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CORPORATE INNOVATION SYSTEM

Kukushkin S.N., Yankovskaya V.V.

This paper presents an enterprise in terms of the system analysis in interaction with the environment. A corporate innovation system is studied as part of the enterprise's organizational system, formed consciously by a willful decision of the management to implement effectively the enterprise's goals and objectives. The issue of financing of the innovative activity is studied independently.

Objective: Development of the concept model of the corporate innovation system.

Keywords: *enterprise as a system; corporate innovation system; properties and characteristics of a corporate innovation system; system mechanism.*

КОРПОРАТИВНАЯ ИННОВАЦИОННАЯ СИСТЕМА

Кукушкин С.Н., Янковская В.В.

В статье рассматривается предприятие с точки зрения системного анализа во взаимодействии с окружающей средой. Исследуется корпоративная инновационная система как составная часть организационной системы компании, формируемая осознанно, волевым решением менеджмента для эффективной реализации целей и задач фирмы. Отдельно рассматривается вопрос финансирования инновационной деятельности.

Цель: разработка принципиальной модели корпоративной инновационной системы.

Ключевые слова: *предприятие как система; корпоративная инновационная система; свойства и характеристики корпоративной инновационной системы; механизм системы.*

An enterprise as a system was and is studied by many authors [1; 2]. This approach is a result of formation of cybernetics and systems analysis, based on which was formed an approach, known as the systemic paradigm of economic development [19]. In the analysis of the enterprise as a system, it is required to focus the objective and a subjective assessment. The objectivity is the presence of forces of mutual influence between the elements (components) of the system. They allow the system to reserve the configuration. Generally, the objectivity is based on the self-reproduction and self-preservation. The subjectivity is manifested in the following aspects: 1) the researcher himself determines the parameters, defining the system and 2) there is a significant difference between the identification and the description of the parameters of the system. The identification is the distinguishing of it from other similar objects for comparison. The description is the registration of the information about the system in an orderly manner.

The system concept of the enterprise implies a descriptive part (i.e. the way of performance of the enterprise) and regulatory (i.e. how should the enterprise perform).

In order to describe the enterprise as a system J. Kornai [18; p. 10, p. 154–161; 14, p. 118–120] identifies the following principles.

1. The integral system, interacting with other systems, including the system, the part of which it is (for example, industry, market, etc.).

2. The preferences, specific to relatively independent parts and elements of the system, "are mostly the products of the system itself" [18, p. 10].

3. The system is developed by virtue of its own evolution and in the view of adoption of special administrative decisions. In this re-

gard, "the researcher, ... should look for the explanation in history", especially, in the history of development of this system. Given that, the attention should be "paid not only to the events or processes per se, but rather to a more permanent institutions in the framework of which these events and processes occur and which determine their course" [16, p. 118], mainly, to the "institutions appeared historically and developing evolutionary" [16, p. 120].

4. "All systems have their specific weaknesses or dysfunctions" [18, p. 161].

5. The qualitative and quantitative comparison of the properties of the system being analyzed with the relevant properties of other systems is the applicable the method of analysis.

Based on these principles, the following conclusions can be made:

- the enterprise is a multi-dimensional and multi-spatial system [see 17, p. 144–154];
- the links between the enterprise and its external environment are of a dual nature;
- the internal environment of the enterprise is sufficiently saturated, it contains the objects of different quality and the spaces, structured to varying degrees [20; 21]. Various theories offer us various options for the contents of the internal environment: 1) the neoclassical theory offers technologies; 2) the neoinstitutional offers contracts of different nature; 3) the evolutional offers traditions and customs; 4) the managerial – the staff and managers interacting in the framework of the management system; 5) the cognitive – the knowledge and the mechanisms for its update; 6) the cultural – organizational (corporate) culture; 7) the political – the "power" centers within the enterprise etc.;
- the interaction of the enterprise with the environment is manifested through pressure and assistance. The pressure occurs when the external environment by means of the combinations of sanctions and incentives reduces the possibility of the enter-

prise, making it take certain decisions. The assistance[1], on the contrary, increases the possibilities by creation of the additional alternatives for a decision making;

– the purpose of the formation of the enterprise is expressed in independent terms. The systemic paradigm allows to overcome the limitations of traditional economic theory – the determinated causality as a principle of explanation of the economic behavior. In this case the interaction is the basic form of the relationship between the objects, rather than the unidirectional causality [8; 9; 17, p. 159];
– the assertion that every system has its unique disadvantages, does not contradict to the desire of the enterprise to perfection. This principle emphasizes the multicriteriality of this task. The dysfunctions are not stable, the recognition of such indicates the unattainability of perfection by all criteria simultaneously. That system dysfunctions are the source of differences between the enterprises. A variety of enterprises, necessary for functioning of the market, is provided by dysfunctions that occur in the course of creation of the enterprise and the initial stages of its formation, as well as by direct and indirect influence of the factors of the external environment on it;
– the enterprise and the external stakeholders [12; 13; 14; 26]. The systemic paradigm implies the differentiation, classification and grouping of the persons interested in the performance of the enterprise. For example, the following groups may be distinguished: 1) non-strategic minority investors – the temporary shareholders; 2) the shareholders whose behavior can be regarded as a stable, permanent system, resulted in strategic decision making. In addition to the above, there are other ones (see [22; 27]).

[1] The assistance is considered by us as the conditions in which the enterprise operates, particularly, performs the innovative activity.

– the internalization and externalization. The internalization means the presence of temporary (episodic) subsystems and can be expressed, for example, in the general meeting of the shareholders. The externalization is the formation of the permanent sub-systems, such as the product sales subsystem (marketing) [11].

Any enterprise theory is expressed in the development of a system of provisions based on a relatively small number of original assumptions. Provided that, the result depends on which provisions are admissible in this theory. The further study of the enterprise in terms of this theory depends on the kind of system-containing identification space where the enterprise was defined as a system. The neoclassics define the enterprise as a functional unit, converting the resources into products. According to the contract (neoinstitutional) theory of the firm, the enterprise is defined in the space as a system combining the assets, the employees, the managers and the owners, bound by certain contractual relationships. G.B. Kleiner [12] considers the following groups of factors, affecting the activities of the enterprise:

– macroeconomic: the exchange rates, the interest rates, etc.;
– nanoeconomic: the orientation of the behavior of the managers, the employment opportunities, etc.;
– a combination of the above mentioned factors;
– the inter-level factors.

The enterprise as a system has important quality property – the *integrity*, which is the irreducibility of its properties to the properties of the elements, and vice versa. At that two basic conditions should be followed:

– the availability of the independent elements;
– the interaction between these elements.

The enterprise is formed in the informal environment, the equilibrium of which is disturbed by occurrence of some ordered, resistant elements in it. In the course of formation some systems (subsystems) are formed in a natural way, for example, the communication system. Other ones are formed consciously, for example, various technical systems.

Unlike the enterprise the corporate innovation system is formed consciously by the willful decision of management. This is due to the fact that the innovative system is designed for the efficient implementation of the objectives of the enterprise.

Any enterprise can be represented as a system of objectives, which includes:

- the global objective – the survival. This objective can be measured by three indicators: the achievement of the objective, the effectiveness and the efficiency;
- the main objective – the maximum satisfaction of the customer;
- the organizational or strategic objectives. These objectives with respect to the first two objectives can be considered as operational.

The achievement of the objectives of the enterprise is possible as a result of creation and implementation of the innovations in the market.

Being an integral part of the organizational system of the enterprise, the corporate innovation system (subsystem) has a number of common proprieties:

- the system should be based on a material substance, once the materia in the modern sense includes the substance, the energy and the information, then the systems based on such substances, are crucial. There is a lot of serving, secondary systems, which in turn have the auxiliary formations of the class of systems providing a successful performance of these systems. This creates a hierarchy of systems, based on the principle of self-sufficiency;
- each system consists of a number of elements specific by the tasks to be solved, but their performance is subjected to the global objective of the system and constituting its purpose. Otherwise, the structure of the system is determined by the stated purpose, and the parts of the system taking no part in solving the main task are the rudiments and die historically;
- *the elements of the system must be linked together* in order to achieve a global objectives in the framework of the system, and

therefore should share substantionally the materia, the energy, the information;

– the inherent propriety of the system is the *ability to evolve,* to adapt to new conditions through the creation of new links, elements with their local (private) links and means of their achievement.

At the same time the innovative system has a number of specific proprieties:

– it is an open system, i.e., it is influenced by its environment;
– it is a complex system, it consists of several hierarchical levels, types and subtypes of interacting subsystems;
– it is a socio-technical system. This feature applies only to the economic systems, and it is based on two principles: the social medium – the association of people who created this system, this system is for a human and a human contributes to its development; techno – the material objects of natural and artificial origin, which are exploited by a human in the course of creation, distribution and consumption of goods.

The innovative system has a number of internal and external properties:

– the interconnection of the system environment and the existence of the system itself. The environment is not only the backbone of the system, but any system is surrounded by the environment in the framework of which it lives and performs, the environment affects it and, in turn, the system has an impact on the environment. Often, the system is created only in order to change the properties of the environment;
– integrity. The internal unity, the principal irreducibility of the properties of the system to the sum of the properties of its constituent elements are recognized, i.e., the system has the proprieties "of the whole, conceivable as the plenty" [25]; Such a unity of the whole makes the formation a system and reduces

the role of its elements to the provision of the performance of the whole;

- stability. Maintaining the stability is the inside objective of the system, as opposed to the outside one, characterizing the relationship with the environment. Consequently, the system should be organized so as to ensure its own survival, stability in a changing world and at the same time, the development, the evolution, the approach to some objective;
- conservatism. It is characterized by the resistance to the attempts to transform the system, resistance to influence, including the controlling ones. On the other hand, the need for purposeful change, the movement toward the objective, perfection, requires the system to modify, configure and implement the control functions. It seems that this contradiction is typical for the systems of any complexity;
- the implementation of the functional properties of the system is possible in the informational interaction between the elements and, consequently, the availability of not only communication channels but also their material completeness of the signals. Then of course the question on the methods of implementation of the informational entity arises, IE the question on the semantics and the semiotics. These system properties are appropriately called informationality;
- complexity. The bulkiness of the description of the system, the need to involve the developed mathematical apparatus in the study of it, the multi-dimensional dynamics complete with the bifurcation points are the evidence of non-triviality of the system and are characteristic for the complex systems. However, even based on the objective perception of the study process, it is impossible to distinguish the simple and the complex system, and, therefore, it is impossible to give a definition of complexity, nor, moreover, to formulate the indicator of complexity. One

of the simplest approaches, for example, is that the complexity can be defined as the number of elements of the system and the links between the system and its environment, as well as the same within the system;

– hierarchy. Stratification in the construction of a system by a human or by nature was a natural reaction to the complexity of the system, namely, to the expansion of the number of its tasks and their inconsistency. This was reflected in the functional and structural differentiation, when the introduction of the principle of hierarchy allowed to obtain another degree of freedom to expand a system: it became possible to develop vertically a variety of equal systems due to the introduction of the principle of subordination.

The corporate innovation system refers to a set of business processes determining the control mechanism aimed at the most complete disclosure of potential of the enterprise, the development of the innovative products, processes and business models.

In our view, the objectives of the corporate innovation system are:

– the implementation and building of the potential of the enterprise;
– the increase in the market share of the enterprise on the market;
– the increase in the economic efficiency of the performance of the enterprise;
– the stimulation of the creative and innovative activity of the personnel.

The corporate innovation system, in our opinion, includes the following elements (Figure 1):

– Information – both internal and external information sources;
– Bank of ideas – the fund, accumulating, forming and distributing the innovative ideas;
– Promotion system;
– Innovation financing fund;

– The technical means providing a link between the participants of the innovation process and the distribution of the ideas.

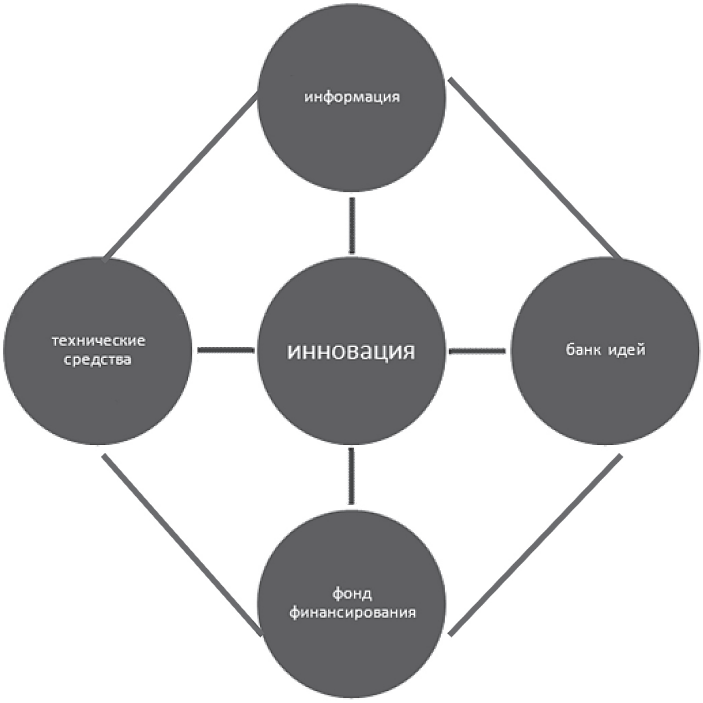

Fig. 1. Schematic model of a corporate innovation system

According to the results of the empirical research, one of the most important elements of the enterprise and the corporate innovation system is the organizational culture described more detailed in [3; 4; 5; 6].

The organizational culture allows to define the informal firm management procedures, eliminating the bureaucratic barriers and thereby reducing the obstacles to the distribution and introduction of the innovations. At the same time the organizational culture can motivate the activity of the staff of the enterprise and contribute to the implementation of the innovations [3; 4; 5; 6].

The model of the corporate innovation system can be represented as the function in the following form:

$$S = f(I,M,F) \rightarrow N,$$

where

S is the corporate innovation system;

I is the information, knowledge;

M is the incentives and the motivation of the innovation;

F is the financing of the innovation projects;

N is the innovation.

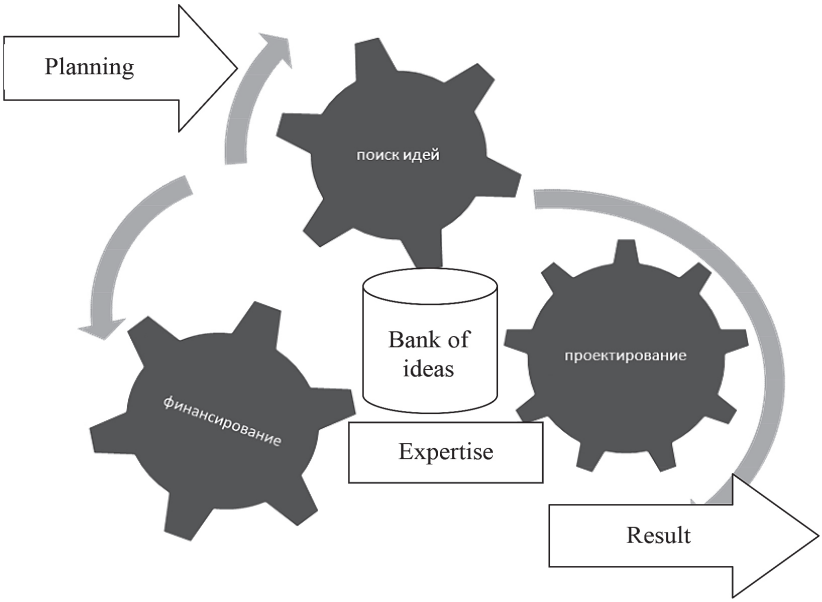

Fig. 2. Mechanics of the innovation process

In our view, the corporate innovation system mechanism can be described as a process model, including the following business processes (Figure 2):

– the planning of the innovative activity;
– the search for innovative ideas;

- the expertise of the innovative ideas;
- the design and implementation of the innovations;
- the communication in the innovation process;
- the marketing of the innovations;
- the financing of the innovative activity;
- the motivation of the innovative activity.

The planning of the innovative activities is performed in the strategic and medium-term, the innovative activity plans should be updated at least once a year.

The strategy developed determines the general direction of the activity of the enterprise and generates a demand for the necessary innovations: product, process, organizational and social. The strategic plan, being the policy document of the enterprise, defines the objectives for the medium-term period. In the medium term plan the budgets are formed for the implementation of the planned innovations: material, labor, financial and others.

The sources for the search for the ideas can be divided into internal and external ones.

The *search for the innovative ideas* in the external environment is based on an active benchmarking. These sources include:

- the study of the business literature, analytic and news Internet resources;
- the analysis of the experience of the competitors;
- the technological brokerage;
- the feedback from customers received directly through the sales representatives of the enterprise, the website of the enterprise and in other ways.

The *internal sources* are the staff of the enterprise [see 7, 21 for details]. The activation of the innovative activity of the staff can be conducted in the form of a enterprise-wide competition:

- General search competition. The objective – to search for the possible points of growth of the enterprise. In this case, the

problem should be formed as wide as possible to find as many options as possible;

– Specialized search. In this case, the restrictions and criteria for the most efficient solutions, based on availability of the resources and existing business processes are stipulated in advance.

All proposed ideas must necessarily take an objective *expertise*. In the course of expertise both qualitative and quantitative methods can be used. The choice of method is determined by practical necessity and the specific challenges faced by the enterprise.

Qualitative methods include: cost and benefit analysis, Delphi method, the theory of inventive problem solving. The expertise should be carried out in several stages, and only at the last stage the analysis of compliance of the innovations with the strategic and tactical problems solving should be performed. This approach would not miss the ideas that can be highly effective in the long term.

The use of the quantitative methods is based on a system of economic indicators: the sales volume growth, the increase in the added value, the material and labor costs saving, the payback period, the profitability etc.

The process of *implementation* of the innovative ideas in the operation activity is carried out through the implementation of the projects. For the implementation of the projects the enterprise must have a specialized unit dealing with development and design. But given that innovation projects are very different in nature, the enterprise must have a special Centre to coordinate the activities of all the project teams [see 10].

To improve the effectiveness of development and implementation of the projects, they should be classified not only by the type of innovation (subject / process, organizational and social), but also by the category. There may be several categories of the projects. The following may serve as the criteria for attribution to a particular category:

– the volume of funding and the design period;

- the complexity (for example, the ability to cover several business processes) or specialized (intended for a specific business process);
- the efficiency and payback period, etc.

The project life cycle should comprise the following stages:

- initiation, preparation, protection of the project idea and the method of motivation;
- approval of the request for proposal;
- formation of a group to carry out the pre-project stage and project development;
- approval of the proposal for pre-project funding;
- preparation of the business plan, the financial conclusion for the project, the approval of the order on inception of the project;
- project implementation;
- stage-by-stage control;
- evaluation of the final results, approval of the project manager report;
- approval of the order on termination of the project. Awarding of the participants according to the results of development and implementation of the project.

An important component of the corporate innovation system is the *communication* with the mandatory feedback. At the same time the communication of the enterprise should be kept from the unauthorized access (in any form) in order to protect the trade secrets and the interests of the enterprise. Modern communication in the innovation system must contain the following elements:

- the corporate bank of ideas. It is required at the stages of search and examination of the innovation. The employees of the enterprise should have free access to the bank of ideas. This will allow a free and open discussion of the ideas and their transformation;
- electronic document management. It is used at the stages of design and implementation of the innovations. The users are

the project team and the management. It serves as a source of knowledge about all the realized projects.

The challenges of the *marketing* in the innovation system are reduced to the promotion of the innovations. To oversee the development and implementation of the projects (project stages) the reports must be drawn up, stipulating the financial results and significance for the development of the activities of the enterprise and the enterprise itself. It is desirable for the project team to complete the article about the project for the in-house and / or external placement.

The financing of the innovative activity should have two components:

– financing of the strategic, long-term developments of importance for the future of the enterprise;
– financing of the tactical and operational developments, mainly, updates and improvements.

The financing of the strategic innovations by the enterprise can be performed either at their own expense or with the participation of the involved ones. The Own funds are formed at the expense of the part of the capitalized profit (the profit remaining at the disposal of the enterprise).

But the own funds may be sufficient for the design and development, but not sufficient for the implementation, development and market penetration. Therefore, the enterprise should attract the investors' funds, which can be formed from the following sources:

– additional contributions of the founders (major shareholders) of the enterprise;
– funds obtained due to the initial public offering – IPO.

The financial resources of the bank (loans) may be attracted only in the most extreme case.

Thus, the funds of the development fund of the enterprise should be divided into two parts:

– the investment fund – financing of the innovations requiring the funds not only for design and development, but also the funds for investments. The disbursement is long-term;

– the financial fund for the financing of the projects and developments requiring insignificant capital investment. The disbursement is performed within one fiscal year.

The main objective of the system of *motivation* of the project team and the innovators is the launch and the support of the mechanisms of the innovative and effective development of the enterprise given the active participation of its staff. The system of motivation should be built and adjusted based on the experience of the innovative activity of the enterprise itself, as well as other business organizations and rely on the resources for the management of the development of the enterprise. The motivational system should contain two subsystems [6]:

– material incentives (incentive fund);
– moral incentives.

The subsystem of material incentives is built on the basis of two components:

– the formula of motivation;
– the amount of incentives (remuneration).

The formula of motivation formula defines the relationship between the level of achievement of the degree of profitability of the project and the volume of funds allocated in the incentive fund. The volume of the material incentive fund indicates the amount of remuneration in terms of value and is included in the project budget. It must be paid in case of 100% (or close thereto) achievement of the project objectives. The development of the motivation formula must be commenced at the initial stages of the project (preparation and protection of the proposition). The final wording of it must be acquired in the project business plan. The remuneration of the participants of the project is determined individually, depending on the outcomes of the project and the degree of participation of each participant.

The incentive fund should be formed depending on the type of project. For projects with the determinable direct financial result the

fund is formed in proportion to the financial result. The volume of the fund should be based on the following criteria:

– the importance of the project for the enterprise;
– the complexity and novelty of the design solution;
– the complexity and history of the project.

For projects without direct financial result (or where it is difficult to determine) the volume of the incentive fund can be determined by an expert. The amount of the incentive is determined based on:

– the importance and complexity of the project;
– the labor intensity of the project;
– the opportunity cost of the design work, for example, by outsourcing.

Given that, the amount of remuneration for the projects without direct financial result shall not exceed the threshold for these types of projects established by the enterprise.

The incentive of the project team members is applicable for [see 10]:

– the idea;
– the participation in the development of the project;
– the results obtained.

The proportions of the remuneration should be established at the initial stages of development and should be adjusted in the development of the business plan.

In addition to the direct cash payments for the innovation and design activity, the project participants may receive other types of material incentives.

A constant monetary compensation, royalty, may be established for a definite proposal and may be in the form of:

– a percentage of sales volume within a specified period;
– a percentage of the financial result obtained for the sales or otherwise.

Also, the innovator may be rewarded for the idea with a stake, or with a position of the founder of the enterprise.

In addition to material incentive and motivation system should contain a subsystem of moral incentive. Moral incentive has more powerful effect.

The following may be used as the moral incentive:

- the awarding with the diploma, pennant, etc. for the results achieved;
- the best in the profession;
- the best innovator of the enterprise, etc.

The innovative activity is always associated with high risks. Therefore it is necessary to form a control system for the monitoring of the innovative projects. This system is independent of the corporate control system. Its main challenge is to predict the effectiveness and profitability[2] of the projects being developed and their results. The monitoring should be carried out in the following areas:

- the use of funds for the implementation of the project;
- the evaluation of the results of the project development stages;
- the assessment of the future profitability and business efficiency;
- the need for additional financing of the project;
- the assessment of the further development of the project or its termination.

Therefore, in planning and developing of the project schedule it is required to determine the "control points" for prediction of the future outcomes. The monitoring should be carried out by the top-managers of the enterprise, the involvement of the independent, external experts is possible in case of necessity.

Conclusion

The corporate innovation system is the targeted complex system. The main objective of the system is the sustainable development of the enterprise (firm). This system includes the following main elements:

[2] The term "profitability" is understood by the author as the possibility of making a profit in future periods.

the internal and external information; the bank of ideas; the incentive system; the innovation financing fund; the technical means. The interaction among the elements of the system is ensured by the following processes: the planning and marketing of the innovative activity; the search and expertise; the design and implementation; the communications; the financing; the motivation and the incentives.

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DATA ABOUT THE AUTHORS

Kukushkin Sergey Nikolaevich, Candidate of Economic Sciences, Associate Professor, Department of Industrial Economics
Plekhanov Russian University of Economics
36, Stremyanny lane, Moscow, 117997, Russian Federation
kykychkin@mail.ru

Yankovskaya Veronica Vladimirovna, Candidate of Economic Sciences, Associate Professor, Department of Theory of Management and Business Technologies
Plekhanov Russian University of Economics
36, Stremyanny lane, Moscow, 117997, Russian Federation
veronika28-2@mail.ru

ДАННЫЕ ОБ АВТОРАХ

Кукушкин Сергей Николаевич, кандидат экономических наук, доцент
Российский экономический университет им. Г.В. Плеханова
Стремянный переулок, 36, г. Москва, 117997, Российская Федерация
kykychkin@mail.ru

Янковская Вероника Владимировна, кандидат экономических наук, доцент
Российский экономический университет имени Г.В. Плеханова
Стремянный переулок, 36, г. Москва, 117997, Российская Федерация
veronika28-2@mail.ru