

## Some Questions of IT Control in Economic Entities

F.I. Kharisova and I.M. Kosova

Institute of Management, Economics and Finance, Kazan Federal University,  
420008 Kazan, Russia

---

**Abstract:** In this study, the existing interpretations of the concept of information technology audit, gives an overview of the standards controlling this sphere. There is described the approach to the control of IT processes in accordance with the standard COBIT, offered the methods for calculating the cost-effectiveness of information technology. The study shows the interrelation of the classical models of measuring the effectiveness of indicators system used in the COBIT.

**Key words:** Audit of information technology, IT audit, control objectives for information and related technology, COBIT, IT efficiency, maturity model, balanced scorecard

---

### INTRODUCTION

At present, the Information Technology (IT) is a key factor in the survival of the business units in the fast-growing competitive environment. In the process of using information systems become more complex, consuming more and more financial, time and human resources. For their proper, departments or even service companies are created. At the same time, it is almost difficult to assess the economic effect of created IT infrastructure. In these circumstances, the role of audit of Information Technologies (IT audit) at all levels and stages of development of the economic entity becomes more and more important because this type of audit allows not only quickly receive systematic and reliable information to assess IT processes but also allows to take appropriate decisions on the selection and management of IT processes. IT audit is a form of control and includes both an external and independent audit and internal audit which is part of the financial control.

There are no special audit practice standards which define the concept, objectives and scope of IT audit in Russia. In this regard, the audit of information technology is based on international standards and methodologies. It should be identified a number of standards that are in some way regulate this area.

Standard Control Objectives for Information and related Technology (COBIT) (Objectives for Information and Related Technology) is developed by the Association of Specialists in Accounting and Information Systems Control (ISACA) and contains a methodology and standards for the management of information technology, IT audit and IT-security. COBIT is

characterized by a focus on business requirements, process approach to IT management, control objectives to IT management processes, assessing the effectiveness of IT. A key provision of the standard is to obtain the information necessary for the organization to achieve its objectives; IT resources should be managed by a set of naturally grouped processes. To do this, COBIT allocated 34 individual IT processes which are divided into 4 groups:

- Planning and organization
- Acquisition and implementation
- Delivery and support
- Monitoring and evaluation

The above processes are a set of objectives containing detailed control purposes. Objectives are the steps required to achieve measurable results.

### MATERIALS AND METHODS

COBIT is a standard approach to managing IT processes with emphasis on control. Control objectives describe the requirements for effective control of each IT process and include:

- Formulation of administrative actions
- Policies, procedures, practices and organizational structures
- Conditions that inspires confidence in the achievement of business goals, the prevention of unwanted events whose consequences are identified and corrected

Standard the Committee of Sponsoring Organizations of the Treadway Commission (COSO) was established in the US (and later recognized as the international). The standard contains a generalized model of internal control and risk in comparison with which companies can assess their own management system.

Standard IT Infrastructure Library (ITIL) describes a set of processes which are necessary to ensure consistent high quality IT services and improve user satisfaction. ITIL provides IT professionals by the knowledge and resources to be used to maintain an efficient infrastructure, at the lowest cost meeting customer needs completely.

ISO 20000, the international standard for auditing and certification is a generalization of the world experience in management organization and delivery business support IT services and is applicable to any organization, regardless of size and industry sector. It offers universal criteria by which one can objectively assess the company's ability under specific user requirements.

ISO/IEC 38500 "corporate governance of information technology" a standard that allows top management to understand and effectively fulfill their legal, ethical and regulatory obligations regarding the use of IT and carry out the assessment, management and monitoring of the use of IT in the management of IT.

Belkin AP gives the following definition of IT audit: "IT audit is part of the technical audit of the company, directly related to the control operation of information technology. Under the technical audit is usually understood to test independent experts used in the enterprise technical solutions and conclusions about the validity of data solutions and related information systems and processes with the requirements of regulations" (Pavel, 2008).

In this context, in our opinion, IT audit should include procedures such as: inventory of audit objects (hardware, software, data transmission systems, information security, etc.) the collection of statistical information of the objects of being studied IT infrastructure, analysis of the IT infrastructure state on the basis of the inventory and statistical information, development of recommendations aimed at improving the efficiency of the technical component of the IT infrastructure.

For this type of audit is characterized by small scale of work and technical specialization studies. The company may restrict with poor management of IT processes, if the leadership does not understand that IT strategic planning is necessary in order to achieve business goals. In this connection, the determination of Belkin AP is not exhaustive.

Today, there are many other concepts including some aspects of the audit information system. In this connection, all the different formulations useful to combine several groups depending on the subject of the study.

Operational IT audit is reviewing the current values of the general parameters of the functioning of the IT infrastructure at different levels: network, operating system, system software, application software, cryptography, etc. The purpose of this study is to obtain accurate information about the number and types of used devices, information systems, automated systems, software. The main direction is the collection and systematization of information, analysis and assessment is not carried out.

Audit of technological infrastructure aims in conducting an expert assessment of the current status and level of functioning of the IT infrastructure including technology platforms, hardware and software systems, networks and communications, receive recommendations for improving the efficiency of their use, upgrading, lower cost of ownership as well as the certificate of compliance server load by their characteristics, confirming that the server platform allows you to build tasks or work at maximum capacity.

Audit of IT business process is to analyze the relevance and acceptability of the information system tailored to the needs and capabilities of the organization as a whole or a particular business process, test information technology, supporting a business process organization for compliance evaluation criteria. The result of the study answers the question of whether the needs of the business processes of the company's existing information system. Similar procedures are performed in an audit of IT processes that occur within the IT department such as application development, testing, implementation and execution of operations, maintenance, backup, support, incident handling, etc.

Audit of IT management includes a review of the organizational structure, strategic planning work, resources, budgeting, cost control, etc. and, if applicable, the audit relationship with external suppliers of IT services (in some cases audit these aspects can conduct independent auditors performing financial audits, leaving IT auditors more technical aspects).

Information security audit involves the performance of inspections relating to the confidentiality, integrity and protection against unauthorized access to systems and data. For this type of research on the similarity of the subject it is advisable to include an audit of the legal aspects of IT resources is a test used software licenses, data protection, regulatory compliance.

Comprehensive audit of IT is necessary to give to the management the opportunity to evaluate all processes in IT organization or IT department, compare the adequacy of the IT business needs, predict the development of the organization and to commensurate it with the current state and prospects of IT development.

If it is possible to carry out an audit of individual elements of an information system or inventory without the usage of an integrated approach, based on training and experience but it's not possible to conduct IT audit (especially complex) out of a systematic approach, without special knowledge and approved methods.

To solve such problems Audit and Control Association of Information Systems (ISACA) was established; today it is a world leader in the development and dissemination of standards for IT management and audit. ISACA standard for IT audit became COBIT. The standard has been defined above.

According to COBIT, the main purpose of IT audit is to provide the management of the organization by approved data on the effectiveness of IT management tasks. As part of the COBIT standard, management principles are closely linked with the principles of auditing. By controlling IT infrastructure has an influence and then achieves the goals. The audit is necessary for monitoring the achievement of purposes. Consequently, IT audit should contribute to improving the information system which is determined by the level of its safety and effectiveness of IT management processes. Therefore, the audit examines the current state, evaluate the resulting risks and issue recommendations for corrective action. Audit of IT management system includes organizational and procedural levels of IT management processes. General principles of management determine a strategy of the IT audit. They focus mainly on the distribution of responsibilities, standards of management and control of information flows between the subjects and objects of management. The main objective of COBIT-determination of basic principles and general structure of the IT audit which are applicable to a wide range of organizations and information systems (Alexander, 2003).

Terms and model of the IT audit corresponding to management principles of COBIT are set out in one of the main books "audit guidelines". It describes how to inspect the implementation of each of the 34 high-level IT processes and 318 detailed control objectives. This allows the auditor to evaluate the adequacy of implemented management to system standard requirements and business objectives, generate recommendations for its improvement. The overall approach to IT audit, set out in COBIT has a three-tier structure. The highest level is represented by the following elements:

- COBIT framework, determining the overall conceptual system and including a classification of IT processes, information criteria and description of IT resources
- Requirements for the audit process itself
- Generic requirements for IT process auditing
- General principles of control

The second level is to determine the stages of the audit and the formulation of detailed instructions on audit of particular IT processes which the auditor complements and specifies in order to bring them into line with the specific terms of the audit and the characteristics of the study information system. "Audit guidelines" provides detailed instructions for each of the 34 IT processes. Actual management objectives should be based on the current needs of the organization. At the third level, detailed instructions are supplemented by the following factors:

- Sector specific criteria
- industry standards
- Platform specific elements
- Detailed control techniques employed

IT audit procedures on COBIT includes four successive stages:

- Identification and documentation (includes the collection and primary analysis of information)
- Evaluation of control mechanisms
- Compliance test
- Detailed testing

The objective of "identification and documentation" phase is that to examine IT processes and determine the opinion of management regarding the level of management and control of IT processes. At this stage, it is revealed: who controls the IT processes where and when is happening IT process, the initial data for IT process and expected outgoing data, approved control procedures in the company.

The objective of "evaluation of control mechanisms" phase is to evaluate approved in the procedures and controls the company to determine whether they provide an effective control environment. As a result of this step, it is necessary to make the following conclusions:

- Whether comply approved procedures with the legislation and industry standards
- Whether provide an approved control procedures by appropriating control over IT procedures

- Whether there are alternative control measures similar to IT processes
- Whether control measures and a set of approved alternative form a control environment

In addition, the overriding objective of this step is to identify the IT processes that are necessary to be tested for compliance. The objective of “compliance tests” phase verification of compliance of the approved control procedures by company. At this stage, it is necessary to compare used control mechanisms with a set of stated and alternative ones and determine whether the applicable real control procedures are continuously and properly. At this stage, it is determined the degree of specialization of detailed tests.

The objective of “detailed testing” phase is collection of the necessary test data to support or refute of achievement of the control objectives.

According to this approach, the general scheme of the audit (in the figure “general audit guideline”) includes four phases: identify, evaluate, test, substantiate. To evaluate the achievements of each of the 34 management tasks “detailed instructions for audit” is used (in the figure “detailed audit guideline”). Development of strategy and planning of audit procedures is carried out according with the general requirements (in the figure “audit process requirements”). During the audit it should also be considered “control observations” (in the picture “control observations”). In addition, in all the above documents conceptual system and model relationships between business goals, IT processes, IT resources and information criteria and objectives of management, defines the methodology COBIT is used (in Fig. 1 “control framework”) (Alexander, 2003). Using COBIT methodology as a basic method of IT audit has several advantages:

- Priority of audit procedures and audit boundaries are determined by taking into account the studies using primary and secondary criteria analysis
- Allows targeted research that is practically impossible without the methodological approach
- The role of interviewing as part of this methodology allows the auditor to understand the logic of IT processes
- Obtained data, during the audit, allow us to focus on indicators which are most characterize each IT process
- Methodology determines the strategy of IT audit which guarantees complete coverage of the audit and regular obtain audit consultations

However, the use of this model has some disadvantages:

- Change never comes easy
- Significant detail denature makes the initial applications cumbersome, especially when checking the completeness and applicability of the control objectives
- Requires a degree of repetition audit procedures, since one purpose of the control mechanism rarely equals one, often one control mechanism is used to accomplish several objectives of control and vice versa
- Enforces some formalism

## RESULTS AND DISCUSSION

Summarizing the above, we note the value of IT audit as a high-level independent examination of the decisions and proposals for optimization and at the same time planning tool for the company. IT audit can be an indispensable tool for those who need a qualified expert assessment of the state of information technology, it is necessary to optimize costs, develop a strategy for the organization.

For example, when making a decision on the need to implement an information system, there are questions of a strategic plan for the organization, the place and role of information systems in this respect, the prediction of problem situations, optimizing IT investments which solution can help IT audit. IT audit results allow evaluating the work of contractors, to identify shortcomings. At the stage of information systems functioning, it's interesting another information: whether applied IT goals and objectives of the business correspond each other, whether the business has not turned into an appendage of the information system is to reduce the cost of ownership of IT infrastructure such as

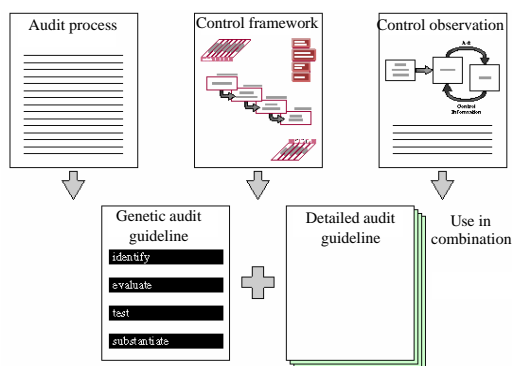


Fig. 1: The overall approach to IT audit in accordance with COBIT

optimal use of existing IT in business development. In the event of malfunction of the IT, it is necessary to know what to do in case of an emergency situation, how to identify and isolate problems. You need to understand how to deal with security and access control in the organization, how to minimize the risks of placing sensitive data in the information system of the organization. IT audit can substantiate for which requires the purchase of additional equipment and software or upgrading and assess the need for investment in employee training of IT department.

As one of the priorities of IT audit is improving the state of information systems by improving the efficiency of management, it is expedient to introduce techniques for evaluation and measuring of the economic efficiency of IT.

It should be understood that the cost-effectiveness refers to the effect on one cost, i.e., ratio of economic benefits to the costs of implementation and operation of information systems. Under the economic impact should be understood calculation of business profits which is the result of business. It should be noted that economical efficiency may be denoted as the ability of the system during its operation to give an economic effect (potential efficiency) and thus, provide a real creation of such an effect (actual efficiency) (Seredenko and Seredenko, 2011).

Make an objective view of their own level of efficiency is difficult. The company must, firstly to assess its current state and secondly, to determine the "thin" places where improvements are needed and third to introduce tools for monitoring changes. To implement the above objectives COBIT provides:

- Maturity model for comparative analysis and to identify needed improvements
- Evaluation of the effectiveness of processes based on the balanced scorecard (Anonymous, 2000)

Originally maturity model was developed by Software Engineering Institute and is offered to establish an effective instrument to classify and evaluate projects related to software development and to guarantee the quality in the performance of these projects. Later maturity model was modified for the purpose of IT service management and audit management processes.

Maturity models are designed for effective management, identify key actions that indicate what should be done to achieve the required quality and provide ways to control the correctness of the implementation of key IT processes and methods of their adjustment.

The methodology on the principle of gradation of each of the 34 IT processes on the level of maturity from a non-existent (0) to the optimal (5). Description of levels given in Table 1. The evaluation results of the company based on the model of maturity will determine:

- The recent efficiency of the organization to assess at what stage an organization is today
- The recent status of best practices in the industry to compare their organization with the best organization in the industry
- Strategic corporate goals to determine what results the organization wants to achieve
- The necessary measures to improve the current to the desired status (Fig. 2)

There is no universal algorithm for calculating the current and desired maturity level. Each company itself determines which parameters characterize the specifics of its IT processes and how to calculate the degree of influence of the selected criteria to them. In its turn, COBIT defines the following attributes, considering which you can give an opinion on the current level of maturity of the organization:

**Table 1: General description of COBIT maturity models levels**

Levels	Designation/Description
0	Non-existent; the complete absence of any noticeable processes. The organization is not aware of the existence of problems that must be solved
1	Initial/repeated episodically and haphazard. There is evidence that the organization recognizes the existence of problems and the need to solve them. In this case, there are no standardized processes, there are approaches used in certain situations or random cross-sectional solutions. Organized approach to IT management is absent, recognition of problems randomly and inconsistently
2	Repetitive but intuitive; processes have reached a level where different employees performing the same task and use similar procedures. There is no formal training and informing about usual procedures, responsible for the procedures lies entirely on the employee. Organization largely depends on the individual knowledge, whereby a high probability of errors
3	Defined; procedures are standardized, documented and communicated to the employees of the organization through training. There are requirements to follow a formal process described but it is unlikely that deviations will be detected. The procedures themselves are not complex and they are formalized version of the existing practice
4	Managed and measured; it is possible to monitor and assess the degree of compliance with accepted procedures and the ability to take action if the processes are ineffective. Processes are constantly being improved and consistent standard practice. Automated tools and performance management process uses a limited or episodically
5	Optimized; processes are optimized to the level of best practices, they are based on the results of continuous improvement and comparisons with other organizations using the Maturity Model. IT are used for complex workflow, providing a means of improving quality and efficiency as well as increasing the organization's ability to adapt quickly

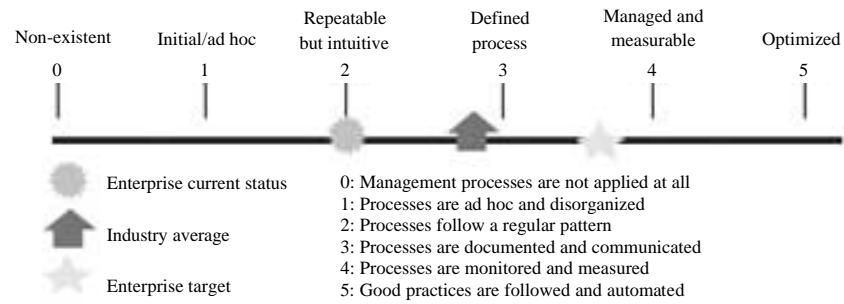


Fig. 2: Graphic representation of maturity model

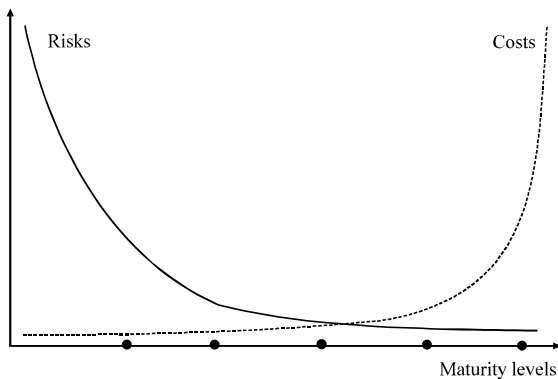


Fig. 3: Graph of risk and cost correlation of the level of maturity

- Awareness and knowledge
- Policies, plans and procedures
- Tools and automation of the process
- Skills and competence
- Responsibility and accountability
- Setting goals and assessing their achievement

Note that the above attributes are aggregated and it is expedient for the organization yourself to determine the priority criteria. For example, to determine the level of maturity specific business goals, the individual conditions in which the organization operates or industry practice may affect.

The calculation of criteria may be determined by: the proportion (%) of (pieces, currencies, hours/days/weeks), qualitative assessment.

When assessing the desired result in terms of the model it is necessary to consider that the effectiveness of the process depends on the level of maturity is nonlinear. Thus, the cost of providing maturity does not grow linearly and exponentially. As can be seen in Fig. 3, raising the level of maturity from 2-3 and from 4.5-4.8 would be disproportionate to the costs.

COBIT maturity model provides a measure of how well management processes are developed. It shows the

deficiencies in the management of IT processes and allows to set a goal of further development. Maturity model shows the evolution of the management and control of IT processes from the current to the desired. Increasing the level of maturity leads to minimize the risks and increase efficiency, reduce errors, more predictable processes and more efficient use of resources.

**Balanced scorecard:** The concept of a Balanced Scorecard (BSC) was developed in the early 90s of 20th century by team of Harvard Business School under the control Robert Kaplan and David Norton in order to address the shortcomings of classical metrics. Classic indicator system are based primarily on financial data, while the effectiveness of the organization's activities have a significant impact plurality of components with non-financial nature such as a strong brand, knowledge and experience of employees, relationships with customers and partners, the use of IT and others. Not less important issue is the complexity of the implementation of control measures for the implementation of the strategic plan.

BSC concept offers a solution to these problems. Firstly, the financial indicators are only one of the four equivalent components (prospects), "finance", "customers", "internal business processes", "learning and growth". Secondly, the key values are not given to indicators and ratios but their interaction and balance.

The methodology focuses on strategy which is interpreted in terms of the operational process through a system of interrelated indicators that gives a general idea of the outlook, corporate values and key purposes of the organization at both the management and execution. It is assumed that the set of parameters that the company includes such a system, depend on the strategic corporate objectives. Consequently, in the center of the model BSC are not indicators and strategic objectives (Fig. 4).

Strategy is a set of some hypotheses about cause and effect. Evaluation system should clearly represent

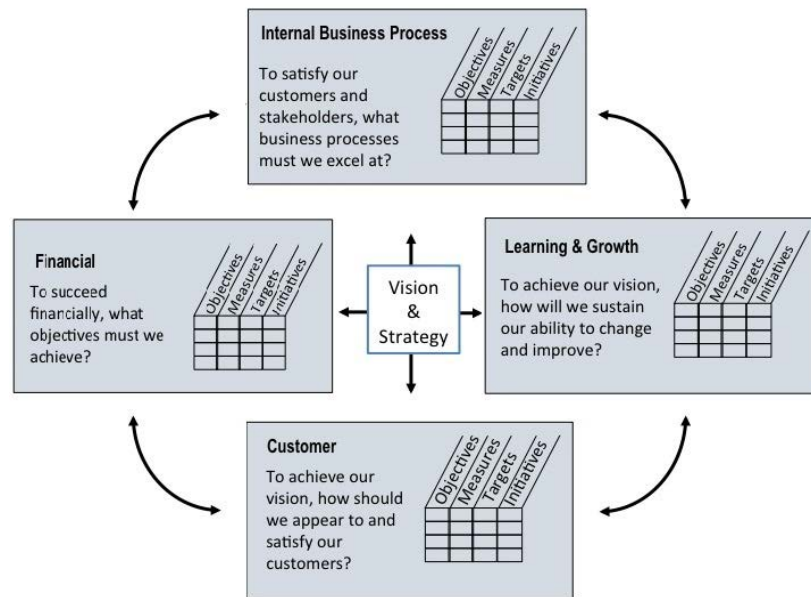


Fig. 4: The scheme of the overall strategy of the organization on the balanced scorecard

the relationship between the objectives and criteria for achieving them so that, they are real and they can be controlled. The chain of causality, being the basic principle of construction BSC permeates all its components. In other words, if a company skips the initial planning phase of the strategy with clear cause and effect relationships, everything can complete in the definition of indicators that are not directly related to business performance.

Further, it is expedient to assess the relationship of indicators with each other. Only the presence of a balance between the parameters of four perspectives allows you completely to fit them into the strategy of the organization. This is due to the fact, that the criteria for the various components may be simply different from each other but opposite to each other. For example, reducing the cost of labor increases the attractiveness of financial performance but significantly reduces the degree of employee satisfaction.

In addition, correctly compiled BSC should also include measures to achieve the target values of the indicators, the so-called factors of achievement. Without these factors, it is impossible to understand what the results were achieved. On the one hand, only with the help of indicators it is impossible to assess how successfully strategy of the organization was implemented. On the other hand, factors results may reflect only short-term operational improvements which also characterizes the strategic goals. BSC of COBIT terminology key goal indicator, key performance indicator and critical success factor.

Key indicators describe the set of measurements which show that the IT process has reached the business requirements. These indicators can be measured by the fact of doing actions that is why they are also called "indicators of delay".

Key performance indicators determine criteria for assessing the performance of IT processes when their business are reached goals and these indicators are designed to control the results of IT processes.

Critical success factor determine the most important actions for achieving control over IT processes. They should be controlled and describe the necessary steps to achieve strategic, technical, organizational and procedural problems.

For the implementation of BSC model is necessary to identify key indicators, objectives and key outcome indicators for each of the four components to develop a methodology for calculating each indicator and the basic standards of performance and to establish the critical success factors for the organization of the control of IT processes. The structure of the BSC based on the above parameters can be as follows (Table 2). During the practical application of BSC, organizations are faced with a number of challenges. Among them are discussed there.

#### Problems with the choice of strategic objectives:

- Defining incorrect focus which creates a false impression of the performance which does not correspond to reality

Table 2: Balanced scorecard for IT departments

Prospects	Key goal indicator	Key performance indicator	Critical success factor
Financial component	Budget savings of IT department; increase in income from investments in IT	Increase the profitability of the IT department; reduce the cost of IT processes; percentage of the plan implementation of IT departments	Development of methods for the optimal use of IT resources and increasing of productivity
Customer component	He search for new and existing customers satisfaction	User satisfaction; the growth rate of implemented projects	Timely fulfillment of customer orders
Internal business processes component	Minimizing the risks associated with the violation of the confidentiality of data	IT security; uninterrupted operation of services; the high speed of data recovery	Development of methods for safety audit; standardization of IT processes to ensure the safety
Learning and career development	Providing in staffing needs	The degree of satisfaction of staff; the average salary for IT department; the cost of education and training	Create a comprehensive system of staff development; development of corporate culture

- There is no sense of purpose in the future, made a focus on short-term indicators
- Taking only financial targets and indicators

#### **Problems associated with the choice of indicators:**

- No connection between indicator and the company's goals
- Too many or too few parameters
- Selecting indicators, the measurement of which is more expensive than subsequent result
- Indicators are contradictory

#### **Problems associated with the human factor:**

- In determining the index the opinion of the executive does not take into account
- At default of planned values indicators, manager looking for the guilty, not the cause of the failure
- Indicators are measured regularly
- Collecting unreliable or conflicting information that allows for random interpretations (Dzhumigo, 2009)

### **CONCLUSION**

Summarizing the foregoing, the four components of BSC allows to achieve a balance between strategic and short-term goals, between desired outcomes and factors to achieve them, between hard objective and softer subjective criteria. Balanced system in spite of the diversity reflects the commonality of purpose as all its parameters is aimed at achieving a common corporate strategy.

Today, there are many methods of evaluating the effectiveness of IT. However, it should not be limited only by the economic component. In addition, it is necessary to assess the impact of information systems on customers and partners, on the image policy of the company to take into account the company's prospects in the market and internally for employees, increase the transparency of the company. Also, keep in mind that any method of evaluating the effectiveness is costly and results of the evaluation demands qualitative analysis.

### **REFERENCES**

- Alexander, A.I.T., 2003. AUDIT in accordance with the standard COBIT-A. Astakhov-Chief Information Officer, Russia.
- Anonymous, 2000. Audit guidelines COBIT 3rd edition released by the COBIT steering committee and the IT governance institute. COBIT 4.1 Russia.
- Dzhumigo, N.A., 2009. The concept of the balanced scorecard as an important control element. News of Altai State University, Barnaul, Russia.
- Pavel, B., 2008. Justification and usefulness of IT-audit-belkin. Chief Information Officer, Russia.
- Seredenko, E.S. and N.N. Seredenko, 2011. The Estimate Model of the Cost-Effectiveness of Information Systems Analysis. Springer, Moscow, Russia.