

Determining the Effectiveness of Corporate Controlling Based on the Use of Effective Algorithms

Ivan Nepomnyashchikh
Control and Audit Department
Ministry of Internal Affairs
of Russia in the Tver region
 Tver, Russia
 ivan-baton23@mail.ru

Alexey Artemyev
Tver State Technical University
 Tver, Russia
 aaartemev@rambler.ru

Abstract—Currently, the trend of globalization of the world economy is intensifying, therefore corporate entities seek to expand their economic power and influence, which encourages them to constantly search for ways to increase the efficiency of their activities both in the domestic and foreign markets. These circumstances force corporate structures to accelerate the pace of development through the introduction of innovations, lower costs and risks. Solving the above problems allows the use of controlling. To carry out controlling in order to reduce risks, it is necessary to have relevant financial information not only external but also internal, in this connection, the role of corporate structures using the internal audit (control) mechanism is growing. The aim of the study is to develop a system of indicators for assessing the effectiveness of controlling in the corporate environment. The main results and conclusions obtained personally by the authors and possessing scientific novelty are as follows: 1. The development of a mechanism for assessing the effectiveness of controlling through the use of an internal audit (control) system and corporate risk management, the use of which allows us to create models that can increase the effectiveness and external attractiveness of the corporate structure. 2. A methodology for assessing the effectiveness of controlling is proposed, algorithms for its development in the corporate structure are modeled, based on strategic planning methods.

Keywords—controlling, assessment system, audit, control, risk management.

I. INTRODUCTION

Difficulties in the development of the national economy, foreign policy and foreign economic upheavals indicate that the development and modernization of various elements of managing corporate structures, including controlling, is of particular importance. Consequently, the development of controlling is relevant for both state and private corporate structures.

It should be noted that at present you can find many interpretations of the term controlling, many of them are close in their economic essence, while others have certain differences. Different interpretations of the term controlling affect corporate decision-making when choosing approaches to controlling organization, and, accordingly, on the application of previously unused management techniques and methods in implementing organizational changes [1-5].

The studies found that the following scientists made the main contribution to the development of corporate controlling: D. Khan [5], E. Mayer [6], A. Daile [1], P.

Horvath [2], and others. They identified some theoretical aspects and directions of controlling application, but designated authors, first of all, rely on national experience, which varies significantly in different countries.

Considering this definition in a broad sense, a number of scientists believe that controlling is an independent section of management (D. Khan, E. Mayer, M. Hauser, S. G. Falco, A. M. Karminsky, E. M. Korotkov, E. A. Utkin, A.M. Pavlov, V.A. Starykh, N.I. Olenev, A.G. Primak, etc.). Others believe that controlling is an independent institution, a type of economic activity (R. Nelson, R. Everta, N.G. Danilochkina, L.V. Popov, T.A. Golovina, R.E. Isakova, E.L. Popchenko etc.). Some define controlling as an element (function) of management (P. Horvath, A.K. Andronova, E.D. Pechatnova, etc.). A variety of views leaves its mark on the theoretical conclusions and practical tools that are used by corporate structures in building a controlling system. At the same time, it should be noted that the above authors highly appreciate the capabilities and prospects of controlling as an element of internal corporate governance.

A comparison of foreign and Russian experience of application shows that the controlling system in domestic corporate structures is on the way to formation and in order to create effective models it is necessary to overcome the contradictions between participants in corporate economic relations and subjects of the internal and external environment, to increase the level of completeness and reliability of both managerial and financial information. It seems to us that in order to build an effective controlling system in the corporate environment, changes are needed in the activities of both the organizations themselves and in the structure and quality of work of controlling entities, as well as the creation of new and development of the tools used to evaluate their performance.

An analysis of domestic experience allows us to identify general directions of development of corporate controlling [7-9], namely:

- improvement of methods and tools for its implementation;
- building models for evaluating the effectiveness of the application, based on the use of a system of predefined indicators and criteria.

Particularly relevant is the question of determining a system of indicators and criteria that allow you to create a model for assessing the effectiveness of controlling in the

corporate environment in the context of dynamically changing socio-economic relations, which determines the directions for its further development.

A significant number of domestic corporate structures are faced with inefficient use of resources due to the lack of relevant information for making managerial decisions, possible abuses by the management, intentional (or unintentional) concealment of reporting data. To solve these problems in corporate associations, it is necessary to increase the transparency of the information received, and, therefore, to improve the internal audit (control) system aimed at risk management.

The introduction and development of the internal audit (control) and risk management mechanism is a priority for the development of the controlling system in corporate structures. Firstly, this tool is the main supplier of internal financial and other information, which, in turn, is the guarantor of effective management. Secondly, the developed system of internal audit (control) has an effective impact on reducing the risks of the corporate structure, which is again important for corporate entities in modern conditions.

To determine the effectiveness of controlling, methods should be used to adequately evaluate management results based on the use of both internal and external information. However, there is still no clear understanding of the methods to fulfill these conditions.

II. RESEARCH METHODOLOGY

The tasks to be solved required the study of economic, informational, social and other features of the use of controlling, and the identification of directions for increasing its effectiveness. This also determined the specifics of the research methods used, which made it possible to study various aspects of the economic, functional, structural, temporary, logical, institutional nature of the formation and justification of areas for increasing the effectiveness of controlling through the introduction and development of an internal audit (control) mechanism.

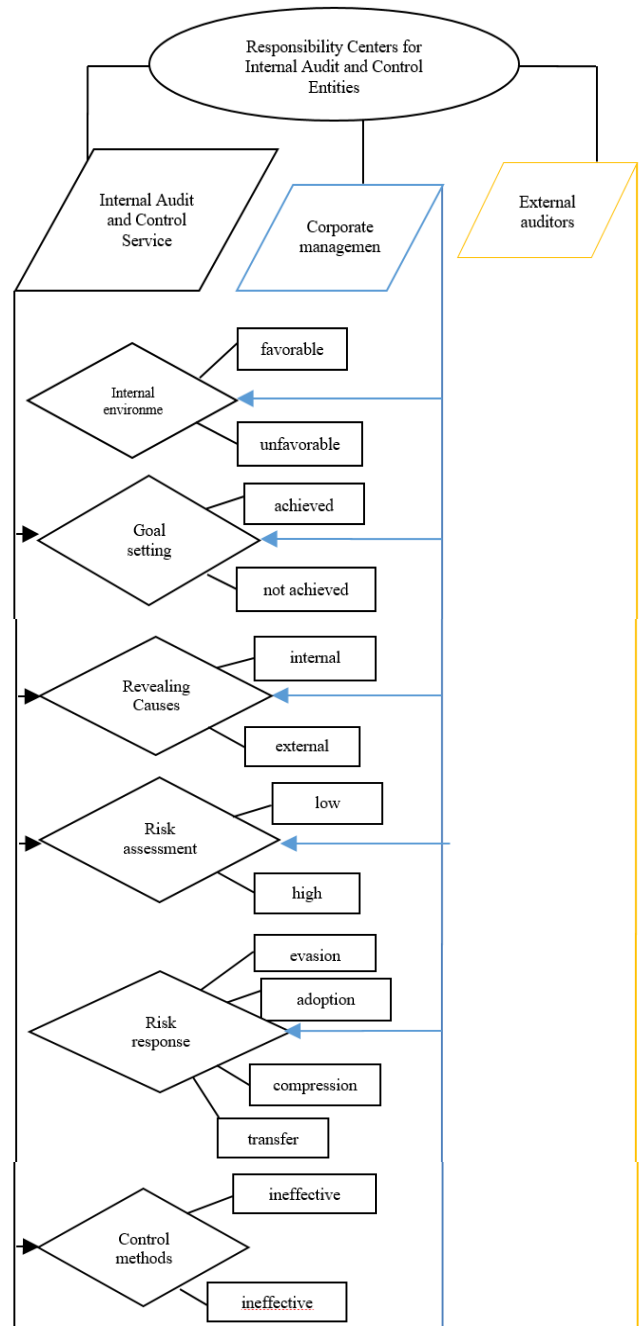
To determine the effectiveness of using controlling in corporate entities, the approaches used in strategic management were used, as well as the following methods:

- the index method, providing calculations of generalized indicators of the corporation;
- balance sheet method, which provides an opportunity to compare the relationship of indicators of economic activity;
- economic and mathematical methods used to select the best options for organizing a system for managing the corporate structure and its elements;
- method of functional cost analysis, applied in the process of determining the optimal set of functions performed by the corporate structure, and, accordingly, the optimal set of controls, etc.

III. RESULTS

The corporate structure, which is developing an internal audit (control) mechanism, has questions about the effectiveness of the tasks that it must solve, as well as the determination of the competence and responsibility of those directly involved, for this we will build a “decision tree” (Fig.

1). The “Decision Tree” in this form plays the role of an assistant to the board of directors in determining the general level of organization and functioning at different stages of the internal audit (control) system and in determining responsibility centers.



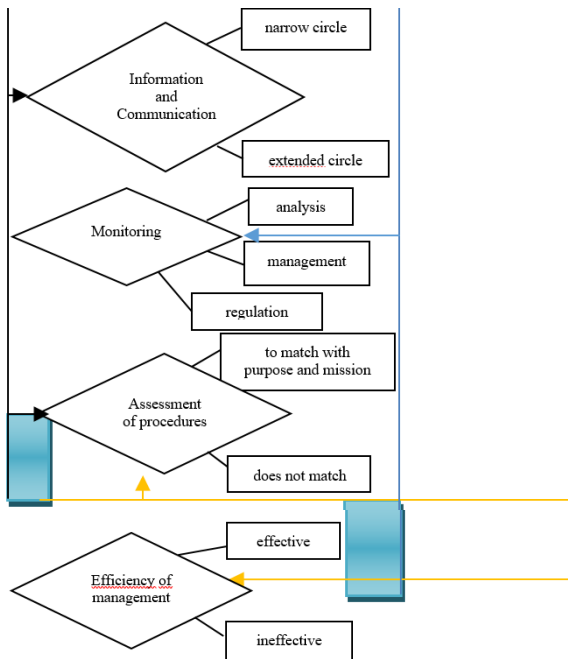


Fig. 1. The definition of centers of responsibility for the organization of the internal audit system (control) at different stages

Consider the functioning of the presented decision tree:

- The internal environment. Corporate structure management maintains an atmosphere in the organization of internal audit (control). The work and result of the internal audit and control service directly depends on the nature of the organization's internal environment (favorable, unfavorable). This stage determines the responsibility of corporate management as the center of responsibility.
- Setting goals. Management must pinpoint the goals of the corporation that are relevant to the mission. The internal audit (control) service should clearly represent the tasks that are set for it. At this stage, the responsibility centers are the internal audit (control) service and management.
- Identification of the reasons. The internal audit (control) service provides management with information that helps determine the reasons that affect the integrity and mission of the corporation. The management of the corporation determines what factors relate to the causes (internal or external) and subdivides them into risks and opportunities. At this stage, the responsibility centers are the internal audit (control) management service.
- Identification of the reasons. The internal audit (control) service provides management with information that helps determine the reasons that affect the integrity and mission of the corporation. The management of the corporation determines what factors relate to the causes (internal or external) and subdivides them into risks and opportunities. At this stage, the responsibility centers are the internal audit (control) management service.
- Response to risks. When risks arise, management must determine methods to counter them. The selected risk management strategy determines the degree of risk

reduction. This stage defines the responsibility center of corporate management.

- Methods of control. Based on the results of the measures taken, the internal audit (control) service determines the effectiveness of the response to risks through an operational analysis of their changes. The responsibility center is the internal audit (control) service.
- Information and communication. Operational information received by the internal audit (control) service is distributed among interested structural units. The exchange of data helps to increase employee motivation, due to the perception of their involvement in the occurrence of risks, a reaction to risks occurs. The responsibility center is the internal audit (control) service.
- Monitoring. The corporate structure management continuously monitors the information and results obtained through analysis, management and risk management, defines new goals for the internal audit (control) service. This stage is determined by the responsibility center of the corporation management.
- Evaluation of the procedures performed, management effectiveness. To determine an independent and objective assessment of the creation of a risk-based model, its functioning, as well as the contribution of the parties involved, we suggest the use of highly qualified external auditors who perform the functions of identifying weaknesses and preparing a consolidated report to the board of directors.

External auditors play a central role in the indicated model of the "decision tree", since their activity is also evaluated, and they themselves are the lever for determining the subjects of responsibility. The performance of the functions of external audits in this system is also possible with the participation of the internal audit (control) service directly.

It is also important that the generated model of the "decision tree" assists the board of directors in resolving issues of stimulating and increasing the motivation of subjects in developing an internal audit (control) system. The ability to increase the effectiveness of the motivation system through the prism of introducing a reward system after achieving results will create the need for management (whose earnings are based on the current state of affairs) to concentrate and focus their activities on the long-term development of the corporate structure. At the same time, it is important to draw a line between the interests of the corporate structure and management in order to exclude the situation when managers, in order to get large rewards, try to maximize the use of revenues without thinking about possible losses in the future, thereby increasing risks. At the same time, we believe that when building a motivation system, it is necessary to focus on improving the work of the internal audit service.

In order to differentiate the competences of subjects of the internal audit (control) system represented by the management of the corporate structure and the internal audit and control service, it is advisable for the board of directors to use a rating of their work to determine the amount of remuneration. This will be the driving force behind the use and development of this system. The main indicators for evaluating the work of

management and the internal audit and control service are depicted in Figure 2.

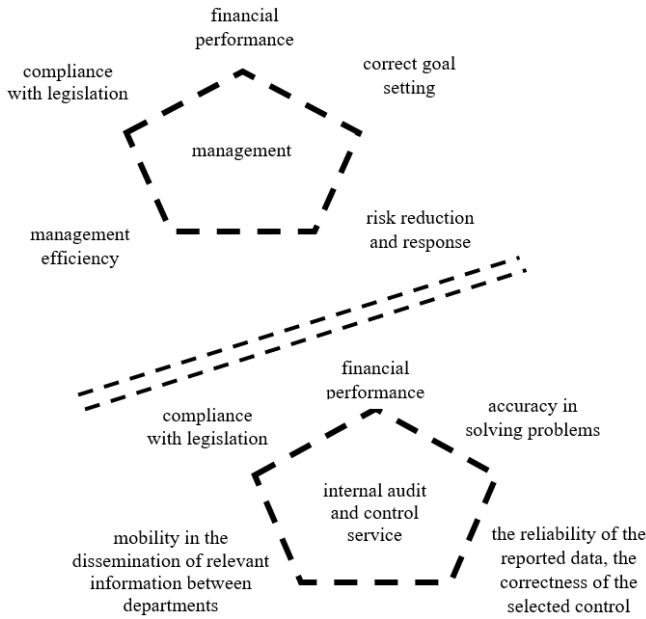


Fig. 2. The main indicators for evaluating the activities of subjects of the internal audit system (control)

Let's consider the author's rating of the corporate structure management evaluation, for this purpose we will draw a graph (Fig. 3).

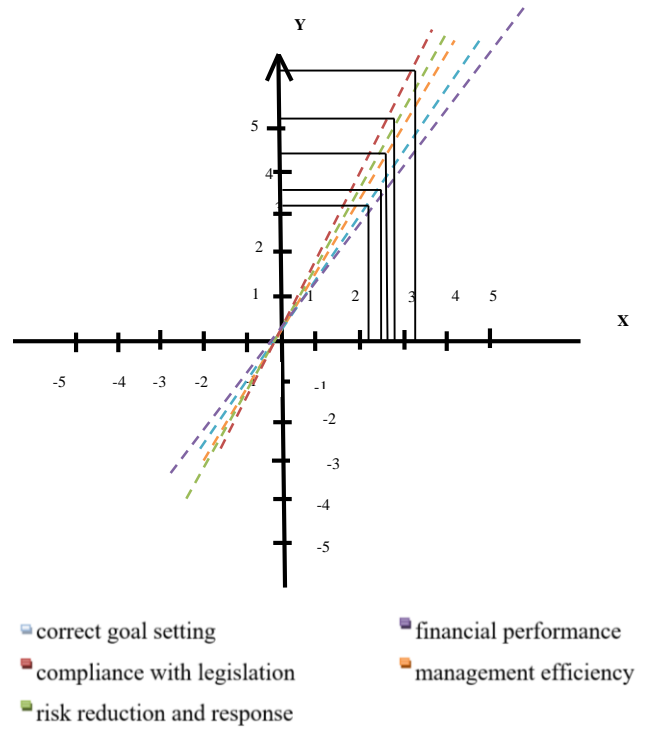


Fig. 3. The schedule for determining the rating of corporate structure management

To determine the rating of management activities in the proposed model of internal audit (control), we propose to use the following formula:

$$y = x^2 - x, \tag{1}$$

where y - the rating of management activities; x - the indicators of management performance assessment.

The definition of management performance indicators (x) is presented in Tables I, II.

TABLE I. CRITERIA FOR ASSESSING MANAGEMENT PERFORMANCE FOR GIVEN INDICATORS

Assessment indicators	Grade level				
	1	2	3	4	5
correct goal setting, x	the goal is not achieved	the goal is achieved, below average expectations	the goal is achieved, the average expectations	the goal is achieved, above average expectations	the goal is achieved
compliance with legislation, x	legal requirements are not met	legal requirements are met below average	legal requirements are met at the average level	legal requirements are met above average	legal requirements are met
risk reduction and response, x	risks increased	the risks are above average	average risk	The risks are below average	The risks are minimized
management efficiency, x	lack of efficiency	Efficiency is below average	average efficiency	Efficiency is above average	effective

The state of financial indicators is evaluated in positive and negative results.

TABLE II. THE CHOICE OF PERFORMANCE ASSESSMENT FOR FINANCIAL INDICATORS

financial performance, positive dynamics, x	1 unchanged	2 small increase	3 high increase
financial performance, negative dynamics, x	- 1 small decline	- 2 average decline	- 3 significant decline

If the management activity is negative (the state of financial indicators is the arithmetic mean) we use the calculation according to the formula:

$$y = -(x^2) - (-x). \tag{2}$$

To assess the performance of management, we can propose the creation of an expert group. The Board of Directors is responsible for the formation of the expert group. The following composition of the expert group competent in the field of economics and management is proposed (Fig. 4).

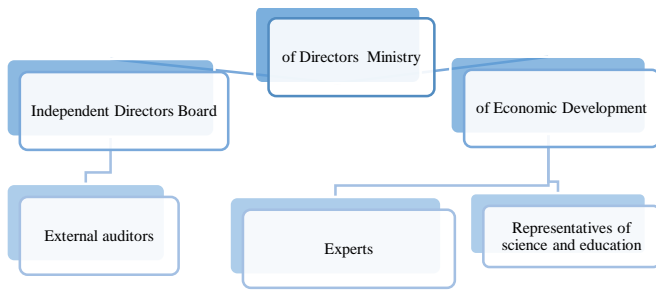


Fig. 4. Formation of the composition of the expert group

Management performance indicators are evaluated using an assessment sheet. Table III shows the layout of the evaluation sheet, which is a typical one and can be used by other corporate structures.

TABLE III. THE AVERAGE VALUES OF MANIFESTATION DEGREE AND VIRAL LOAD IN DIFFERENT LEAVES PARTS

Ongoing performance assessment	Board of Directors	Independent Directors	External auditors	Ministry of Economic	Representatives of education and	Experts	\bar{x}	\bar{y}
correct goal setting	3	2	3	3	2	2	2.5	3.75
compliance with legislation	3	3	3	4	3	3	3.16	6.82
risk reduction and response	4	2	3	2	3	3	2.83	5.17
financial performance	-1	-1	-1	1	2	1	1.00	0.00
management efficiency	3	2	3	3	3	2	2.66	4.41

Next, the arithmetic mean values of management performance indicators are calculated according to the following formula:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^n x_i = \frac{x_1 + x_2 + \dots + x_n}{n} \quad (3)$$

To determine the remuneration index, we use the formulas:

$$I_y = \frac{\frac{1}{n} \sum_{i=1}^n \hat{y}_i}{\frac{1}{n} \sum_{i=1}^n \bar{x}_i} = \frac{\hat{y}_1 + \hat{y}_2 + \dots + \hat{y}_n}{n} \cdot \frac{\bar{x}_1 + \bar{x}_2 + \dots + \bar{x}_n}{n} \quad (4)$$

$$I_y = \frac{20,15}{12,15} \approx 1,65.$$

We form deterministic groups that determine the ratio of the index to the management remuneration rating (Fig. 5).

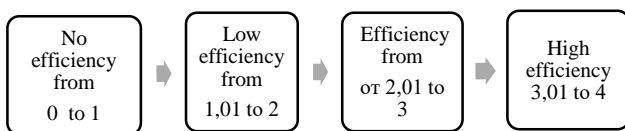


Fig. 5. Groups of ratio of index to rating of remuneration

The designated rating groups can perform several functions: firstly, to characterize the overall assessment of the management's performance in the internal audit (control) system; secondly, when calculating the coefficient (size) of its remuneration. The Board of Directors, for its part, needs to determine to which source of payments the associated index should be linked.

According to the results of the analysis, the management remuneration index is 1.65; which indicates the average level of its promotion and work efficiency in the considered system of internal audit (control).

IV. DISCUSSIONS

Leading scientists [5-6,10-12] refer controlling to the system of information support oriented to the result of managing of organization. In connection with the globalization processes in economic relations, as well as changing technological structures and the development of the global information and telecommunications space (increasing information volumes), corporate structures need further development of controlling systems, which is based on the collection and processing of information not only external but also internal, what is the basis of the internal audit (control) system.

Internal audit (control) is already used by many Russian organizations. At the same time, the management of firms is still not sufficiently aware of its essence, purpose and objectives of its implementation. The Board of Directors, which should set strategic goals in the implementation of the company's activities, should take responsibility for its implementation and use. Internal audit allows you to assess the validity and effectiveness of management decisions. Many organizations, citing the fact that they conduct an external audit, underestimate the importance of internal audit. To improve the internal audit (control) mechanism, it is important to carry out the following activities:

- the creation of a separate regulatory body, consisting of qualified specialists in the field of audit, middle managers, international experts;
- reallocation of responsibilities, which enables regulatory authorities to improve work efficiency;
- the implementation of a budgeting system that will help to develop a budget for individual structures of the enterprise, increase the motivation of employees to obtain the intended result, will show the strengths and weaknesses of the enterprise;
- formation of a database of suppliers and buyers;
- the creation of a methodological base based on international experience;
- introduction of the latest automated accounting systems for the preparation of management decisions;
- creation of effective risk-based systems based on performance indicators.

The creation of effective risk-based systems based on performance indicators is an integral part of the formation of the internal audit (control) mechanism, however, it should be noted that foreign companies do not have a common opinion on the use of methods that can fulfill these conditions.

Therefore, the algorithms considered in the study will contribute to the solution of the tasks set for the formation of a unified system of internal audit, control and risk management, will increase the effectiveness of controlling, and will enhance the financial stability and investment attractiveness of both foreign and Russian corporations.

V. CONCLUSION

In Russia and abroad, there are quite a lot of large, medium and small state and private corporations, the scale of production and the activities of which require some monitoring and, on its basis, the development of more accurate and timely solutions for their further development. If we take into account international and national experience in using the internal audit (control) system, we can conclude that the main subjects of this system are management and the internal audit and control service.

Based on the use of the presented model of estimated indicators, the management link of the corporate structure will be able to foresee the possible risks of functioning. Implementation of the developed rating system for evaluating indicators of the internal audit (control) system and risk management will help to identify areas for improving the corporate controlling system and take into account the individual interests and benefits of all interested both internal and external entities, and will help corporate entities increase operating efficiency in a dynamically changing environment and, accordingly, will allow more reasonably accept corporate management decisions aimed at modernizing the internal environment.

REFERENCES

- [1] S.G. Falco, *Controlling in small and medium enterprises - a collection of scientific papers of the IV International Congress on Controlling*. Prague, Moscow: Association of controllers, 2014.
- [2] S.G. Falco, *Collection of scientific papers of the international forum dedicated to the 85th anniversary of the department "Economics and Organization of Production" MSTU named after N.E. Bauman*. Moscow: Scientific publication "Modern Enterprise and the Future of Russia", 2014. (in russ.)
- [3] The official website of the Russian controllers. <http://www.controlling.ru>
- [4] T.A. Khudyakova, "Modeling of controlling system of enterprise stability under conditions of variable environment," pp. 303-306, 2016 [4th International Congress on Interdisciplinary Behavior and Social Science, 2015]
- [5] D. Hahn, "Controlling – Stand and Entwicklungstendenzen unter besonderer Berücksichtigung des CIM-Konzeptes," *Saarbrucker Arbeitstagung*, pp. 3-39, 1987.
- [6] E. Mayer, *Controlling as a system of thinking and management*. Moscow: Finance and statistics, 1993. (in russ.)
- [7] T.A. Khudyakova and A.V. Schmidt, "The preconditions for the development of controlling system of sustainability on Russian enterprises in conditions of variable economy," *SGEM*, pp. 789–795, 2016 [3rd International Multidisciplinary scientific conference on Social Science and Arts, 2016]
- [8] T.A. Khudyakova, "The role of controlling during managing sustainability of industrial enterprises," Ufa: Bashkir State University, 293-295, 2014. (in russ.) [Innovative development of modern science: collection of articles of the International scientific-practical conference, 2014]
- [9] T.A. Khudyakova and A.V. Schmidt, "Steady Functioning of an Enterprise in the Conditions of Variable Economy," *Mediterranean Journal of Social Sciences*, Vol. 6, No. 4, pp. 274–279, 2015.
- [10] T. Reichmann, *Controlling mit Kennzahlen und Managementberichten: Grundlagen einer systemgestützten Controlling-Konzeption*. Munchen: Vahlen, 1997.
- [11] E.V. Frank, "How to manage organizational change?," *Rossijskoe predprinimatelstvo (Russian Entrepreneurship)*, No. 5, pp. 38-43, 2012. (in russ.)
- [12] *Corporate governance practice in Russia: defining the boundaries of the national model, expert-analytical report*. Moscow: 2011. (in russ.)