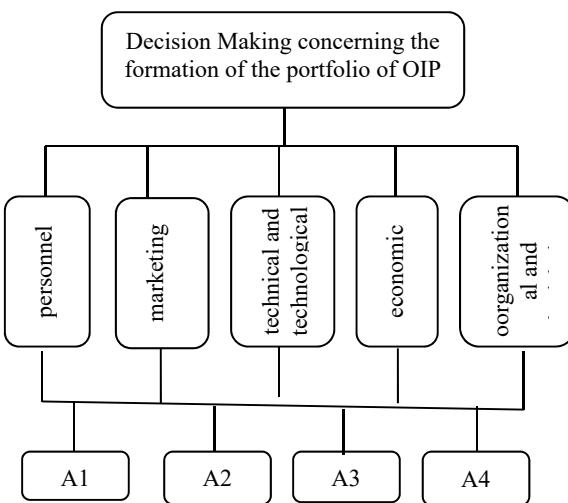
Method of analysis of hierarchies involves identifying the main alternatives and criteria by which they will be analyzed. The objectives of forming a portfolio of OIP of an enterprise are the possibility of carrying out innovation activities, ensuring its competitive position in the market, the possibility of obtaining additional income from the sale of rights to use OIP. Taking this into account, it is expedient to include the following to the alternatives of forming a portfolio of OIP:

- conducting own R & D, creation of a development and its legal protection by issuing a patent (A1);
- conducting own R & D, creation of a development and its legal protection by classification (know-how) (A2);
- involvement of external OIP (A3);
- refusal to continue research and activities in this direction (A4).

The feasibility of implementing each of these alternatives will depend on the presence of direct influence including certain factors. Based on the analysis of the works of leading scholars and practitioners, as well as author's own research on functioning industrial enterprises, such factors include personnel, marketing, technical and technological, economic, organizational and legal details. It should be noted that the above mentioned factors may have both a positive and a negative impact on the goals achievement within the

enterprise. That is, it can be both a source of benefits and losses.

A hierarchical structure for decision making in the formation of an OIP portfolio according to these criteria is presented in Figure 3.



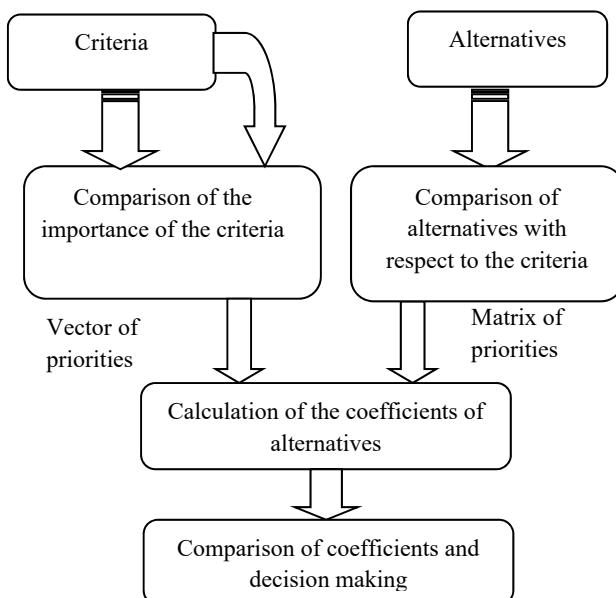
*Figure 3. A hierarchical structure for decision making in the process of forming a portfolio of OIP*

When considering in a more detail the influence of each of these groups including factors and form a set of criteria for making a decision we presented it as in Table 1.

*Table 1. Identification of criteria for decision making in forming a portfolio of OIP*

Factors	Criteria
Personnel	availability of necessary human resources; level of personnel development in general
Marketing	a possibility of gaining market (market niche), creating new markets; influence on forming an image of an enterprise
Technical and technological	technical and technological potential of the enterprise for conducting R & D and implementation of the development
Economic	financial advantages from implementing alternatives (reducing the cost of products by using OIP, profit benefits, additional revenue from the sale of a license, etc.); financial expenses (for the creation of development, its protection and implementation, the cost of attracting external OIP, loss of profit from violation of rights and the cost of their protection); possibility of attracting financial investments; payback period of investments
Organizational and legislative	a possibility of providing protection and defense of a development

The scheme for decision making concerning a development in the process of forming a portfolio of OIP of an enterprise is presented in Figure 4.



*Figure 4. Scheme of decision-making concerning developing of the in the process of forming a portfolio of OIP of an enterprise*

The first stage of the analysis is a pairwise comparison of the criteria according to their importance for the enterprise. We can express the set of criteria as  $k_1, \dots, k_n$ . Then quantitative judgments about pairs ( $k_i, k_j$ ) will be presented in the form of a matrix. Elements  $k_{ij}$  are determined by the following rules:

- if  $k_{ij} = \alpha$ ,  $k_{ji} = 1/\alpha$ ,  $\alpha \neq 0$ ;
- if the judgments are such that  $k_i$  has an equal importance with  $k_j$ , then  $k_{ij} = k_{ji} = 1$ .

Having assigned values for each  $k_{ij}$  and  $k_{ji}$  of the matrix, it is necessary to determine the own vector of matrix, which after the normalization becomes the vector of priorities.

Further, using the same scheme, pairwise comparison of alternatives for each criterion is made, and the vectors of the priorities of each matrix are calculated. We obtain a matrix of priorities, having multiplied it by the vector of criteria importance; we make the final calculation of the coefficients of each of the alternatives. A comparison of the calculated coefficients makes it possible to make decisions about choosing the optimal alternative in forming a portfolio of OIP in each particular case.

## 5. Conclusion

In order to improve the process of making managerial decisions when creating a portfolio of objects of intellectual property of an enterprise, it is proposed to use a methodological approach based on the method of analysis of hierarchies. As alternatives we propose to consider creation of a development at the enterprise and its legal protection by registration of a patent; creation of a development and its legal protection by classification (know-how); involvement of external OIP and refusal to continue research and activities in this direction. The expediency of choosing an alternative is influenced by personnel, marketing, technical and technological, economic, organizational and legal factors. On the basis of the selected factors a system of criteria for decision making has been formed. The suggested methodological approach will give an opportunity to increase the degree of economic feasibility of decisions in the process of forming a portfolio of OIP, taking into account the criteria for choosing alternatives and their importance.

Further research in this area will be aimed at developing a methodological approach taking into account the peculiarities of specific intellectual products and enterprises.

## References

- [1]. August, C. P., & Cuchenhorner M. J. (1995). Strategies for Developing Intellectual Property Portfolios in the Global Environment: Protection of Intellectual Property in Hostile Environments. *Canada-United States Law Journal*, 21, 261-274.
- [2]. Balan, V., & Chulak, O. (2012). Evaluation of intellectual property objects in the formation of a competitive enterprise strategy. *Bulletin of the Taras Shevchenko National University of Kyiv*, 136, 30-33.
- [3]. Chystiakova, A.V. (2015). Methodical Approach to Substantiation of the Priority Direction for Intellectual Property Management at the Machine-Building Enterprises. *Business Inform*, 5, 184-191.
- [4]. Edvinsson, L. (1997). Developing Intellectual Capital at Skandia. *Long Range Planning*, 30(3), 366-373.
- [5]. Edvinsson, L., & Malone, M. (1997). *Intellectual capital, realizing your company's true value by finding its hidden brainpower*. Harper Business.
- [6]. Husakovska T.O. (2009). *Upravlinnia intelektualnoiu vlasnistiu pidprijemstva [Management of the intellectual property of an enterprise]*. Abstract of Ph. D. dissertation, Economy and enterprise management, NTU «KhPI», Kharkiv, Ukraine.

- [7]. Kaplan, R.S., & Norton, D.P. (1992). The Balanced Scorecard: Measures that Drive Performance. *Harvard Business Review*, 1, 71-79.
- [8]. Kolosov, O.Ye. (2013). Patent or IP-audit. *Intellectual Property*, 5, 1-5.
- [9]. Kosenko, O.P. (2015). *Commercialization of intellectual innovation technologies*. Kharkiv: Smuhasta typohrafia.
- [10]. Pike, S. & Roos, G. (2000). Intellectual capital Measurement and holistic value approach (HVA). *Works Institute Journal (Japan)*, 42, 21-27.
- [11]. Poltorak, A. I., & Lerner P. J. (2013). *Essentials of licensing intellectual property*. Hoboken, NJ: John Wiley & Sons.
- [12]. Rodov, Ph. Leliaert (2002). FiMIAM: financial method of intangible assets measurement. *Journal of Intellectual Capital*, 3, 323-336.
- [13]. Saati, T. (1993). *Decision making. Method of the analysis of hierarchies*. Moscow: Radio and communication.
- [14]. Semenova, V.H. (2016). *Upravlinnia intelektualnoiu vlasnistiu pidpriemstva: protsesnyi pidkhid [Intellectual Property Management of an enterprise: process-oriented approach]*. Doctoral dissertation, Economy and enterprise management, ONEU, Odesa, Ukraine.
- [15]. Stewart, T. A. (1997). *Intellectual capital: The new wealth of organizations*. New York: Doubleday.
- [16]. Sveiby, K. E. (1997). The Intangible Assets Monitor. *Journal of Human Resource Costing & Accounting*, 2, 73-97.
- [17]. Sveiby, K.E. (2001). Methods for Measuring Intangible Assets.
- [18]. Tobin, J. A (1969). General equilibrium approach to monetary theory? *Journal of Money Credit and Banking*, 1(1), 15-29.
- [19]. Volkov, A.S. (2013). Formirovanie portfelia obiektov intellektualnoi sobstvennosti naukoemkikh predpriatii s uchetom riska [Forming a portfolio of intellectual property objects of science-intensive enterprises taking into account risk]. *Intellektualnaia sobstvennost. Promyshlennaia sobstvennost*, 10, 64-68.
- [20]. Zinov, V.G. (2003). *Intellectual Property Management*. Moscow: Delo.