

VILNIUS UNIVERSITY

Lukas Giriūnas

**ASSESSMENT OF INTERNAL CONTROL SYSTEM IN
EXTRACTIVE INDUSTRY ENTERPRISES**

Summary of Doctoral Dissertation
Social sciences, management and administration (03 S)

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VILNIAUS UNIVERSITETAS

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**VIDAUS KONTROLĖS SISTEMOS GAVYBOS PRAMONĖS
ĮMONĖSE VERTINIMAS**

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GENERAL CHARACTERISTICS OF THE DISSERTATION

Relevance of the topic. Each enterprise is unique for its performance, management policy and goals, although especially for extractive industry enterprises it is very important to know how purposefully materials and financial resources are being used and whether the enterprise's capital is not being embezzled or wasted. Maximizing the rational commodity of available resources and financial profit, the enterprise's shareholders aim to implement different forms and methods of internal control in the enterprise management system and thus to ensure its effectiveness.

In the nowadays competitive world, technologies are rapidly developing and varying, market needs are changing, business processes are becoming more difficult, and it is getting more and more complicated to control an enterprise and to perform its internal control. Consequently, the heads of enterprises operating in the extractive industry sector need a system of control management that might enable to control effectively the enterprise's performance and to ensure the implementation of its goals and tasks. It must be emphasized that only an effective internal control in the enterprise can help to ensure its productive economic performance, guarantee that the laws, subordinate legislations and the enterprise's internal rules are being obeyed, to implement proper enterprise's capital safety methods, to avoid mistakes, to reveal indulgences, etc. However, in scientific literature there is often expressed another non-traditional attitude stating that an effective internal control reveals the prospects of enterprise development and helps to notice threats to its existence, and so such a control becomes an important means of risk management.

An enterprise operating in the extractive industry sector is constantly influenced by external and internal environmental factors, and changes of these factors may increase the risks to its performance. Trying to decrease the risks to a reasonable minimal level, there appears also a demand to establish some changes in the internal control system – to refuse some irrelevant and inefficient control procedures and functions and to adjust the valid ones or to set the new ones. The demand to improve the internal control system might be fulfilled upon obtaining the required information about the efficiency and the internal control system and knowing the ways of strengthening the control and activities so as to avoid losses and reach the goals of the enterprise. Thus, the need of a special function – to assess the internal control system and its effectiveness – appears in the enterprise. Unfortunately, there is still no reliable method or model that might be applied for internal control analysis and its effectiveness assessment in extractive industry enterprises. In foreign scientific literature, means of a partial assessment of such enterprises are available, but they usually do not correspond to the conditions we have in

Lithuanian business enterprises; besides, they are not specialized for extractive industry enterprises and their accounting system particularities.

The problem and the scale of its research. The internal control system is very important in all enterprises without any exception, be they large, medium or small. The specific performance and accounting of extractive industry enterprises have a huge influence not only on their internal control and its system, but also on its assessment. This is why the purpose of internal control is to manage business risk, i.e. to find the coordinated methods and means of the system of internal control so as to minimize the risk related to business environment, to the processes happening in the enterprise, and to generate the information that would be an essential background for making business decisions. Indeterminacy of these three types are common for every business, and managing to control them, i.e. to avoid, decrease, accept or divert them to the required direction provide an organization with the guarantee of success of its performance and a competitive advantage.

Nowadays, the rapid development of technology and economic pressure in the competitive environment make the enterprises change their attitude to internal control. This helps enterprises to achieve their goals through a set of certain rules and procedures. Among the foreign scientists that investigate the state of enterprise internal control system and its assessment, we should mention C. Barnabas (2011), M. Biegelman (2012), H. K. Chung (2000), W.S. Fardo (2009), P. Dechow (2004), S. McVay (2005), J. R. Elder (2008), M. Fardon (2010), A.A. Grambling (2010), L.E. Rittenberg (2010), P. Gupta, (2010), J.C. Helbeck (2008), F.R Jacobs (2011), C.C.M. Schelleman (2009), T.E. Vollmann (2011), A.M. King (2011), W.R. Kinney (2000), J. Krishnan (2005), M. Leitch (2008), N.B. Macintosh, (1984, 2010), K.A. Merchant (2011), B. Moller (2010), D. Pfaff (2007), F. Ruud (2007), A. J. Pfister (2009), R. Simons (1990, 1995, 2000), E.H.J. Vaassen (2009), K. H. S. Pickett (2010), J.K. Shim (2011), L.W. Vona (2008, 2011), J.T. Wells (2011). In Lithuania, some aspects of this topic have been analysed by R. Bičiulaitis (2001), J. Kabašinskas (2007), I. Toliatienė (1997, 2002), R. Kanapickienė (2001, 2007, 2008), E. Buškevičiūtė (2008), V. Kačergienė (2005), V. Pečiūra (1998, 1999), V. Lakis (2007, 2008), J. Mackevičius (1999, 2001, 2003, 2008, 2009), R. Bartaška (2003), L. Kazlauskienė (2009), V. Navickas (2011), J.A. Staškevičius (1998) and others. However, a detailed analysis of these and other sources has shown a lack of attention to the analysis of enterprises' internal control system, especially in enterprises operating in extractive industry.

The changing subjects of political, economic, social and technological aspects changes in the policy of enterprise management. Therefore, internal control in an enterprise of extractive industry in the changing conditions may become inappropriate or even ineffective; therefore, its

assessment must be regarded as one of the main instruments to improve the policy of accounting, to protect the enterprise's property, to assure the effectiveness of its performance. Internal control is the main part of the enterprise management system; however, the modelling of its assessment in the worldwide scientific environment is not being widely discussed or analysed. There is no exact recipe of how an enterprise could ensure the effectiveness of its internal control system, and there is no ready-made model of such assessment, especially in the extractive industry sector.

A preliminary analysis has shown that in Lithuanian enterprises that operate in the extractive industry sector there are not enough formalized procedures of internal control; the official distribution of responsibility is informal and ineffective, resulting in a weak internal control and consequently in mistakes in financial reports and frauds. These facts reflect the inefficiency of internal control. To identify and fight the reasons for intentional or unintentional mistakes and frauds, which usually emerge because of an insufficient level of internal control, becomes an essential necessity. It must be mentioned that the problem of uncertain practical assessment of internal control effectiveness is also complemented by the very specific accounting system which prevails in extracting industry enterprises. The specificity is mainly influenced by the sphere of reserves, because they are not just produced or purchased like in production or sales enterprises; they are extracted by natural mining, and in their evaluation theory there are more than twenty different mathematical ways of calculation; by the way, a three-percent bias is allowed, which normally comprises quite a marked sum. It is in reserves accounting that an extractive industry enterprise can vary not only the extracted amounts, but also account for certain natural conditions; for example, wet digging obtained during the rainy weather would be heavier than the one extracted in a dry period. Thus, the accounting particularity in this sphere of industry determines the necessity of a model of assessing the effectiveness of internal control to prevent the conditions for the enterprise's employees or authorities to make intentional mistakes or frauds; besides, such identifications in accounting are practically impossible.

Object of the research: the internal control system existing in extractive industry sector enterprises, methods and means of its organization and maintenance.

Purpose of the research: to elaborate a model of assessing the effectiveness of internal control in extractive industry enterprises according to a theoretical analysis of internal control and the results of research.

In order to achieve the objective, the following **tasks** were accomplished:

- to investigate the conception, goals and elements of the internal control system;

- to evaluate the demand of internal control effectiveness assessment model in extractive industry enterprises, identifying the most common mistakes and frauds;
- to make an analysis of the existing and practically applied assessment models of internal control;
- to identify the principles of the effectiveness assessment model of internal control in extractive industry enterprises;
- to draw the structure diagram of the effectiveness assessment model of internal control in extractive industry enterprises;
- to identify and detailize the factors that might limit the application of the model in practice;
- to make a practical empirically based assessment of the proposed model of internal control system effectiveness.

Methods. While analysing the possible internal control assessment models of effectiveness, the following scientific research methods were used: systematic and comparative analysis of scientific data, synthesis, induction, deduction, abstracting, and analogy. For the preparation of the model, financial and statistical analysis was made and the form-filling research method was used. To justify empirically the existing internal control effectiveness assessment model in extractive industry enterprises by performing an analysis of criminal cases, and using the collected data to perform an econometric analysis of the proposed model in practice.

Research resources. The theoretical research of the dissertation work is based on the data published by Lithuanian and foreign scientists. Statistical information about the extractive industry sector in Lithuania was taken from the Lithuanian Statistics Department data base. To create the model of assessing the effectiveness of internal control in the extractive industry sector, data published by Lithuanian and foreign authors were used. To justify the model functionality, studies of its practical application were carried out in enterprises operating in the Lithuanian extractive industry sector.

Defended propositions:

- According to the analysis of theoretical data, the proposed model of assessing internal control effectiveness in extractive industry enterprises becomes dynamic and can be applied during fossil exploitation.
- The proposed model can be applied not only for evaluating the accounting of geological and extracted resources and control of mining processes, but also it can

be successfully used by institutions that supervise extractive industry and its accounting, and it might help to identify the prevailing intentional mistakes and frauds in extractive industry enterprises.

- By applying the proposed model, the enterprise could not only save a lot of money and time and in this way to minimize its performance expenses, but also, by applying appropriate control measures, to disclose faster and more effectively different violations, fraud cases and to ensure the implementation of its goals.

Theoretical significance and scientific novelty of the research. The scientific novelty is manifested by analysing the existing internal control system in extractive industry enterprises in the context of defining their performance and trying to increase the effectiveness of their management. This is the first work to investigate the effectiveness of internal control in extractive industry enterprises, based not only on the analysis of scientific data, but also on the results of studying Lithuanian extractive industry enterprises. To justify the proposed model by theoretical and practical evaluation, its assessment was carried out, and Lithuanian enterprises operating in extractive industry were surveyed.

The novelty of the dissertation and its theoretical value are obvious from the results of the main scientific studies:

- the proposed model of assessing the effectiveness of internal control in extractive industry enterprises is not universal, but it is the first in the area and allows assessing a significant part of enterprises with regard to the particularities of their performance and accounting system, and such a purposeful approach allows to assess the effectiveness of the internal control system precisely and objectively;
- the proposed model has been created considering the specificity of performance and accounting in extractive enterprises, but according to the main principles of its formation it can be also applied in enterprises of other branches for assessing the effectiveness of internal control in them.

Practical significance of the research. A model of assessing the effectiveness of internal control system in extractive industry enterprises is proposed in this dissertation work. It defines the effectiveness of the internal control system, its essential mistakes, and enables to assess the risk and to elucidate the weakest sides of the enterprise, which provide conditions for the emergence and development of mistakes and frauds. Such assessment enables not only to identify mistakes and frauds in extractive industry enterprises, but also to provide means of their prevention; also, it may be used for the coordination of enterprise performance, its management, development and improvement. Thus, the proposed model enables:

- to assess the availability and effectiveness of the internal control system in an enterprise operating in the extractive industry sector;
- to identify the weakest areas of internal control in an enterprise of extractive industry;
- to identify the areas of emergence of intentional and unintentional mistakes and frauds and to elaborate the means of their prevention.

Structure and scope of the study. The doctoral thesis consists of the introduction, three chapters, conclusions, and three annexes. The volume of the work, without annexes, is 218 pages, 19 tables and 49 figures; 230 references were used while writing the thesis.

The logical structure of the dissertation is presented in Fig. 1. It showed a consecutive realization of the study objectives.

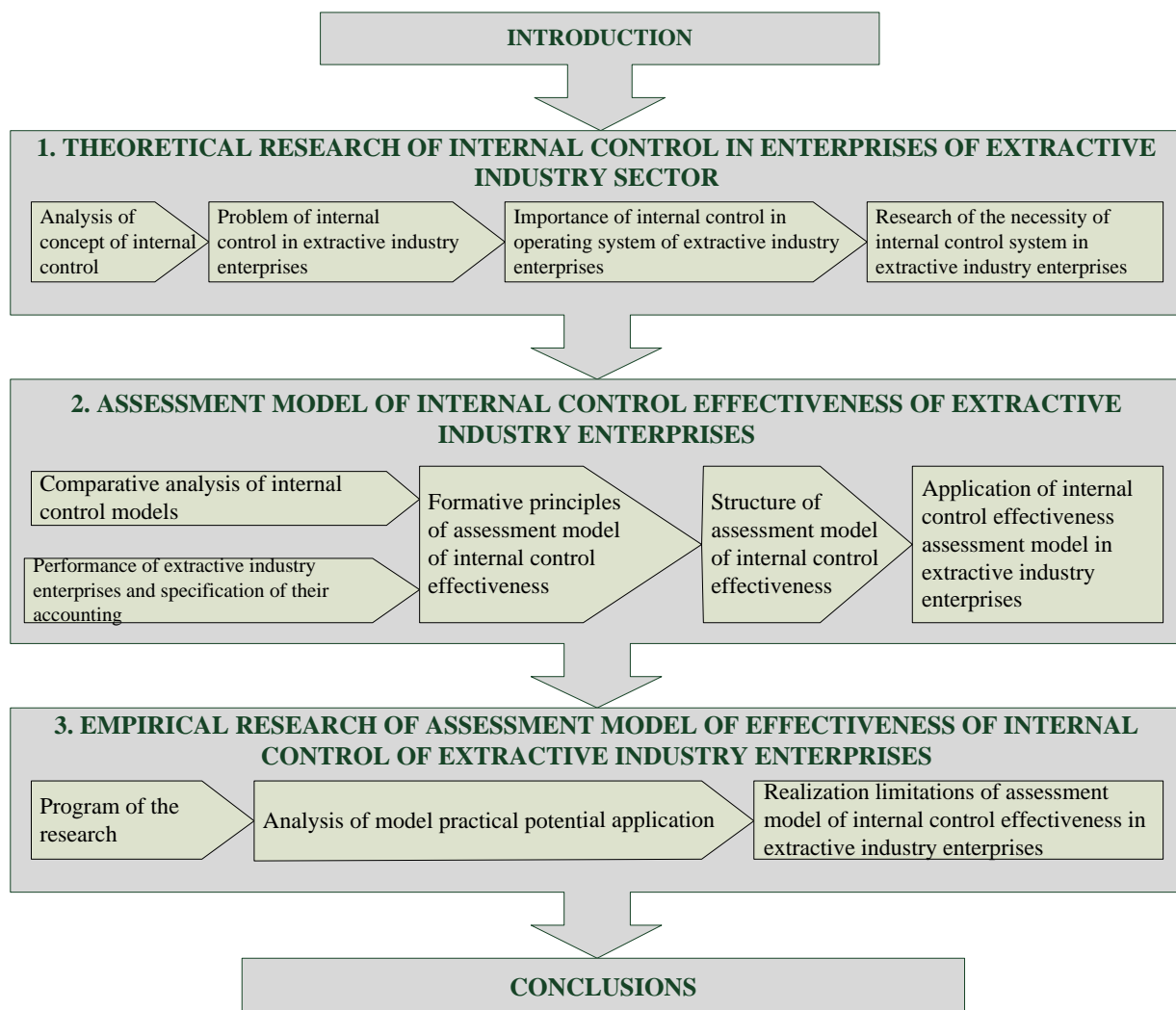


Fig. 1. Logical structure of the dissertation

SUMMARY

Theoretical research of internal control in enterprises of extractive industry sector

The results of a detailed analysis of the internal control conception enable to state that the very different definitions of internal control, made by different authors, still involve some main goals of internal control, which are to present reliable and detailed information, to protect capital and documents, to ensure an effective economic performance, obeying the accounting principles, the presentation of reliable financial reports, obeying the laws and subordinate legislation, the established rules of the enterprise, and an effective control of risk. The analysis based on foreign and Lithuanian data of the internal control conception research enables to present a resumptive definition of internal control: an internal control system is part of the enterprise management system, which ensures the implementation of the enterprise’s goals, its effective economic-commercial performance, obeying the principles of accounting, and an effective performance risk control enabling to minimize the number of intentional and unintentional mistakes and avoiding frauds made by authorities or employees in the enterprise performance process (see Fig. 2).

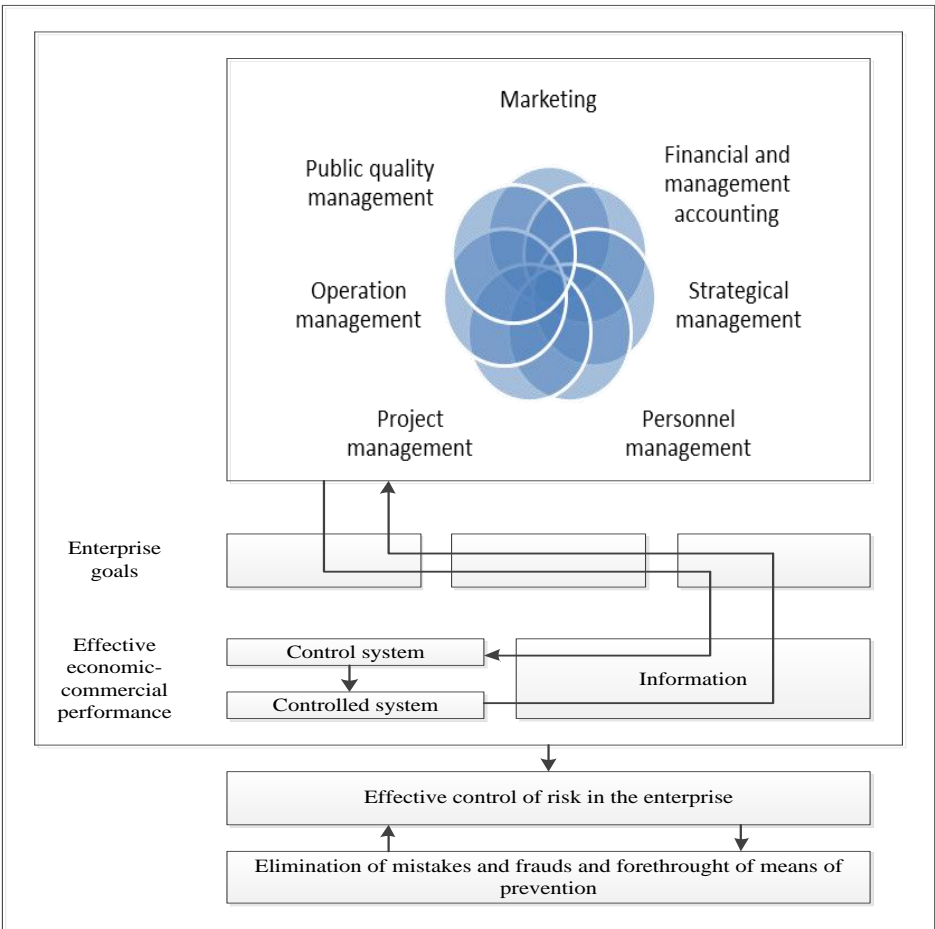


Fig. 2. The proposed structural scheme of the resumptive concept of internal control
 Source: compiled by the author.

Alongside quantitative indicators, in each enterprise, and especially in extractive industry, most attention must be paid to control mistakes and frauds and to project the means of their prevention, to establish an effective and optimal internal control and accounting system. An effective internal control guarantees not only goal achievement, but also positioning in the market, optimizing the organization's performance and profitability.

It must be mentioned that in enterprises operating in extractive industry there is a specific accounting system which also influences the character of mistakes or frauds. Practice shows that the most common frauds are influenced by raw extraction specifics. The accounting of raw materials in extractive industry enterprises is quite difficult because these materials are not purchased or stored, so their amounts can be evaluated very differently. Besides, employees of extractive industry enterprises can embezzle raw materials and thus abuse their accounting system. Accounting and its data cannot reveal such embezzlements, unlike in other types of enterprises; therefore, internal control in extractive industry enterprises is so important, and here the assessment of mistakes and frauds becomes the main task of an effective internal control. To identify potential spheres of frauds in extractive industry enterprises and to project particular means of prevention so as to avoid them, it is most purposeful to ensure a good internal control; thus, identification of conditions that allow the emergence of mistakes and frauds becomes a very important task of research. Foreign scientists and the Association of Certified Fraud Examiners have grouped the factors, conditions and events of the emergence and presented them in a fraud triangle. It is divided into three parts that consist of opportunities, motivation and realization. Those three elements together provide conditions for the emergence of mistakes and frauds. However, such a portraying without assessing the risk affords little benefit. It is only in the presence of an efficient internal control system that such a portraying allows not only to identify the main fraud components of the triangle, but also to reveal their importance and place in the internal control system and more precisely in the assessment of risk, and to identify the conditions that favour the mistakes and frauds made by authorities or employees in extractive industry enterprises (see Fig. 3).

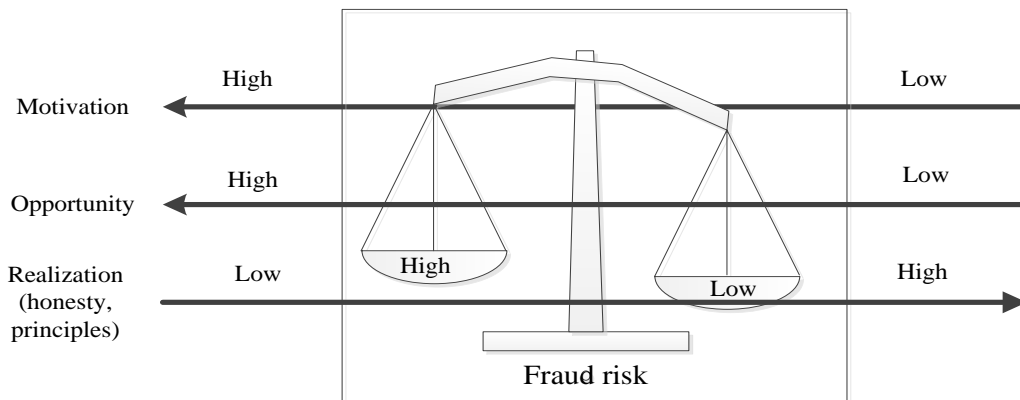
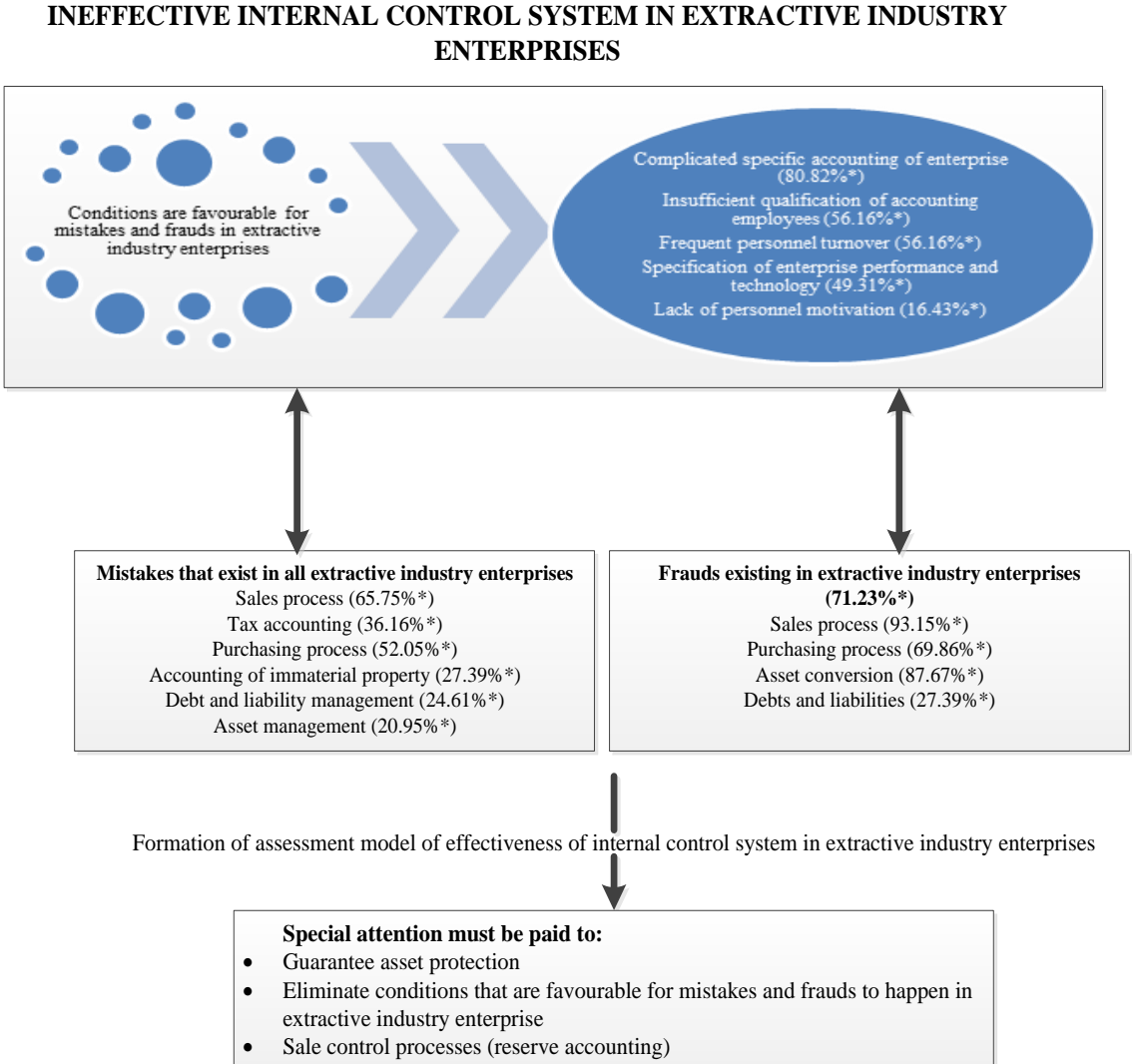


Fig. 3. Scales of assessment of fraud risk components
 Source: compiled by the author.

Motivation can be distinguished as the first element in the scales of fraud risk assessment. It shows whether an employee is prone to dishonest behaviour and gives the reason why the motivation is normally linked with greed and some exact life events, for example, an abrupt need of financial resources caused by debts, wrong loans, drugs, alcohol or gambling, personal problems in the family, etc. The second element of the scales of fraud risk is the opportunity treated as a chance given to the employee who is planning to make a fraud. It is indicated regarding the person's position and delegation in the enterprise, access to the enterprise's capital and accounting records. This is usually also related to the internal control existing in the enterprise: the more effective the internal control, the less the possibility to make a mistake or fraud. The third element in the scales of fraud risk is realization, although in the scientific works that analyse the fraud triangle and its elements it is indicated as rationalization and is treated as the ways an employee explains his dishonest behaviour. Although the third element in the scales of fraud risk must be defined as realization, it is not the excusatory reasons but the employee's personal traits such as honesty or principles that allow assessing objectively whether the employee is prone to make mistakes and frauds. Identifying and distinguishing the weaknesses leading to mistakes and frauds enable to anticipate the limitations of some processes and problems arising in internal control. To find out the problems that occur in the internal control system of an enterprise and that cannot be easily audited, an essential condition becomes to evaluate the connections of assessment criteria, relations among mistakes and frauds, and the weak points that create conditions for mistakes and frauds. For this purpose, a questionnaire survey of internal control and its present state assessment was carried out in Lithuanian enterprises of extractive industry. The results of the survey have shown that the assessment of the internal control system may be performed more objectively and enables to compile its model

with regard not only to the particular spheres of enterprise performance, but also to the weak points causing mistakes and frauds (see Fig. 4).



* Results of respondents according to questionnaire survey.

Fig. 4. Identification of the state of internal control system in enterprises operating in extractive industry sector

Source: compiled by the author.

The results of the questionnaire survey have shown that the internal control system existing in enterprises operating in extractive industry is not effective enough; particular attention must be paid to certain spheres of performance while compiling the model of assessing the internal control system effectiveness. Also, if there are no intentional or unintentional mistakes or frauds mainstreaming in the enterprise, it is possible to state that its internal control system is effective.

The model of assessing the effectiveness of internal control in extractive industry enterprises

An analysis of the available data enables to state that there is no solid opinion as regards the structure of the internal control system. Some authors analyse this system as a structure that consists of even around twenty elements, although such extended models are difficult to apply in practice. Thus, there naturally arises the necessity to have a model of assessing the effectiveness of such control, which should involve also the nowadays strongly emphasized risk management, maintenance, constant training, and the enterprise authorities should constantly watch whether the internal control system of the enterprise operates effectively.

One of the most important tasks of the analysis is to calculate accurately the reserves of natural minerals and to fix the following indicators:

- reserves of natural minerals and their groups according to the types;
- the quality of natural minerals;
- the technological characteristics of natural minerals and recommendations with respect to their industrial consumption;
- data on the geological and geotechnical mine opening and extraction conditions;
- and, the most important, indicate the reliability of the calculation of reserves and the substantiation of their economic exploitation.

One of the main factors determining the rational consumption of natural resources is their correct accounting. Their amounts in the mine, calculated in the mass or capacity units according to geological prospecting data and meeting the industry requirements, are called raw material reserves, which are recorded in the State Natural Mineral balance. The accounting of reserves in extractive industry enterprises is regarded as a very specific sphere divided into explorative (all reserves found in the mine), balanced (reserves of all categories, available to use by present technologies), conditioned (determined by a state institution according to each mine's technical economic calculations), and unbalanced (reserves whose exploitation at the moment is inexpedient).

Despite such a distribution, at present there are about twenty methods of calculating the reserves of natural resources used in practice, but normally just a few of them are used most frequently. The most famous and most often used are the following reserve assessment methods: incisions, geological blocks, exploitation blocks, multiangulars, triangles, isolines (see Fig. 5).

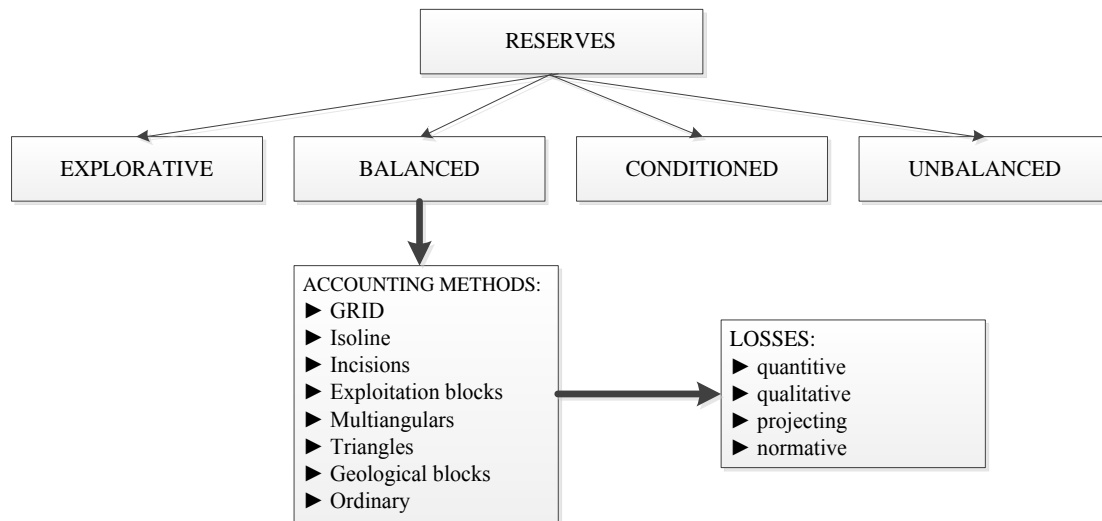


Fig. 5. Assessment methodologies of natural resource reserves
 Source: compiled by the author.

Reserves of natural resources are calculated by all methods without accounting for the losses that might appear during exploitation, recycling and dressing processes. The indicators of a mine of natural resources, its capacity and mass are usually calculated by a particular, so-called ordinary, methodology by identifying the outlines of the mine, the area of the whole mine or of its parts, the medium lug of the valuable layer, and the mass of the valuable component. Such a specific accounting of resources in extractive industry enterprises allows variations in assessing the amounts of extracted resources; therefore, the importance of internal control in such enterprises is essential.

The principles of model formation determine not only the structure of the model and its design or parameters, but also its adaptation possibilities. Identification of model formation principles might be approached as the starting point in compiling the assessment model of internal control effectiveness. The model quality, rationality, perfection and its adoption possibilities will depend on its formation principles; thus, this stage is essential and must be based on the final results and the insight of its application benefits. Formation of the assessment model of internal control effectiveness begins with identifying the principles of model formation and their selection motivation (see Fig. 6).

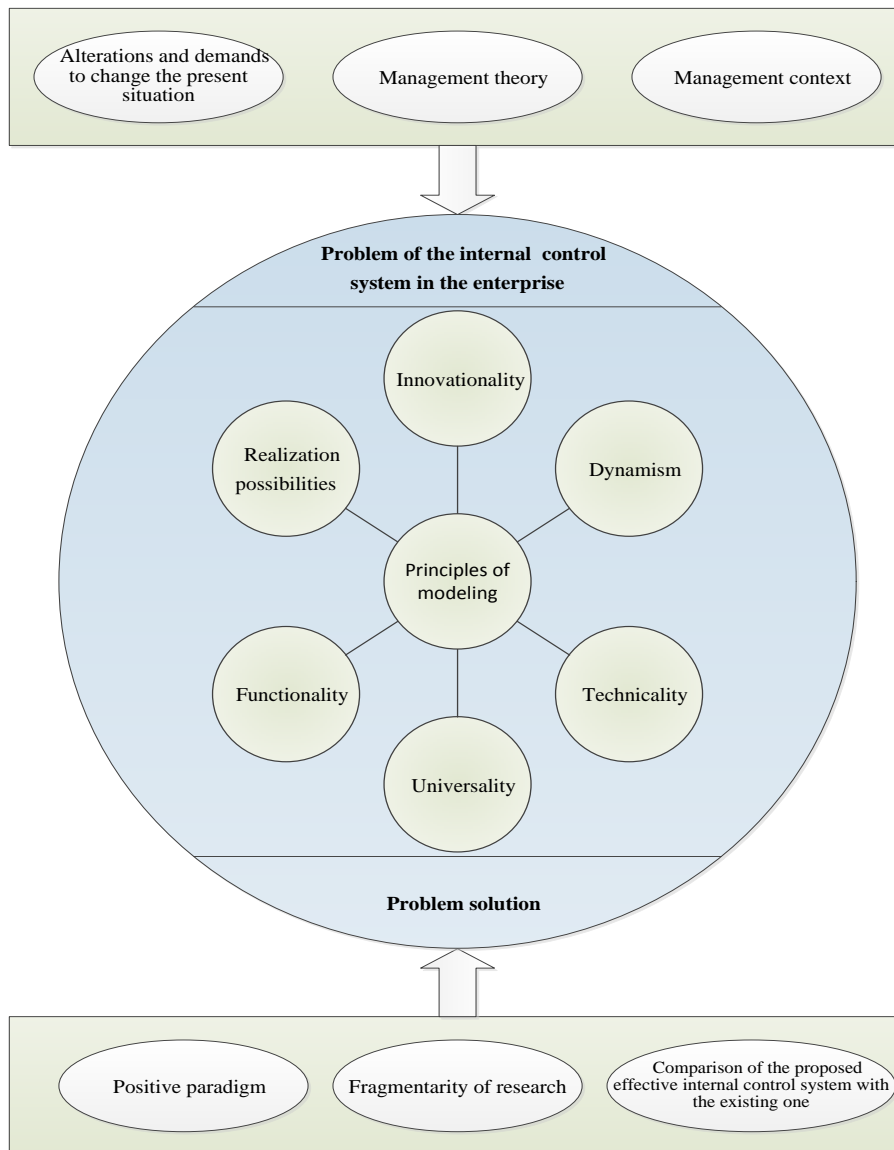


Fig. 6. Formation principles of assessment model of internal control system effectiveness in extractive industry enterprise
Source: compiled by the author.

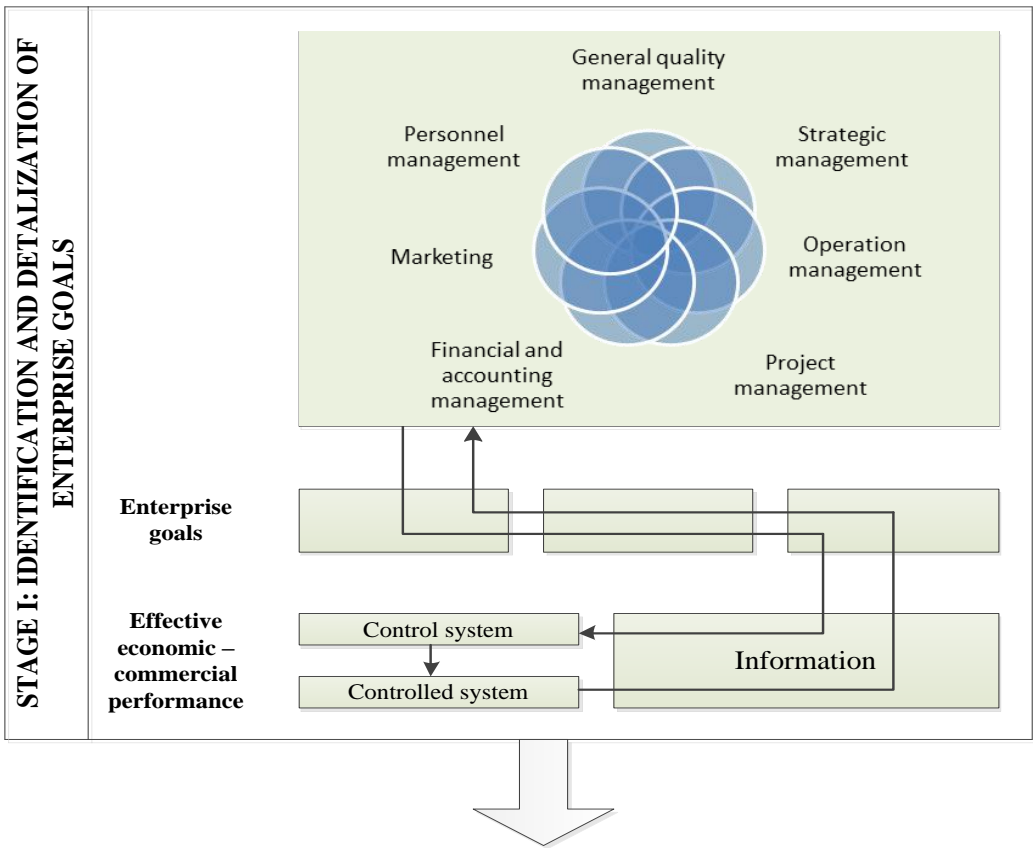
The assessment model of internal control system effectiveness in extractive industry enterprises and its realization possibilities are comprehended as a background for theoretical assumptions, synthesis and implementation:

- for the formation of a new internal control system, because applying the proposed model as a background a progressive internal control system can be successfully compiled and implemented according to the enterprise authorities' needs;
- to improve the existing internal control system if this system is not effective enough or ineffective at all.

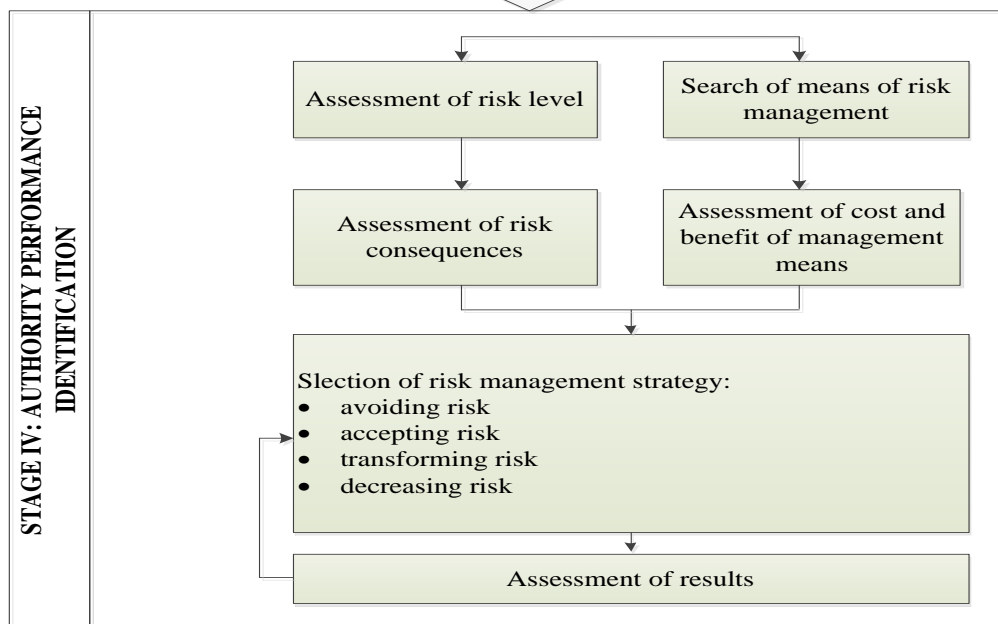
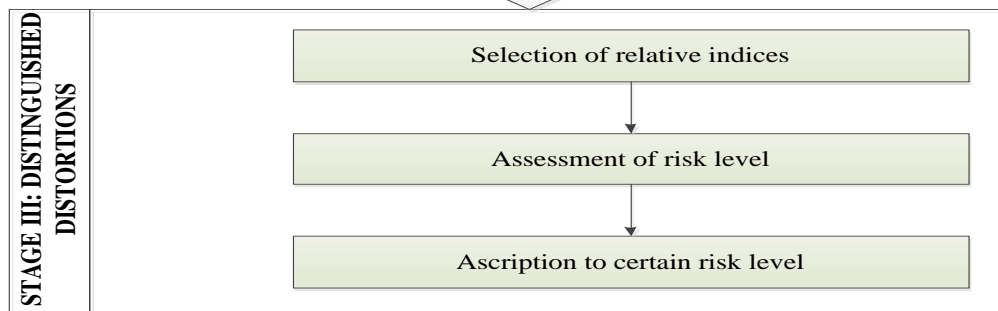
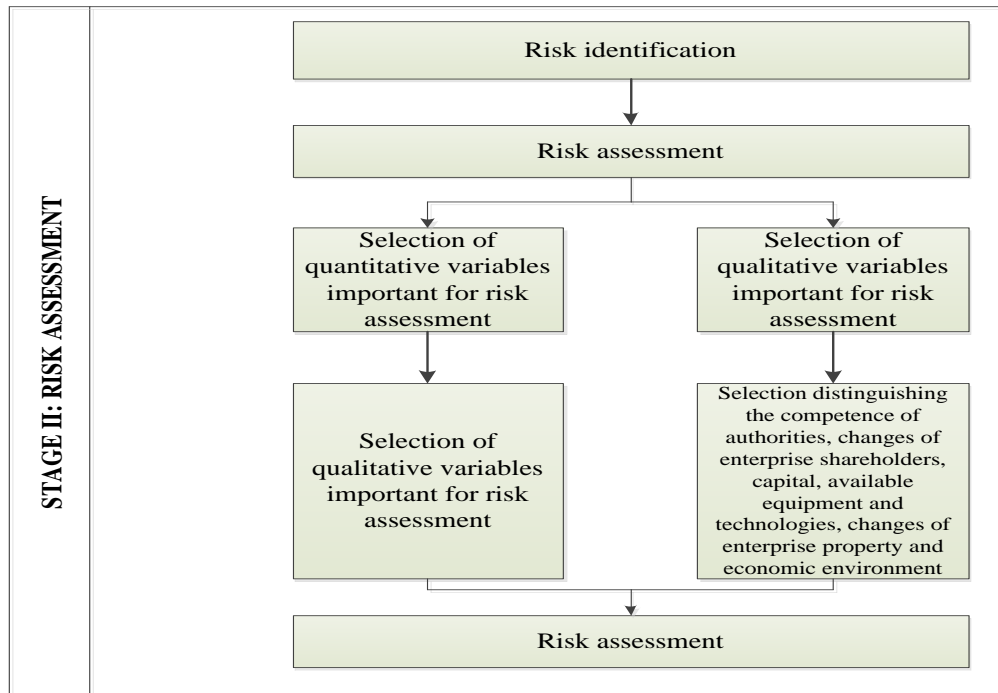
By following the properly identified and defined principles, it is possible to compile an efficient model of assessing the effectiveness of internal control in extractive industry

enterprises; it may be useful not only for practitioners while solving operative and strategic internal control problems and improving the effectiveness, but also for academic society when creating internal control and its assessment theories.

Assessment of internal control in extractive industry enterprises is based on a particular model. The specific character of the model is reflected in its structure, which is based on the above identified, formulated and clearly defined principles of model formation. It must be also mentioned that the proposed model is not going to be analysed as a closed self-efficient system, but, based on the above principles of the model formation, it would be approached as a certain integral system of assessing the effectiveness of internal control. To this end, the focus in the model structure is on model integration into the general system of internal control assessment (see Fig. 7).



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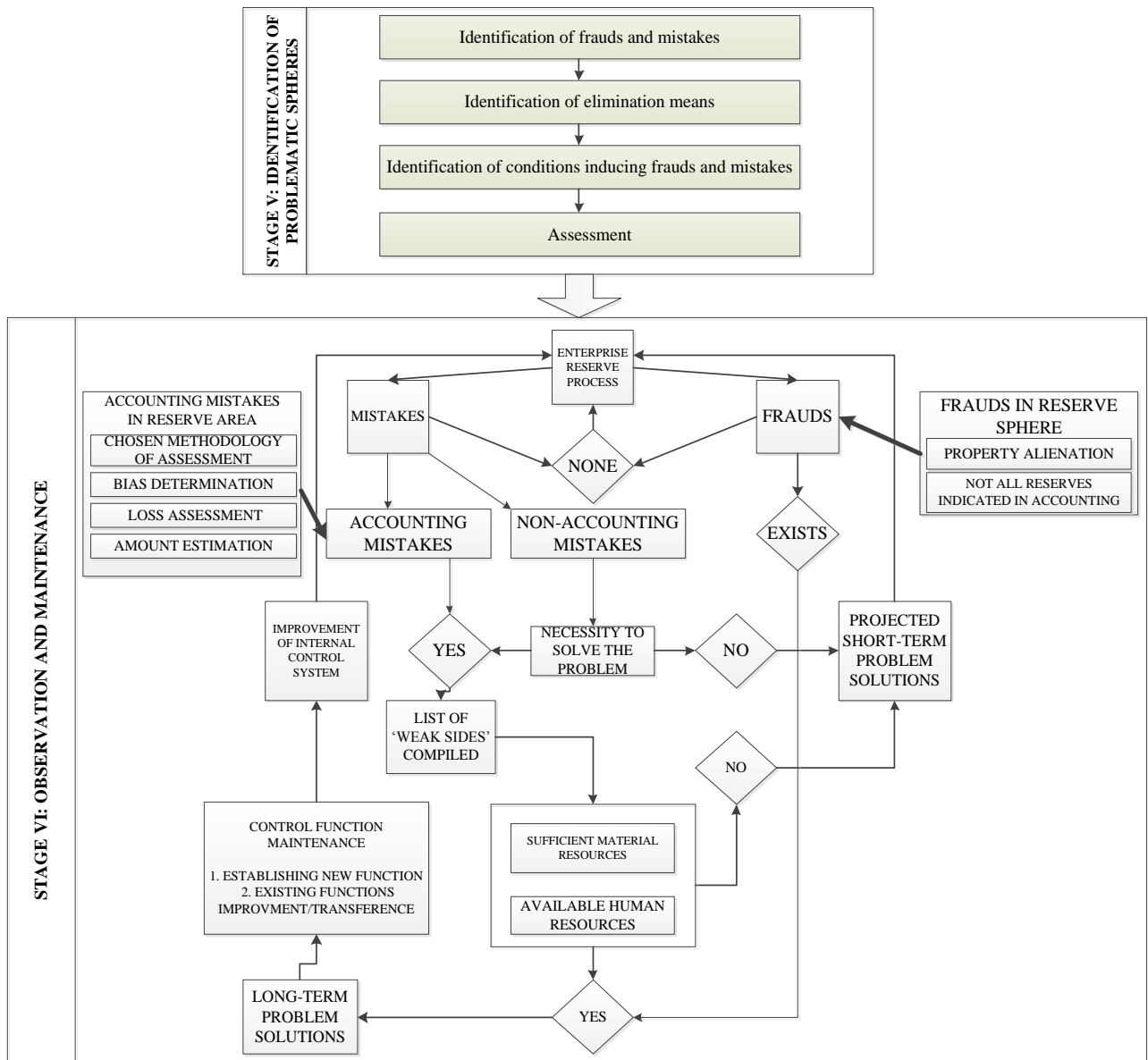


Fig. 7. Model of a assessing internal control effectiveness in extractive industry enterprises
 Source: compiled by the author.

The systematization and generalization aspects of the structure and application of the proposed model are related to its practical relevance and theoretical substantiation, i.e. to the principles that are essential in an intervention research. The model consists of a logical sequence of six main stages, which helps to implement the process of effectiveness assessment coherently and purposefully. These stages are motivated by theoretical assumption made in the first part of the dissertation and by the assumption confirmed in the second part. The main specificity of the proposed model is the fact that it is rather universal and suitable for enterprises operating in other branches of industry. The main purpose of the model is to ascertain whether there exists a certain extractive industry enterprise, an effective system of internal control to identify the ‘weakest’ points of the enterprise and to reveal the specific resources of accounting. This is a

very important sphere of accounting, because in extractive industry enterprises each engineering decision on raw material extraction, recycling, production transportation must be analysed and approved economically. In all cases the least energy and labour expenditures should be used. It is also very important to optimize the raw material and production transportation in the regional aspects. Natural resources are heavy, their consumption amounts are large, and distances of transportation are usually long; thus, expenditures on transportation make a big part of production cost. Therefore, the purchasing sphere becomes another important object of internal control beside the reserve sphere. Not only in Lithuania, but also in the practice of other countries very common are cases when enterprises abuse the specification of their performance and supposedly buy and include into expenditures especially large amounts of fuel, which are not reasonable. Production costs in extractive industry enterprises of small capacity (up to 150 thousand t/m) are usually supposed to be three times bigger than in large enterprises. However, recently the wide usage of stainless aggregates and the exploitation of local small raw mines can guarantee a higher economic effectiveness, vacate some means of transportation and make the construction cheaper. This fact has determined the selection of relative indices and their analysis in the third stage of applying the model.

To manage the risk successfully, extractive industry enterprises should first of all identify all the risks that influence their performance and be able to assess the value of the implemented means of risk management. Supposedly, the risk management in each enterprise must be identified with shareholders' property value increase because all enterprises without exception face the uncertainty and challenge to decide how much of uncertainty is acceptable to increase the shareholders' property value. During this process, the enterprise chooses the most appropriate risk assessment and management instruments as well as risk management strategy that transfers the risk to an acceptable level (see Fig. 8).

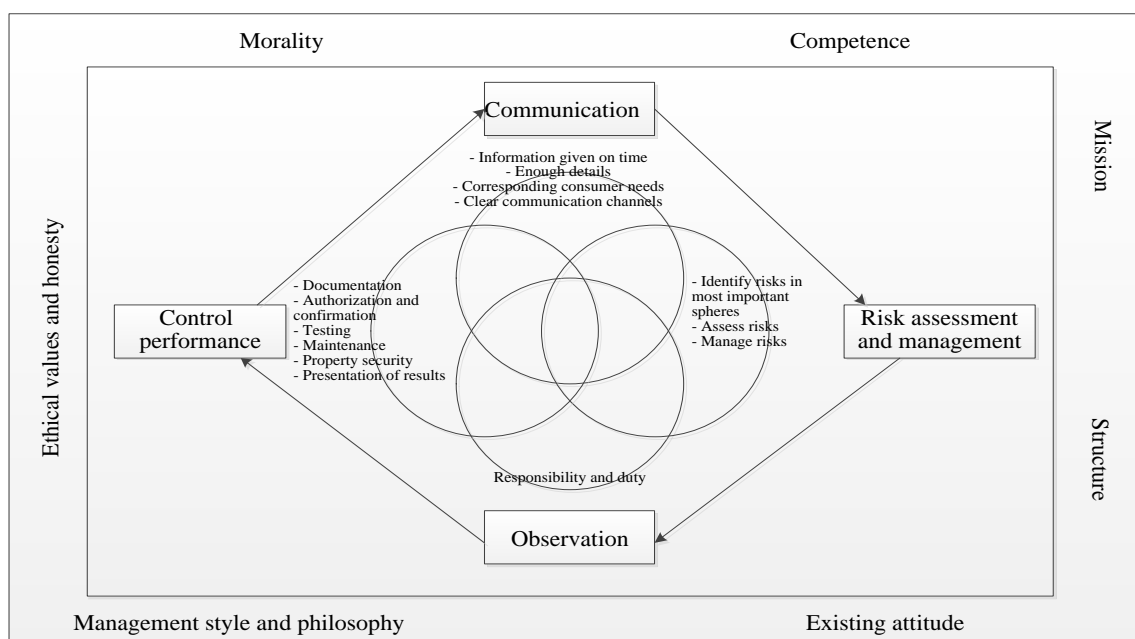


Fig. 8. Process of risk management in extractive industry enterprise

Source: compiled by the author.

It must be mentioned that risk depends on many subjects; thus, usually it is quite difficult to assess it. This is the reason why the analysts must coherently and constantly, incessantly analyse the risk, its manifestation forms and probabilities. In business practice, there are also formed some risk level assessment methods, formulas and rules. Their choice involves each unacceptable way of risk management and assessment of their abilities; therefore, for each risk management possibility there analysis must be made a cost – benefit.

Empirical research of the effectiveness internal control effectiveness assessment model in extractive industry enterprises

In quantitative research, different methods such as survey, observation, experiment, etc. may be used. In our case, the empirical modelling of financial accounting has been chosen. Thus, the model was verified by making an analysis of 20 from 73 Lithuanian enterprises operating in the extractive industry sector. They were selected not accidentally, as half of them had been found guilty by court of making frauds initiated by enterprise authorities, and the other enterprises were chosen in an accidental way, emphasizing that they had never made any frauds initiated by enterprise authorities. Since the qualitative research method must meet some requirements, including sample characteristics, the realization of these requirements in the empirical approach is acceptable as the study sample constitutes 27.93 percent of the whole Lithuanian extraction industry. It must be also mentioned that the empirical research was performed using a synthesis of deductive and inductive methods. The above approach

guarantees a systematic, structural, critical and controlled study based on testing the advanced hypotheses of interrelation, among particular manifestations.

With regard to the research logic, at this stage the deductive hypothesis formulation method was applied. The hypotheses were tested employing statistical methods.

Since the research deals with Lithuanian enterprises operating in extractive industry, the hypotheses could be formulated as follows: assessment of the effectiveness of internal control depends on the peculiarities of enterprise performance and accounting; the effectiveness of internal control can be evaluated by assessing the enterprise risk as a background; the proposed grouping of indicators of risk assessment according to separate dimensions can be substantiated; the performance spheres in which frauds and mistakes exist can be elucidated by statistical mathematical methods.

To test of the research hypotheses by the deductive method, the operationalization procedure was used; it helped to transform the hypotheses by using certain measuring scales, while theoretical assumptions could be tested by the respective statistical methods (see Fig. 9).

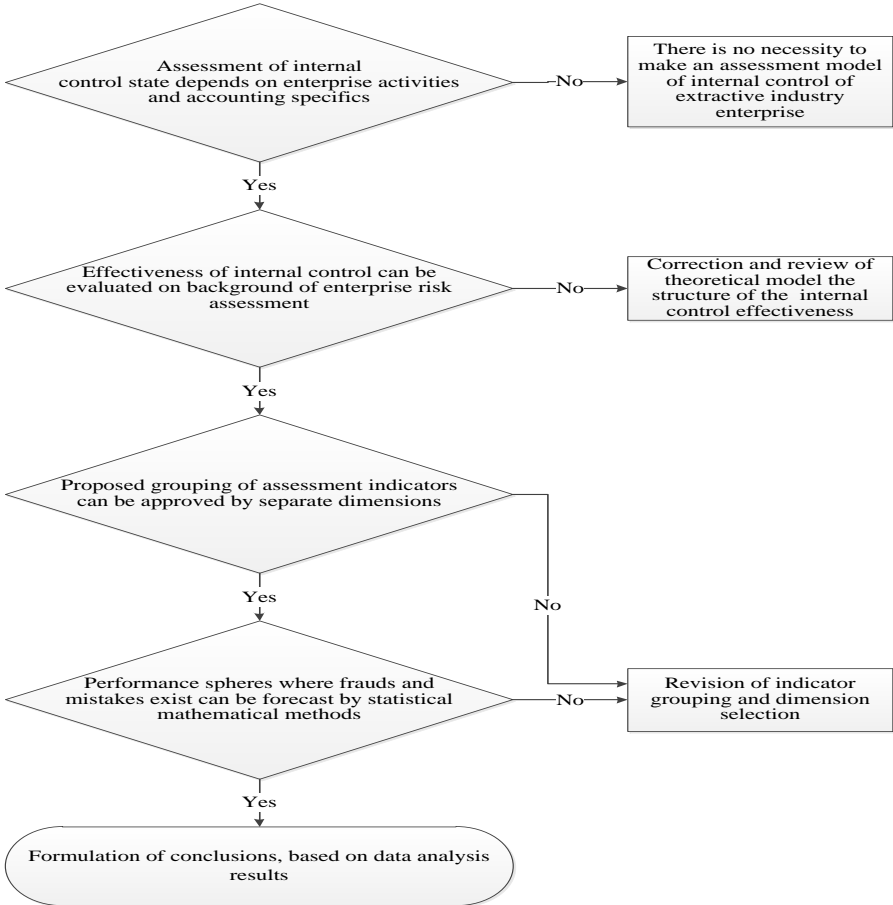


Fig. 9. Structural scheme of the sequence of hypothesis testing and conclusion formulation
 Source: compiled by the author.

Using the operationalization procedure, two statistical hypotheses – zero and alternative – were formulated. The zero hypothesis offers the prediction that a certain effect (connection,

trait, structure, etc.) does not exist. Thus, when the researcher tries to prove that the effect does not exist, he rejects the zero hypothesis, and vice versa, when the researcher tries to prove that the effect does exist, he tries to confirm also the zero hypothesis. This logic of testing is applied when testing the main hypotheses of an empirical research.

In the first stage of assessing the internal control in enterprises operating in extractive industry, the relative financial indicators were analysed. They describe certain aspects of the financial state, whose calculations were based on data of twenty Lithuanian enterprises of extractive industry, presented in their financial reports of 2005–2009. This allowed identifying the problematic spheres of the enterprises in more detail (see Fig. 10).

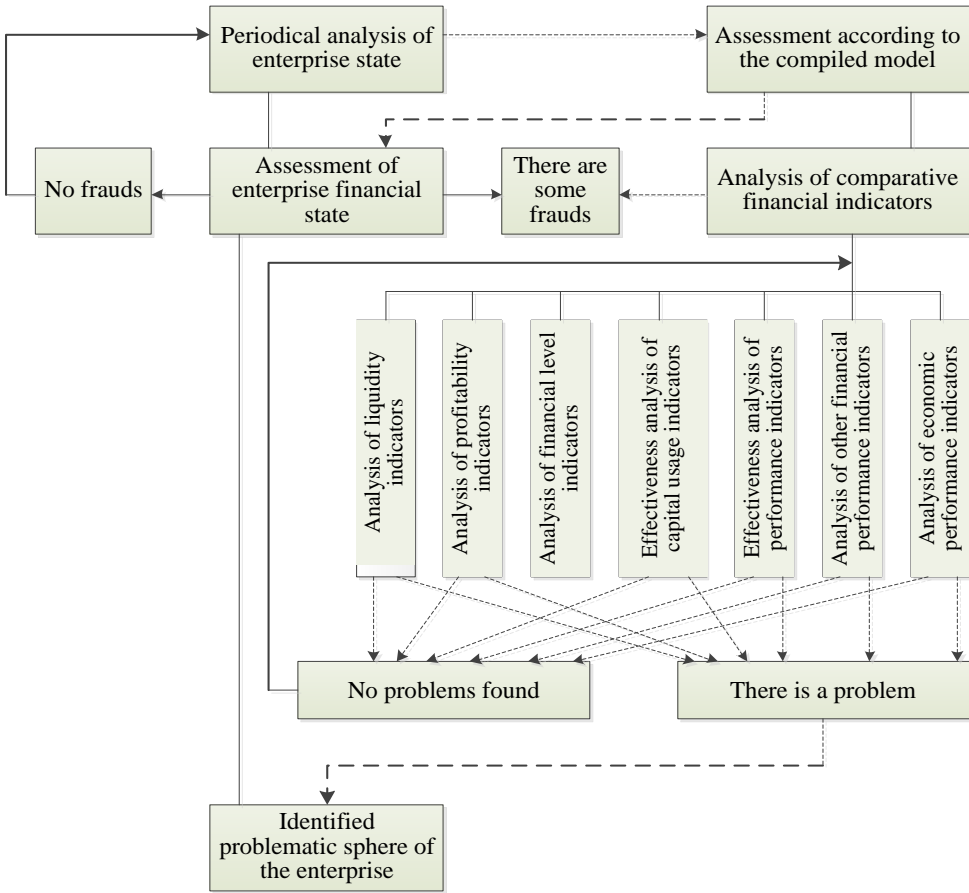


Fig. 10. The first stage of fraud existence diagnostics in Lithuanian enterprises operating in extractive industry sector
Source: compiled by the author.

To draw the general view of frauds made by enterprises operating in extractive industry and to identify the fraud risks, first of all their main comparable financial indices were calculated for the financial periods when the frauds had been made, i.e. the accounting did not reflect or show less amounts of extracted resources.

It was ineffective to assess the risk of the selected Lithuanian enterprises using all relative indicators; even if there is a strong linear correlation among the indicators, taking them for the

further analysis may distort the final result. Therefore, to indicate the interrelations among relative financial indicators, their correlation analysis had to be done, and a linear correlation between each pair of relative indicators was tested during it. This approach allows selecting only the indicators that do not interrelate and maximally reflect the fraud risk and financial state of the Lithuanian extractive enterprises. To prove the reliability of the results, for comparison, a correlative matrix of the relative financial indices of all Lithuanian extractive industry enterprises was compiled, covering the whole period under analysis. The correlative analysis of relative financial indices, made in all extractive industry enterprises without exception, showed that all the variables chosen during analysis of fraud-making enterprises could fully reflect the influence of other indicators for assessing the risk of Lithuanian enterprises operating in the extractive industry sector.

Results of the empiric research confirmed the reliability and practical value of the proposed model. It should be also noted that all the hypotheses advanced in the empiric research were justified. The first hypothesis that the assessment of internal control depends on enterprise performance and its accounting particularities was justified, because, as the empiric research has shown, assessment of the internal control system effectiveness depends on certain specific conditions, so the assessment is purposeful only among enterprises of the same specific character. To approve this statement, for the empiric research, twenty enterprises had been chosen and tested together with enterprises of the whole sector. If there had been enterprises of different specification or a group of them assessed, it would have been impossible to prove the expedience of the selected assessment indices and also the reliability of the study results themselves. The first hypothesis could be proven also by the fact that for internal control assessment there had been chosen enterprises of different character, performance and accounting specificity as well as different financial relative indices, because their specificity and importance but not just dynamics determined the resultativity and objectivity of the assessment.

It must be also emphasized that exactly in the empiric research there were proven the following two hypotheses: the proposed grouping of indicators of risk assessment according to separate dimensions can be proved, and the effectiveness of internal control can be evaluated on the background of enterprise risk assessment. It was grouping the relative relative indices according to different dimensions that enabled to identify precisely the risk level of the selected enterprises and thus to assess their internal control effectiveness. In the empiric research, the risk is conceived as fraud initiated by enterprise authorities, because in the presence of any mistakes or frauds in the internal control, its effectiveness in scientific literature is assessed as very low.

An effective internal control system enables to decrease the probability that the established goals will be missed, although there is always some risk that the internal control will be poorly organized or will not function as supposed. The quality of internal control is determined by the human factor; therefore, some arrangement disadvantages, its interpretation mistakes, misunderstandings, negligence, tiredness, distraction, secret deals, misuse or disregard. Consequently, limits of the realization of the internal control effectiveness model in extractive industry enterprises must be identified and clearly defined (see Fig. 11).

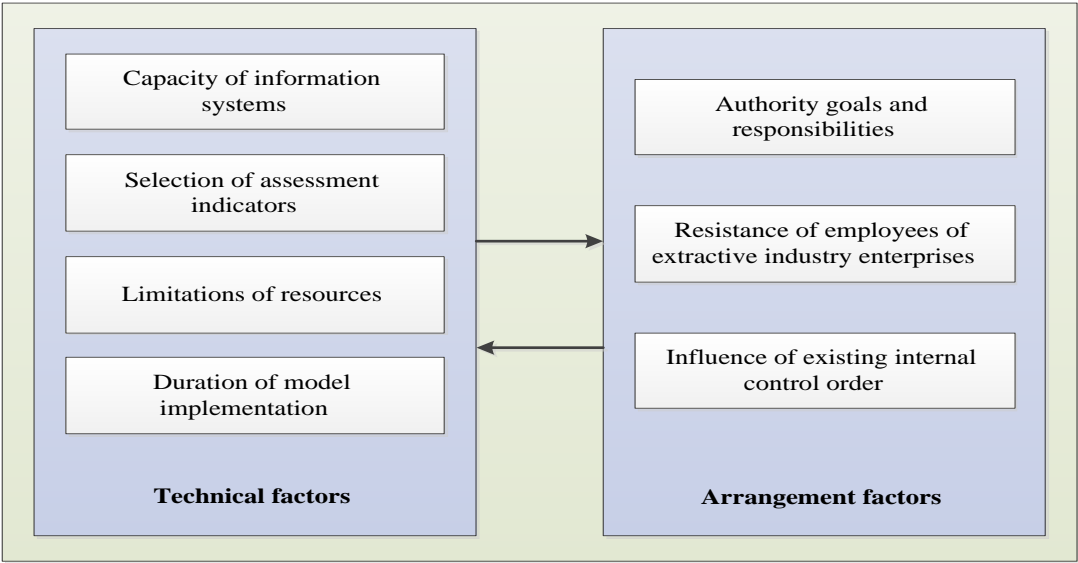


Fig. 11. Identification of factors that influence the realization of the internal control effectiveness assessment model
 Source: compiled by the author.

Analysis of scientific data shows that the technical factors influencing the realization of the model are of the same importance as the arrangement ones, which are usually more concretized and clearly defined. Technical factors have more influence on the process of implementing the model of internal control effectiveness assessment, whereas arrangement factors are more important for the success of implementation, which depends not only on the authorities of an extractive industry enterprise, its employees, but also on the established order.

Effective internal control in extractive industry enterprises normally means a satisfactory level of trust at the minimal cost and risk. While taking any decision on the effectiveness of the internal control system, authorities of an extractive industry enterprise should determine the natural risk of performance and the reasonable level of risk in different conditions, as well as to assess the risk both qualitatively and quantitatively. It is exactly for this reason that the model of assessing internal control effectiveness has been compiled; it enables to assess not only the above-mentioned factors. However, despite the created value added, the implementation of the model may encounter certain factors directly influencing its realization in an extractive industry

enterprise. Besides, limitations arise from other real conditions: decisions taken by enterprises may be incorrect, and because of simple mistakes there can appear some disorders of performance, means of control may be circumvented by an agreement of two or more enterprises, the authorities may ignore the internal control system, etc. All the above-mentioned limitations of the proposed model do not allow the authorities to be completely sure that all the established goals will be accomplished; this depends also on the enterprise flexibility; it must be clear that the authorities' attitude may have an essential influence on the effectiveness of internal control and on the employees that implement the system. Thus, the authority of an extractive industry enterprise must periodically revise the means of control, inform the employees about their changes and show an example in implementing the means leading to internal control improvement.

Conclusions

Upon examining the theoretical and practical aspects of internal control analysis and evaluation in the mining sector, the following conclusions have been made:

1. Analysis of the concept of 'internal control' in scientific literature determines this concept not clearly enough, because there is no emphasis on the fact that control and a human being and his values or actions are inseparable; consequently, internal control in an enterprise must be also oriented to the enterprise's values, mission and vision. While defining internal control, there must be presented its comprehensive and resumptive definition: internal control is part of the enterprise management system; it should ensure the implementation of the enterprise's goals, its effective economic-commercial performance, obeying the principles of accounting and an effective performance risk management, which enable to minimize the number of intentional and unintentional mistakes, and to avoid frauds initiated by the authorities or employees in the enterprise performance processes.
2. To justify the model of assessing internal control effectiveness in extractive industry enterprises by theoretical and practical research, a survey was carried out to elucidate the necessity of compiling a model of assessing the effectiveness of internal control system. The Lithuanian enterprises operating in extractive industry were interviewed. A questionnaire study has shown that the demand of such a model is quite high not only because of specific management and accounting features of extractive industry enterprises, but also because of numerous conditions that favour the appearance of mistakes. Thus, upon implementing an appropriate assessment model, the enterprise can save not only much money, but also time and thus to minimize the expenses by revealing

different breaches, fraud events faster and thus ensuring a more effective implementation of its goals.

3. A comparative analysis of internal control models proposed in scientific literature has shown that they are not only very different, but also none of them is comprehensive enough and only identifies some directions of assessment. These models present a general understanding of internal control and its components, but do not propose any exact way how to calculate or assess the effectiveness of internal control; therefore, it is reasonable to compile a model of a clear structure and logical sequence, which would allow, to a certain degree, to simplify the reality and would be precise enough so as the result would meet the minimal requirements of the assessor; its detalization degree would be determined by data accessibility, and its analysis would take not more time than the assessor could give.
4. Analysis of scientific data shows that the principles of model formation determine not only the structure, design, or parameters of the internal control assessment model in extractive industry enterprises, but also its adoption possibilities and thus influence its quality, rationality and completeness. For this purpose, there are distinguished the following principles of model formation: innovation, technicality, dynamity, universal functionality and realization possibilities. The model and its realization possibilities can be approached as a background of theoretical assumption synthesis and implementation: 1) for a new internal control system formation, because applying the completed model as a background, a progressive internal control system may be successfully elaborated and implemented according to the authorities' needs in extractive industry; 2) to improve the internal control system existing in an extractive industry enterprise, if it is not effective enough or ineffective at all.
5. The proposed model of assessing the effectiveness of internal control in extractive industry enterprises is not universal, but it is the first of the kind and allows assessing a certain part of enterprises with regard to the particularities of their performance and system of accounting; such a purposeful attitude enables assessing the effectiveness of the internal control system precisely and objectively. The attention is focused on the spheres of performance that are specific of enterprises operating in the extractive industry sector, such as stock assessment, reserve loss identification, asset security, i.e. the spheres that influence a clear acceptance of purchasing and expenditure or sale processes. The questionnaire survey has shown that mistakes and frauds are most common in these spheres. The model of assessing internal control effectiveness has

been compiled for enterprises operating in extractive industry with regard to the performance and accounting specification of such enterprises; nevertheless, according to its main formation principles, it can be adapted and applied for assessing the effectiveness of internal control in enterprises of other branches.

6. The proposed model of assessing the effectiveness of internal control in extractive enterprises allows an enterprise to save a lot of money and time and thus to minimize the expenditures, to reveal frauds and different breaches faster and more effectively and to ensure an efficient functioning of the enterprise.
7. According to the scientific data analysis, the proposed model is dynamic and can be applied during the exploitation of extracted minerals. The dynamism is manifested by the fact that the model gives also an assessment of the economic situation; therefore, not only certain processes in the enterprise are being assessed, but also they are compared with data of the whole branch, and it allows the model to be adapted to current economic conditions and not to distort the final results. As the completed model is dynamic, it does not distort the obtained results of modelling and enables to distribute the enterprises into those making frauds, suspected of and not making frauds.
8. The reliability of the proposed and in detail analysed model of assessing the effectiveness of internal control in extractive industry enterprises and its practical adaptation have been proven by an empiric research. Twenty enterprises were selected for the research; half of them, according to competent institutions, had made frauds initiated by an enterprise, and the other enterprises were chosen as not making or initiating any frauds. The grouping of relative financial indicators according to different dimensions enabled to identify precisely the risk level of the selected enterprises and in that way to assess their internal control effectiveness and to identify whether they were making frauds. The empiric research has proven that the proposed model is able to identify enterprises that make frauds, and this is a proof of the practical adaptability of the model and reliability of the obtained results.
9. Analysis of the practical adaptability of the model has shown that because of the clear and logical sequence of assessment actions any enterprise operating in the extraction industry sector, even in the absence of a highly qualified employee, can adapt it in practice without much effort. This is a very important factor, because the existing internal control models are not only adapted for extraction industry, but also do not offer an exact sequence of actions but present just research spheres and elements; therefore, the practical application of these models by enterprises is highly problematic.

10. The testing results have confirmed the components of this model and their interrelation, as well as its good applicability which allows not only specialists in the field to assess the effectiveness of internal control in an extractive industry enterprise, but also other concerned people, for example, the state tax inspectors, to be able to identify which Lithuanian extraction industry enterprises make frauds initiated by enterprise authorities. Such institutions may apply the proposed model and to identify the enterprises suspected in initiating and making frauds.
11. An effective internal control system enables to decrease the danger that the goals of an enterprise will be missed. However, there is still some risk that internal control will be poorly organized or will not operate as expected. Since the quality of internal control depends also on the human factor, there might appear some drawbacks in its arrangement, assessment and interpretation, misunderstandings, distractions, tiredness, negligence, secret deals, misuse, and disregard. Therefore, the model realization limitations have been clearly identified and defined. They were divided into two groups: technical and organization factors. The first group involves such factors as the capability of the information system, selection of assessment indices, limitations of resources and the duration of the model implementation, whereas the second group includes the goals of authorities, resistance of the employees, and the influence of the traditional internal control order.

Approbation of the scientific research results and their dissemination

The main statements and results of the research have been published in thirteen academic publications, of them one article has been published in an academic journal and twelve articles in academic conference publications.

Articles in academic journals:

1. Boguslauskas, V., Jakštonytė, G., Giriūnas, L. 2011. Evaluation of the burden of taxation received by households in Lithuania. *International Journal of Human and Social Sciences Canakkale: World Academy of Science, Engineering and Technology*. Vol. 6, p. 11–16. ISSN 1307-8046

Articles in academic conference material:

1. Giriūnas, L. 2009. Įmonės apskaitos kontrolinių funkcijų optimizavimas. *Ekonomika ir vadyba. Kauno technologijos universitetas*. Nr.14, p. 43–51. ISSN 1822-6515
2. Giriūnas, L. 2009. Evaluation of condition of internal control system in the company. *Ekonomika ir vadyba: aktualijos ir perspektyvos. Šiaulių universitetas*. Nr. 1(14), p. 103–113. ISSN 1648-9098
3. Giriūnas, L., Jakštonytė, G. 2009. Buhalterio profesinio įvaizdžio ir jo prestižo įtakos apskaitos specializacijos pasirinkimui universitetuose vertinimas. *Buhalterinės apskaitos teorija ir praktika. Lietuvos buhalterinės apskaitos švietėjų ir tyrėjų asociacija: Kaunas*. T.5, p. 74–79. ISSN 1822-8682
4. Jakštonytė, G., Giriūnas, L. 2010. Tax system efficiency evaluation modeling with reference to V. Tanzi criteria. *Ekonomika ir vadyba. Kauno technologijos universitetas*. Nr.15, p. 941–946. ISSN 1822-6515
5. Giriūnas, L. Jakštonytė, G. 2010. Evaluation of internal control system condition at industrial enterprises. *Vilnius: Vilniaus universitetas*. p. 66-72, ISBN 978-995-533-594-8
6. Giriūnas, L., Jakštonytė, G. 2010. Buhalterio profesinių gebėjimų ir įgūdžių vertinimas. *Bahalterinės apskaitos teorija ir praktika. Kaunas: Lietuvos buhalterinės apskaitos švietėjų ir tyrėjų asociacija*. T.7, p. 76–82. ISSN 1822-8682
7. Boguslauskas, V., Jakštonytė, G., Giriūnas, L. 2010. Evaluation of the burden of taxation received by households in Lithuania. *World Academy of Science, Engineering and Technology*. Vol. 66, p. 274–279. ISSN 2070-3724
8. Giriūnas, L. 2011. Įmonės vidaus kontrolės funkcijų klasterizavimas apskaitoje. *Contemporary issues in business, management and education*. p. 98–108. ISSN 2029-7963, ISBN 978-609-457-015-5, DOI: 10.3846/cimbe.2011.09

9. Giriūnas, L., Valkauskas, R. 2011. Trumpalaikio turto sąnaudų analizės metodika: teorinis aspektas. Contemporary issues in business, management and education. p. 109-122. ISSN 2029-7963, ISBN 978-609-457-015-5, DOI: 10.3846/cimbe.2011.08
10. Giriūnas, L., Valkauskas, R. 2012. Organizacijos trumpalaikio turto sąnaudų modeliavimas: teorinis aspektas. Verslas XXI amžiuje: 15-osios Lietuvos jaunųjų mokslininkų konferencijos "Mokslas - Lietuvos ateitis" 2012 metų teminės konferencijos pranešimai. Vilniaus Gedimino technikos universitetas. p. 1-6. ISBN 978-609-457-095-7
11. Giriūnienė, G., Giriūnas, L. 2012. Pelno mokesčio pokyčių poreikio vertinimas. Apskaita, auditas, analizė: mokslas inovacijų ir globalizacijos kontekste. I dalis. Vilnius: Vilniaus universitetas, p. 191–200. ISBN 9786094590283
12. Giriūnas, L. 2012. Darbuotojų inicijuojamų apgaulių įtakos vidaus kontrolės sistemai vertinimas. Apskaita, auditas, analizė: mokslas inovacijų ir globalizacijos kontekste. I dalis. Vilnius: Vilniaus universitetas, p. 175-184. ISBN 9786094590283

The results of the research have been presented on these scientific conferences:

1. International conference “Economics and Management“ (ICEM), 23–24 April 2009, Kaunas (Lithuania).
2. National conference “Accounting theory and practice“, 12 November 2009, Alytus (Lithuania).
3. International conference „Economy and management: current issues and perspectives“, 19 of November 2009, Šiauliai (Lithuania).
4. International conference “Economics and Management“ (ICEM), 22-23 April 2010, Riga (Latvia).
5. International conference “Business, economics and finance“, 28-30 June 2010, Paris (France).
6. International conference “The global challenges for economic theory and practice in central and eastern european countries“, 16-17 September 2010, Vilnius (Lithuania).
7. International conference “Development of accounting studlines and study process improvement aspects“, 10 November 2010, Alytus (Lithuania).
8. International conference “Contemporary issues in business, management and education“, 17 November, 2011 Vilnius (Lithuania).
9. 15th conference of young researchers “Science – the future of Lithuania“, 2 February 2012, Vilnius (Lithuania).
10. International conference “Accounting, audit, analysis: science in the context of innovation and globalization“, 29-30 March 2012, Vilnius (Lithuania).

About the author

Born on 13 December 1983, Anykščiai (Lithuania)

Education

2002–2006 Bachelor of Economics, Vilnius University.

2006–2008 Master of Economics, Vilnius University.

2009–2012 Doctoral studies at the Vilnius University, Social Sciences: Management and Administration. In 2009 and 2011 honoured in the competition of scientific achievements of the Faculty of Economics (2nd place among lecturers, assistants and doctoral students).

Professional experience

2002–2011 IĮ Pritinas, financier

2004–2005 National Payment Agency, senior specialist

2010–2011 UAB Kagra, Director

2010–up to now Vilnius University, assistant.

REZIUMĖ

Temos aktualumas. Kiekviena įmonė yra unikali savo veikla, valdymo politika ir tikslais, gavybos pramonės įmonėse ypač svarbu žinoti, kiek tikslingai naudojami materialiniai bei finansiniai ištekliai ar negrobstomas ir nešvaistomas įmonės turtas. Racionalia turimų išteklių panauda ir kuo didesne gaunama finansine nauda suinteresuoti įmonių akcininkai siekia įmonės valdymo sistemoje diegti įvairias vidaus kontrolės formas ir metodus taip siekiant užtikrinti jos efektyvumą.

Šiandieniniame pasaulyje stiprėjant konkurencijai, sparčiai plėtojantis ir keičiantis technologijoms, besikeičiant rinkos poreikiams, sudėtingėjant verslo procesams tampa vis sudėtingiau valdyti įmonę ir atlikti vidaus kontrolę. Todėl gavybos pramonės sektoriuje veikiančių įmonių vadovams reikia tokios kontrolės valdymo sistemos, kuri ne tik leistų efektyviai valdyti įmonės veiklą, bet kartu užtikrintų ir keliamų tikslų ir uždavinių įgyvendinimą. Reikia pabrėžti, kad tik efektyvi įmonėje egzistuojanti vidaus kontrolė padeda užtikrinti produktyvią ūkinę veiklą, garantuoti, kad būtų laikomasi įstatymų, poįstatyminių aktų ir įmonės priimtų taisyklių, įdiegti tinkamus įmonės turto apsaugos metodus, išvengti klaidų ir atskleisti piktnaudžiavimus, kt. Tačiau mokslinėje literatūroje dažnai aptinkamas ir kitas, netradicinis požiūris, teigiantis, kad efektyvi vidaus kontrolė atskleidžia įmonės vystymosi perspektyvas, padeda pastebėti įmonės egzistavimui pavojingą riziką – taip ši kontrolė tampa svarbi rizikos valdymo priemonė.

Gavybos pramonės sektoriuje veikiančiai įmonei nuolat turi įtakos išorinės ir vidinės aplinkos veiksniai, kuriems pasikeitus gali padidėti jos veiklos rizika. Siekiant pastarąją sumažinti iki priimtino minimalaus lygio atsiranda ir poreikis atlikti konkrečius vidaus kontrolės sistemos pakeitimus – atsisakyti nebeaktualių ir neveiksnių kontrolės procedūrų, vykdomų funkcijų bei pakoreguoti esamas ar įvesti naujų. Poreikis tobulinti vidaus kontrolės sistemą gali būti patenkintas tik turint reikalingą informaciją apie esamą vidaus kontrolės sistemos veiksmingumą ir efektyvumą, be to, būsimą kontrolės stiprinimo poreikį ir veiksmus, kuriuos reikia atlikti, kad vidaus kontrolės sistema būtų veiksminga siekiant įmonės tikslų įgyvendinimo ir galimų nuostolių išvengimo. Taip įmonėje atsiranda ypatingos funkcijos poreikis – vertinti vidaus kontrolės sistemą ir jos efektyvumą. Deja, iki šiol nėra parengta bendros metodikos ar modelio, kuris galėtų būti taikomas gavybos pramonės įmonių vidaus kontrolės ir jos efektyvumo vertinimo klausimu. Nors užsienio mokslinėje literatūroje prieinama užsienio įmonių siūlomų dalinių vertinimo priemonių, tačiau dažnai jos neatitinka esamų Lietuvos verslo įmonėse sąlygų, be to, vertinimo priemonės nėra specializuotos gavybos pramonės įmonėms atsižvelgiant į pastarųjų veiklos ir apskaitos sistemos specifiką.

Mokslinė problema ir jos ištyrimo lygis. Vidaus kontrolės sistema turi svarbią reikšmę visose be išimties – didelėse, vidutinėse, mažose įvairaus pobūdžio įmonėse, tačiau gavybos pramonės įmonių veiklos ir apskaitos specifika lemia itin didelį dėmesį ne tik vidaus kontrolei ir jos sistemai, bet ir pastarosios efektyvumui ir jo vertinimui. Būtent tai ir lemia, kad vidaus kontrolės sistemai keliamas tikslas yra valdyti verslo riziką, t.y. pasitelkiant vidaus kontrolės sistemos koordinuojamus metodus ir priemones yra siekiama minimizuoti riziką, susijusią su verslo aplinka, įmonėje vykstančiais procesais ir generuojama valdymo informacija, kurios pagrindu ir yra priimami verslo sprendimai. Šis trejopas neapibrėžtumas yra būdingas kiekvienam verslui, o gebėjimas jį valdyti, t.y. išvengti, sumažinti, priimti ar nukreipti norima linkme, suteikia organizacijai jos veiklos tęstinumo garantijas ir konkurencinį pranašumą.

Konkurencinėje aplinkoje sparti technologijos plėtra ir ekonomikos spaudimas verčia šiandienines įmones keisti požiūrį į vidaus kontrolę, kuri leidžia įmonei pasirinkus tam tikrų taisyklių ir procedūrų rinkinį pasiekti užsibrėžtų tikslų. Iš užsienio šalių mokslininkų, nagrinėjančių įmonės vidaus kontrolės sistemos būklės ir jos efektyvumo vertinimą, reikėtų išskirti C. Barnabas (2011), M. Biegelman (2012), H. K. Chung (2000), W. S. Fardo (2009), P. Dechow (2004), S. McVay (2005), J. R. Elder (2008), M. Fardon (2010), A. A. Grambling (2010), L. E. Rittenberg (2010), P. Gupta, (2010), J. C. Helbeck (2008), F. R. Jacobs (2011), C. C. M. Schelleman (2009), T. E. Vollmann (2011), A. M. King (2011), W. R. Kinney (2000), J. Krishnan (2005), M. Leitch (2008), N. B. Macintosh, (1984, 2010), K. A. Merchant (2011), B. Moller (2010), D. Pfaff (2007), F. Ruud (2007), A. J. Pfister (2009), R. Simons (1990, 1995, 2000), E. H. J. Vaassen (2009), K. H. S. Pickett (2010), J. K. Shim (2011), L. W. Vona (2008, 2011), J. T. Wells (2011). Lietuvoje šią problematiką iš dalies nagrinėjo R. Bičiulaitis (2001), J. Kabašinskas (2007), I. Toliatienė (1997, 2002), R. Kanapickienė (2001, 2007, 2008), E. Buškevičiūtė (2008), V. Kačergienė (2005), V. Pečiūra (1998, 1999), V. Lakis (2007, 2008), J. Mackevičius (1999, 2001, 2003, 2008, 2009), R. Bartaška (2003), L. Kazlauskienė (2009), V. Navickas (2011), J. A. Staškevičius (1998) ir kiti. Tačiau atlikus išsamią šių ir kitų mokslinės literatūros šaltinių analizę, paaiškėjo, kad nepakankamai dėmesio yra skiriama įmonių vidaus kontrolės sistemos būklės tyrimams, o ypač gavybos pramonės sektoriuje veikiančių įmonių vidaus kontrolės sistemai ar jos efektyvumo vertinimui.

Keičiantis politiniams, ekonominiams, socialiniams ir technologiniams veiksniams keičiasi ir įmonės valdymo politika. Efektyvi gavybos pramonės sektoriaus įmonėje egzistuojanti vidaus kontrolė, keičiantis aplinkybėms, gali būti netinkama ar net neveiksminga, todėl jos efektyvumo vertinimas yra viena iš pagrindinių priemonių apskaitos politikai gerinti, įmonės turtui apsaugoti, apskaitos teisingumui ir veiklos efektyvumui užtikrinti. Nors vidaus

kontrolė yra pagrindinė įmonės valdymo sistemos dalis, tačiau jos efektyvumo vertinimo modeliavimas pasaulinėje mokslinėje terpėje nėra plačiai aptariamasis ir analizuojamas. Kaip ir kokiais būdais įmonė galėtų užtikrinti vidaus kontrolės sistemos efektyvumą nėra visiškai aišku, be to, nėra sukurto ir vidaus kontrolės efektyvumo vertinimo modelio, ką jau kalbėti apie gavybos pramonės sektorių, kuris leistų atsižvelgiant į įmonės veiklos specifiką ir kitus veiksnius optimizuoti kontrolę ir jos vykdomą veiklą.

Remiantis preliminariais įmonių vidaus kontrolės stebėjimais, galima teigti, kad Lietuvos gavybos pramonės sektoriuje veikiančiose įmonėse vidaus kontrolės procedūros yra nepakankamai formalizuotos, pareigybinis atsakomybės paskirstymas yra neformalus ir neefektyvus, o visa tai ir lemia silpną vidaus kontrolę Lietuvos gavybos pramonės sektoriuje ir jos padarinius – klaidas finansinėse ataskaitose ir apgaulės. Pastarosios rodo nepakankamą vidaus kontrolės veiklą ir jos efektyvumą. Vyrauja nuomonė, kad tikslingiausia nustatyti ir kovoti su tyčinių ar netyčinių klaidų ir apgaulių atsiradimo priežastimis, kurios paprastai kyla dėl nepakankamos vidaus kontrolės, todėl vidaus kontrolės efektyvumo vertinimas tampa itin reikšmingas ir neišvengiamas veiksnys. Reikia pabrėžti, kad prie vidaus kontrolės sistemos vertinimo modelio neapibrėžtumo ir praktinio pritaikymo neaiškumo prisideda ir gavybos pramonės įmonėse vyraujanti itin specifinė apskaitos sistema. Pastarosios specifiškumą labiausiai įtakoja atsargų sritis, nes jos ne kaip gamybos ar prekybos įmonėje esti gaminamos ar perkamos, kai aiškūs ir jų kiekis, bet išgaunamos naudingųjų gamtos išteklių kasybos metu, o ir joms įvertinti teorijoje yra daugiau nei dvidešimt skirtingų matematinių skaičiavimo būdų, beje, jais skaičiuojant leidžiama trijų procentų paklaida, kuri dažniausiai sudaro ganėtinai ženklų sumą. Būtent atsargų apskaitoje gavybos pramonės įmonė gali varijuoti ne tik išgaunamais kiekiais, bet ir pasinaudoti tam tikromis gamtinėmis sąlygomis, pavyzdžiui, drėgnos, per lietu išgautos iškasenos bus sunkesnės už išgautąsias sausuoju periodu. Taigi šios pramonės sritys apskaitos specifika ir lemia vidaus kontrolės efektyvumo vertinimo modelio poreikį, nes tikimybė, kad pasinaudodami sudarytomis tam palankiomis galimybėmis, įmonės darbuotojai ar vadovybė inicijuos tyčines klaidas ar apgaulės yra didelė, juolab kad ir pastarąsias identifikuoti apskaitoje beveik neįmanoma.

Tyrimo objektas – gavybos pramonės įmonėse egzistuojanti vidaus kontrolės sistema, jos organizavimo ir palaikymo metodai bei priemonės.

Tyrimo tikslas – remiantis vidaus kontrolės teorinės analizės ir tiriamojo darbo rezultatais sukurti gavybos pramonės sektoriuje veikiančių įmonių vidaus kontrolės sistemos efektyvumo vertinimo modelį.

Šiam tikslui pasiekti keliami tokie **uždaviniai**:

- išnagrinėti vidaus kontrolės sistemos sampratą, tikslus ir elementus;
- įvertinti gavybos pramonės įmonių vidaus kontrolės efektyvumo vertinimo modelio poreikį identifikuojant pasitaikančių klaidų ir apgaulių pobūdį;
- atlikti egzistuojančių ir praktikoje taikomų vidaus kontrolės vertinimo modelių analizę;
- identifikuoti gavybos pramonės įmonių vidaus kontrolės efektyvumo vertinimo modelio sudarymo principus;
- sudaryti gavybos pramonės įmonių vidaus kontrolės efektyvumo vertinimo modelio struktūrogramą;
- identifikuoti ir detalizuoti veiksnius, galinčius riboti praktinį modelio realizavimą;
- atlikti praktinį empiriškai pagrįstą sudaryto vidaus kontrolės sistemos efektyvumo modelio vertinimą.

Tyrimo metodai. Analizuojant galimus vidaus kontrolės sistemos efektyvumo vertinimo būdus, disertacijoje naudoti šie moksliniai tyrimo metodai: sisteminė ir lyginamoji naujausios mokslinės literatūros šaltinių analizė, sintezė, indukcija, dedukcija, abstrahavimas ir analogija. Rengiant gavybos pramonės sektoriuje veikiančių įmonių vidaus kontrolės sistemos efektyvumo vertinimo modelį atlikta finansinė ir statistinė analizė bei naudotas anketinio tyrimo metodas. Siekiant empiriškai pagrįsti sudarytą gavybos pramonės įmonėse egzistuojančios vidaus kontrolės efektyvumo vertinimo modelį, atlikus baudžiamųjų bylų analizę ir panaudojus surinktus duomenis, atlikta ekonometrinė analizė tiriant praktikoje pritaikyto modelio veiksmingumo rezultatus.

Tyrimo šaltiniai. Teoriniai disertacinio darbo tyrimai, susiję su vidaus kontrolės efektyvumo vertinimu, remiasi skelbiamais užsienio šalių ir Lietuvos mokslininkų atliktais moksliniais tyrimais. Statistinės informacijos šaltiniais apie gavybos pramonės sektorių ir jo tendencijas Lietuvoje tapo Lietuvos statistikos departamento duomenų bazės. Gavybos pramonės sektoriuje veikiančių įmonių vidaus kontrolės sistemos efektyvumo vertinimo modeliui sudaryti remtasi Lietuvos ir užsienio autorių mokslinės literatūros šaltiniais. Sudaryto modelio funkcionalumui pagrįsti atlikti praktinio pritaikymo tyrimai Lietuvos gavybos sektoriuje veikiančiose įmonėse.

Pagrindiniai ginamieji teiginiai:

- Remiantis atlikta teorinės literatūros analize sukurtas gavybos pramonės įmonių vidaus kontrolės efektyvumo vertinimo modelis tampa dinaminiu ir yra pritaikomas naudingųjų iškasenų eksploatavimo metu.

- Sudarytas modelis tinkamas ne tik išgaunamiems ištekliams vertinti, kasybos proceso apskaitai ir kontrolei, bet ir gali būti sėkmingai naudojamas gavybos pramonę ir jos apskaitą prižiūrinčių institucijų, siekiant išsiaiškinti, ar gavybos pramonės įmonėje vyrauja tyčinės klaidos ir apgaulės apskaitos srityje.
- Sukūrus tinkamą gavybos pramonės įmonės vidaus kontrolės sistemos efektyvumo vertinimo modelį, įmonė ne tik galėtų sutaupyti daug pinigų ir laiko diegiant vidaus kontrolės sistemą, taip minimizuodama veiklos kaštus, tačiau ir pritaikydama tinkamas kontrolines funkcijas, kad būtų greičiau ir efektyviau atskleidžiami įvairūs pažeidimai įmonėje, sukčiavimo atvejai, kartu užtikrinamas užsibrėžtų tikslų įgyvendinimas.

Darbo mokslinis naujumas ir teorinė jo vertė. Mokslinis naujumas pasireiškia tuo, kad gavybos pramonės įmonėse egzistuojanti vidaus kontrolės sistema analizuojama efektyvumo vertinimo požiūriu apibrėžiant jos vaidmenį siekiant didinti gavybos įmonės valdymo efektyvumą. Tai yra pirmasis darbas, kuriame nagrinėjamas būtent gavybos pramonės įmonių vidaus kontrolės sistemos efektyvumas, remiantis ne tik mokslinės literatūros analize, bet ir Lietuvos gavybos pramonės įmonių tyrimo rezultatais. Siekiant, kad gavybos pramonės įmonių vidaus kontrolės efektyvumo vertinimo modelis būtų pagrįstas teoriniais ir praktiniais vertinimo tyrimais, buvo atliktas vidaus kontrolės sistemos efektyvumo vertinimo modelio poreikio tyrimas, apklausiant Lietuvos gavybos pramonės sektoriuje veikiančias įmones.

Disertacijos mokslinis naujumas ir teorinė jo vertė išvelgiama iš pagrindinių mokslinio tyrimo rezultatų:

- sudarytas gavybos pramonės įmonių vidaus kontrolės sistemos efektyvumo vertinimo modelis nėra universalus, o yra pirmasis tokio pobūdžio, nes teikia galimybę įvertinti tik tam tikrą įmonių dalį atsižvelgiant į jų veiklos ir apskaitos sistemos specifiką, o būtent toks kryptingas požiūris leidžia itin tiksliai ir objektyviai įvertinti vidaus kontrolės sistemos efektyvumą;
- gavybos pramonės sektoriuje veikiančių įmonių vidaus kontrolės efektyvumo vertinimo modelis yra sudarytas atsižvelgiant į tokio pobūdžio įmonių veiklos ir apskaitos specifiką, tačiau remiantis pagrindiniais jo sudarymo principais gali būti adaptuotas ir pritaikytas ir kito pobūdžio įmonių veiklos kontrolės sistemos efektyvumui vertinti.

Darbo praktinė reikšmė. Disertaciniame darbe sukurtas gavybos pramonės įmonėse egzistuojančios vidaus kontrolės sistemos efektyvumo vertinimo modelis. Jis apibrėžia vidaus kontrolės sistemos efektyvumą, esmines klaidas ir leidžia įvertinti riziką, konkretinančią

silpnąsias įmonės sritis, kuriose yra sudarytos sąlygos klaidų ir apgaulių atsiradimui bei vystymuisi. Būtent toks efektyvumo vertinimas leidžia identifikuoti ne tik gavybos pramonės įmonėse egzistuojančias klaidas ir apgaulės, bet ir numatyti prevencines jų priemones, bet gali būti sietinas ir su įmonės veiklos koordinavimu, valdymu ir plėtra bei jų efektyvumo gerinimu. Taigi, naudojant sudarytą modelį galima:

- įvertinti gavybos pramonės įmonėje egzistuojančios vidaus kontrolės sistemos naudingumą ir efektyvumą;
- identifikuoti silpnąsias gavybos pramonės įmonės vidaus kontrolės sritis;
- nustatyti gavybos pramonės įmonėje tyčinių ar netyčinių klaidų ir apgaulių atsiradimo sritis ir numatyti prevencines priemones.

Disertacijos struktūra ir apimtis. Disertaciją sudaro: įvadas, trys pagrindiniai skyriai, darbą apibendrinančios išvados ir pasiūlymai, literatūros sąrašas ir priedai. Tekste pateikta 19 lentelių ir 49 paveikslai, bendroji darbo apimtis be priedų – 218 puslapių. Darbe panaudota 230 literatūros šaltinių.

Išvados

Ištyrus teorinius ir praktinius gavybos pramonės įmonių vidaus kontrolės efektyvumo vertinimo aspektus, suformuluotos šios išvados:

1. Atlikus moksliniuose darbuose pateikiamos sąvokos „vidaus kontrolė“ analizę, nustatyta, kad ši sąvoka apibūdinta nepakankamai išsamiai, nes neakcentuojama, kad kontrolė ir žmogus bei jo kuriamos vertybės ar atliekami veiksmai yra neatsiejami, todėl vidaus kontrolė turi būti orientuota ir į įmonės vertybes, misiją ir viziją. Apibrėžiant vidaus kontrolę būtina pateikti visa apimančią ir apibendrinančią vidaus kontrolės apibrėžimą: vidaus kontrolės sistema – tai įmonės valdymo sistemos dalis, užtikrinanti įmonės užsibrėžtų tikslų įgyvendinimą, efektyvią ūkinę komercinę organizacijos veiklą, apskaitos principų laikymąsi bei efektyvų veiklos rizikos valdymą, kuris įgalina minimizuoti tyčinių ar netyčinių klaidų skaičių, išvengti vadovybės ar darbuotojų inicijuojamų apgaulių įmonės veiklos procesuose.
2. Siekiant, kad gavybos pramonės įmonių vidaus kontrolės sistemos vertinimo modelis būtų pagrįstas teoriniais ir praktiniais vertinimo tyrimais, atliktas vidaus kontrolės sistemos efektyvumo vertinimo modelio poreikio tyrimas, apklausiant Lietuvos gavybos pramonės sektoriuje veikiančias įmones. Anketinės apklausos būdu atliktas vidaus kontrolės efektyvumo modelio poreikio tyrimas gavybos pramonės įmonėse parodė, kad tokio modelio poreikis yra gana didelis, netgi būtinas ne tik dėl specifinių gavybos pramonės įmonių valdymo ir apskaitos bruožų, bet ir dėl daugelio sudarytų sąlygų,

leidžiančių atsirasti klaidoms ir apgaulėms. Todėl ir vidaus kontrolės efektyvumo vertinimas įgauna be galo didelę reikšmę įmonės valdymo ir apskaitos procesuose. Taigi, sukūrus tinkamą gavybos pramonės įmonės vidaus kontrolės sistemos efektyvumo vertinimo modelį, įmonė ne tik gali sutaupyti daug pinigų ir laiko diegdama vidaus kontrolės sistemą, taip mažindama veiklos kaštus, bet ir įdiegti bei pritaikyti tinkamas kontrolės funkcijas taip, kad būtų greičiau ir efektyviau atskleidžiami įvairūs pažeidimai, sukčiavimo atvejai, o kartu būtų užtikrinamas ir gavybos pramonės įmonės užsibrėžtų tikslų įgyvendinimas.

3. Kritinė mokslo darbuose siūlomų vidaus kontrolės modelių lyginamoji analizė parodė, kad pateikiami modeliai ne tik itin skirtingi, bet nė vienas iš analizuotų modelių nėra pakankamai išsamus ir iki galo neatspindi vidaus kontrolės efektyvumo vertinimo esmės bei nenurodo konkrečios vidaus kontrolės efektyvumo vertinimo sekos, o tik identifikuoja tam tikras vertinimo gaires. Mokslinėje literatūroje aprašyti vidaus kontrolės modeliai pateikia bendrą supratimą apie vidaus kontrolę ir jos komponentus, tačiau nesiūlo konkretaus būdo, kaip konkrečiai apskaičiuoti ar įvertinti vidaus kontrolės efektyvumą, todėl tikslinga sudaryti aiškios struktūros ir loginės sekos vidaus kontrolės vertinimo modelį, kuris didesniu ar mažesniu laipsniu supaprastintų tikrovę ir būtų tokio tikslumo, kad rezultatas atitiktų minimalius vertintojo reikalavimus, jo detalumą lemtų duomenų prieinamumas, o tokio modelio analizei reikėtų ne daugiau laiko, nei gali skirti vertintojas.
4. Atlikta mokslinės literatūros analizė leidžia teigti, kad modelio sudarymo principai apsprendžia ne tik gavybos pramonės įmonių vidaus kontrolės sistemos būklės efektyvumo vertinimo modelio struktūrą, dizainą ar parametrus, bet ir jo pristatymo galimybes, kurios savo ruožtu turi įtakos ir pastarojo kokybei, racionalumui ir išbaigtumui. Todėl šiuo tikslu išskirti tokie modelio sudarymo principai – inovatyvumas, techniškumas, dinamiškumas, universalumas, funkcionalumas ir realizavimo galimybės. Pabrėžtina, kad gavybos pramonės įmonių vidaus kontrolės sistemos efektyvumo vertinimo modelis ir jo realizavimo galimybės yra suprantamas kaip teorinių prielaidų, sintezės ir įgyvendinimo pagrindas: 1) naujos vidaus kontrolės sistemos formavimui, nes naudojant sudarytą modelį kaip pagrindą, galima sėkmingai kurti ir diegti pažangią vidaus kontrolės sistemą, atitinkančią gavybos pramonės įmonės vadovybės poreikius; 2) esamos vidaus kontrolės sistemos tobulinimui, kai gavybos pramonės įmonėje egzistuoja nepakankamai efektyvi ar apskritai neefektyvi vidaus kontrolės sistema.

5. Sudarytas gavybos pramonės įmonių vidaus kontrolės sistemos efektyvumo vertinimo modelis nėra universalus, o yra pirmasis tokio pobūdžio, nes leidžia įvertinti tik tam tikrą įmonių dalį atsižvelgiant į pastarųjų veiklos ir apskaitos sistemos specifiką, o būtent toks kryptingas požiūris leidžia itin tiksliai ir objektyviai įvertinti vidaus kontrolės sistemos efektyvumą. Pagrindinis dėmesys yra skiriamas tų sričių ir veiklų vertinimui, kurios yra specifinės ir būdingos būtent gavybos pramonės sektoriuje veikiančioms įmonėms – atsargų kiekio nustatymo, atsargų nuostolių vertinimo, trumpalaikio turto apsaugos sritims, kurios kartu turi įtakos ir skaidraus pirkimų bei sąnaudų pripažinimo ar pardavimų procesui. O ir remiantis atliktu anketiniu tyrimu galima teigti, jog būtent šiose srityse dažniausiai ir pasitaiko klaidų ar apgaulių. Nors gavybos pramonės sektoriuje veikiančių įmonių vidaus kontrolės efektyvumo vertinimo modelis yra sudarytas atsižvelgiant į tokio pobūdžio įmonių veiklos ir apskaitos specifiką, tačiau remiantis pagrindiniais jo sudarymo principais modelis gali būti adaptuotas ir pritaikytas ir kito pobūdžio įmonių veiklos kontrolės sistemos efektyvumui vertinti.
6. Sudarytas gavybos pramonės įmonės vidaus kontrolės sistemos efektyvumo vertinimo modelis leidžia įmonei sutaupyti daug pinigų ir laiko diegiant vidaus kontrolės sistemą, taip minimizuojant veiklos kaštus bei pritaikant tinkamas kontrolės funkcijas, kad būtų greičiau ir efektyviau atskleidžiami įvairūs pažeidimai įmonėje, sukčiavimo atvejai, o kartu ir užtikrinamas įmonės užsibrėžtų tikslų įgyvendinimas.
7. Remiantis atlikta teorinės literatūros analize, sukurtas gavybos pramonės įmonių vidaus kontrolės sistemos efektyvumo vertinimo modelis tampa dinaminiu ir yra pritaikomas naudingųjų iškasenų eksploatacijos metu. Dinamiškumas pasižymi tuo, jog modelyje esti įvertinama ir šakos ekonominė padėtis, todėl tokiu būdu įvertinami ne tik konkrečių nagrinėjamų įmonių tarpe vykstantys dinaminiai pokyčiai, bet ir palyginami su visos šakos duomenimis, o tai leidžia modeliui prisitaikyti prie tuo metu vyraujančių ekonomikos sąlygų ir neiškreipti gaunamų rezultatų. Būtent dėl to, jog sudarytas modelis pasižymi dinamiškumu, jis neiškreipia gaunamų modeliavimo rezultatų ir leidžia teisingai bei objektyviai suskirstyti gavybos pramonės sektoriuje veikiančias įmones į vykdančias apgaulės, įtartinas ir nevykdančias apgaulių.
8. Sudaryto ir detalios išanalizuoto gavybos pramonės įmonių vidaus kontrolės sistemos efektyvumo vertinimo modelio patikimumas ir praktinis pritaikymas įrodytas empirinio tyrimo metu. Tyrimui atlikti pasirinkta dvidešimt įmonių, iš kurių, kaip rodo tam tikrų institucijų atlikti tyrimai, pusė vykdė apgaulės, inicijuojamas pačios įmonės, o likusi dalis įmonių pasirinktos kaip neinicijuojančios ir nevykdančios apgaulių. Būtent finansinių

santykinių rodiklių grupavimas pagal tam tikras dimensijas leido itin tiksliai nustatyti atrinktų įmonių rizikos lygį, kartu įvertinti ir jų vidaus kontrolės efektyvumą ir nusakyti ar įmonės vykdo apgaulės, ar ne. Empirinio tyrimo metu įrodyta, kad sudarytas modelis geba identifikuoti įmones, vykdančias apgaulės, o būtent tai ir įrodo modelio praktinį pritaikymą bei gaunamų rezultatų patikimumą.

9. Modelio praktinio pritaikymo galimybių analizė parodė, kad dėl aiškios ir logiškos vertinimo veiksmų sekos kiekviena gavybos pramonės įmonė, net ir neturinti itin aukštos kvalifikacijos darbuotojų, modelį gali lengvai pritaikyti be itin didelių pastangų. Tai yra itin svarbus veiksnys, nes šiuo metu egzistuojantys vidaus kontrolės vertinimo modeliai ne tik nėra pritaikyti gavybos pramonei, bet ir nenurodo konkrečių veiksmų sekos, o pateikia tik tyrimo sritis ir elementus, todėl įmonei pastarąjį pritaikyti praktikoje esti be galo sunku.
10. Tikrinimo rezultatai patvirtino šio modelio sudedamąsias dalis bei jų ryšius ir tai, kad jis yra sudarytas tinkamai ir leis ne tik vidaus kontrolės specialistams įvertinti gavybos pramonės įmonės vidaus kontrolės sistemos efektyvumą, bet ir kitiems suinteresuotiems asmenims, pavyzdžiui, Valstybinei mokesčių inspekcijai, nustatyti, kuriose Lietuvos gavybos pramonės įmonėse egzistuoja apgaulės, inicijuojamos įmonės vadovybės. Būtent tokios institucijos taikydamos sudarytąjį modelį gali identifikuoti tas gavybos pramonės įmones, kurios, kaip įtariama, gali inicijuoti ir vykdyti apgaulės.
11. Efektyvi vidaus kontrolės sistema laidžia sumažinti tikimybę, kad užsibrėžti tikslai nebus pasiekti, tačiau visada išliks rizika, jog vidaus kontrolė bus prastai organizuota ar nebus vykdoma kaip numatyta. Kadangi vidaus kontrolę lemia ir žmogiškasis veiksnys, gali būti jos organizavimo trūkumų, vertinimo ar interpretavimo klaidų, nesusipratimų, nerūpestingumo, nuovargio, išsiblaškyimo, slaptų susitarimų, piktnaudžiavimo ar nepaisymo. Dėl šios priežasties buvo identifikuoti ir aiškiai apibrėžti gavybos pramonės įmonių vidaus kontrolės efektyvumo modelio realizavimo apribojimai. Jie suskirstyti į dvi grupes – techninius ir organizacinius veiksnius. Pirmai grupei priskirtini tokie veiksniai – informacinių sistemų pajėgumai, vertinimo rodiklių pasirinkimas, išteklių apribojimai ir modelio diegimo trukmė, o antrajai – vadovybės tikslai, gavybos pramonės įmonių darbuotojų pasipriešinimas, nusistovėjusios vidaus kontrolės tvarkos įtaka.