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CONCEPT AND MODEL OF RISK-CONTROLLING MECHANISM FOR PRODUCTION ENTERPRISE ECONOMIC SUSTAINABILITY MANAGEMENT

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ABSTRACT— *The risk-controlling is a management concept which can be considered as information-analytical and methodical insure of the management at risk. The great uncertainty which is present in the functionality of the Bulgarian enterprises and the low risk-management application makes the issue of risk-controlling relevant to the current problems. The information-analytical and methodical insure of the management at risk provides a more rigorous application of risk control. The current empirical studies show good results of the application of risk-controlling as an efficiency increase mechanism for economic management sustainability of manufacturing enterprises in an undefined environment. In the presented paper an implementation of risk-controlling in the management systems of the Bulgarian enterprises is presented. This implementation serves as a base for the development of a concept model of risk-controlling mechanism for economic sustainability management. The verification results for the mathematical model if the risk-controlling mechanism are presented.*

Keywords: controlling, economical sustainability, risk, risk-controlling, management

1. INTRODUCTUON

ГОСТ Р ИСО 31000-2010 and ГОСТ Р ИСО/МЭК 31010-2011 are focused on risk management and this process importance for the success of each plant. These standards provide a general formulation of risk, in the meaning of deviation from the objectives pre-set and the impact of this deviation on the organization- as a consequence of uncertainty. This relation of risk to the objectives gives some authors grounds to talk about risk-oriented management (Капустина, 2015). In such a kind of management it is also appropriate to look for the applicability of risk controlling as an integral part of controlling (Chrobok at al., 2007). In this aspect, risk controlling is examined as a proactive assessment of alternative actions on which decision-making process is based. In its activity, risk-controlling performs management advisory function in terms of risk associated with management decisions. Some authors associate this function mainly with information assurance of decision-making process (Магомедова, 2008), while others (Карминский at al., 2014) supplement the role of risk-controlling by its relating to information-analytical and methodological support of the management at risk. It is envisaged application of organizational and economic methods of risk-management (Орлов, 2015) for the performance of this advisory function by risk controlling. The application of these instruments reveals the risk-controlling complex nature, which in terms of its functions is similar to controlling, but its commitment to risk requires use of instruments of risk-management also. This also determines the strong discussion about the risk controlling positioning in the plant management (Hoitsch at al., 2006) (Winer, 2007). Regardless of this discussion, risk-controlling remains related to management advising in making management decisions at risk. Achieving objectives is also considered from risk prospective and in terms of achievement of sustainable success in a dynamically changing environment – ГОСТ Р ИСО 9004-2010. This standard defines provision of preventive corrective actions resulting in achievement of set goals as a prerequisite for achievement of sustainable success. It can be said that risk-controlling relation to decision-making

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process, objectives achievement, risk and sustainability make it also suitable for application in managing economic sustainability of the manufacturing plant- rational balancing of probability deviations from the economic objectives of the manufacturing plant. In terms of risk it can also be sought applicability of risk management in the management of economic sustainability. This could impose introduction of the risk management system, but conducted survey (Богданова at al., 2012) reveals low readiness of Bulgarian plants for its introduction. This fact supports the demand for the applicability of a risk-controlling mechanism that effectively assists management in terms of risk occurring in managing the economic sustainability of manufacturing plants. For this purpose, this article proposes a conceptual model of a risk-controlling mechanism involved in the economic sustainability management.

2. CONCEPTUAL MODEL

Prior to examining the conceptual model, risk controlling positioning in the management system will be indicated in terms of its participation in the management of economic sustainability. Defining this position determines the structure of the proposed conceptual model.

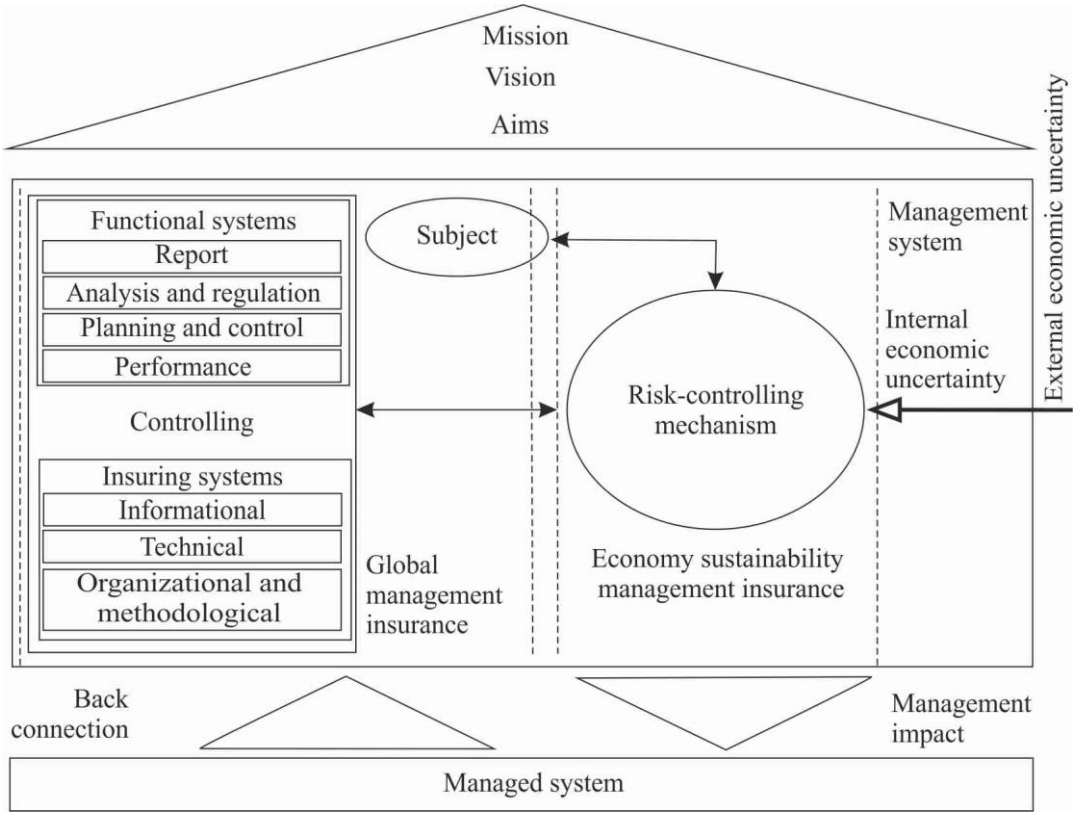

Figure 2.1 Positioning the risk-controlling mechanism in the management system – adapted form (Eberlein, al al. 2015), (Lesidrenska, 2004)

The main alternatives for positioning the mechanism under consideration are to position it as: a part of the controlling system, a part of the risk management system or as a part of a system that is decisive for the specificity of the plant. The abovementioned low readiness of Bulgarian plants for implementing the risk management system also determines the limited opportunity for the risk-controlling positioning as a part of this system. Risk-controlling mechanism introduction, as an independent element in some specific activities of the plant, shall be carefully considered in terms

of its management and economic efficiency. Risk-controlling mechanism positioning as a part of the controlling system could provide increased efficiency. This increase is the result of the advisory function supplementing that controlling and risk controlling perform. This mutual supplement is expressed in the information-analytical and methodical assurance of the management on behalf of the controlling in the general management of business, while risk-controlling performs analogous assurance, but in terms of economic sustainability management. Namely, the possibility of increasing efficiency is a prerequisite for positioning risk-controlling as a part of the controlling system when managing economic sustainability (fig. 2.1). This figure illustrates the interconnections involved in risk-controlling. On the one hand, it communicates with the controlling system, from where it receives the necessary data (resource) that can be generated by the ERP system also. Back to the controlling system, the risk-control mechanism returns information resource that can be used for general controlling purposes. The other interconnection is the one between risk-controlling and subject. The mechanism receives from the subject requests and instructions (restrictive conditions) on the basis of which it performs its analytical and evaluative actions in terms of the risk related to economic sustainability. In the opposite direction, risk controlling reports to the subject risk assessment and alternatives for impact on the unacceptable risk. This direct relationship between subject and risk controlling is determined by the strategic importance of the risk management and assurance of economic sustainability. More detailed actions are reviewed in the proposed conceptual model (fig. 2.2).

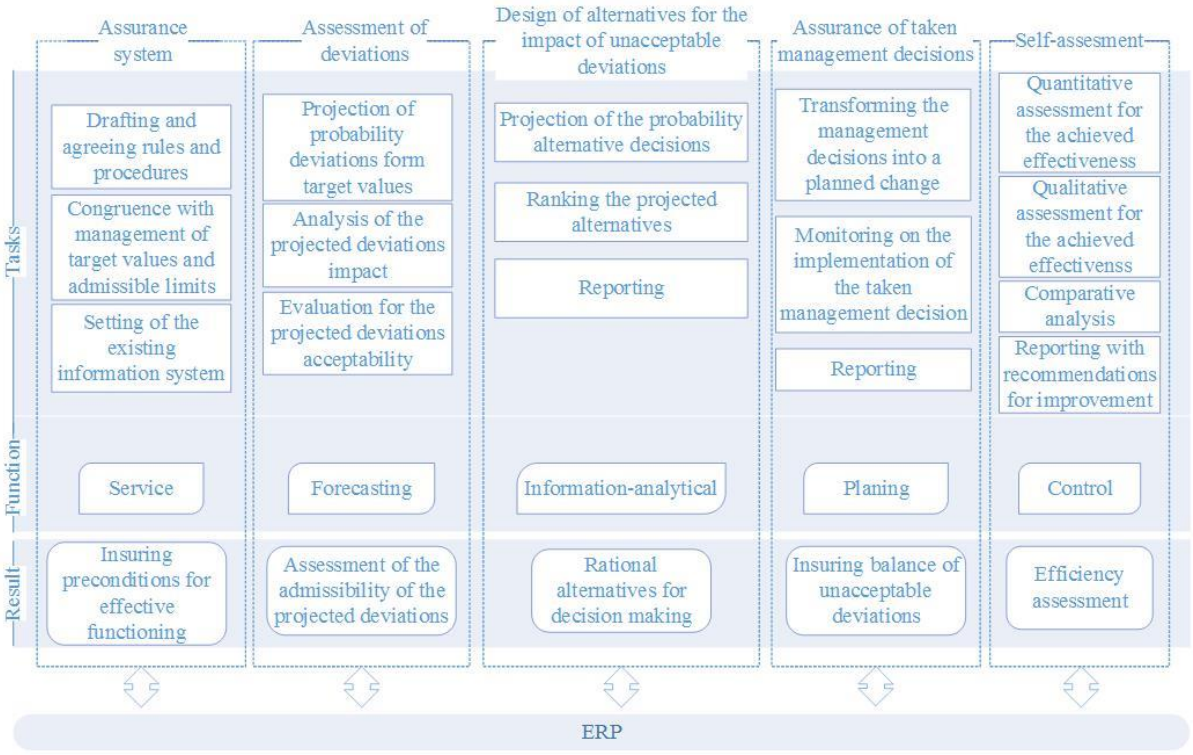

Figure 2.2 Risk-controlling model of economy sustainability management for manufacturing enterprise

The conceptual model includes five integrated systems, which are discussed below. Their interconnection and their relationship with the controlling system and the subject shall be implemented with the help of ERP system.

I. Assurance system.

A. Tasks:

• Drafting and agreeing rules and procedures;

This task regulates the framework of procedures that regulate implementation of the risk-controlling mechanism conceptual model involved in managing economic sustainability. The team involved in the mechanism construction and implementation shall prepare and coordinate the necessary procedures, which will then be validated;

• Congruence with management of target values and admissible limits. The implementation of this task provides for coordination of:

- Target values of economic sustainability indicators - ROI and total liquidity ratio. These values shall cover operational, tactical and strategic time aspect;

- Acceptable limits of the target indicators deviations characterizing economic sustainability. This will enable deviations from the target indicators to be classified as acceptable or unacceptable;

- Limits of the indicators ranges positioned at the lowest hierarchical level in a logic-deductive system describing formation of ROI values and overall liquidity ratio. These limits are expertly defined and shall reflect the uncertainty of the environment in which the plant operates. On their basis, a methodology based on the co-application of Monte Carlo and DuPont methods is applied.

• Setting of existing information system (ERP) and coordination of the information assurance of the risk-controlling mechanism. These settings shall provide for automation of ERP data migration from ERP to the mechanism and from it to the ERP. This is to save time (cost of management work) and therefore is to increase efficiency in economic terms;

• Information assurance (ERP, at the bottom of the fig. 2.2), as a consequence of the previous task. The information assurance of the risk-controlling mechanism shall be considered as a part of its service function in two directions:

- Information assurance between the five systems of the mechanism;

- Information assurance of all stakeholders from management of economic sustainability and functioning of the mechanism.

This information exchange shall be implemented by the ERP system and its application shall ensure:

- Standardized form of communication and data storage

- Documenting the entire information exchange

- Traceability in terms of liabilities and responsibilities

- Constant database updating

B. Function and result:

Integral and coordinated implementation of the above-mentioned tasks allows for the implementation of a service function by the assurance system of the risk-controlling mechanism. This function implementation has an organizational and regulatory nature for the mechanism implementation. The service function is a prerequisite for ensuring effective operation of the risk controlling mechanism;

II. Assessment of deviations.

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A. Tasks:

• Projection of probability deviations from the target indicators. Design of probability deviations from the coordinated target values of the economic sustainability characteristics using the Monte Carlo method. Design is done by applying deductive approach, the Du Pont model. Setting of the lowest hierarchical indicators in the model under consideration is done by the interval values coordinated by the assuring system;

• Analysis of the projected deviations impact. The task is completed by applying the method known as Index Factor Analysis. It helps for determining the percentage impact by which each indicator in the logic deductive system participates in the integral deviation of the top level ROI and overall liquidity ratio;

• Evaluation for the projected deviations acceptability. This evaluation is carried out by applying a comparative analysis. The application of this analysis is done by comparing designed probability deviations of the target parameters and their planned values. A calculation of the observed percentage deviations from the planned target values shall be made. After deviations measurement, it is checked whether the values obtained fall within the limits for the deviations acceptability - expertly determined by the management, which values are coordinated by the assuring system.

B. Function and result.

The above-mentioned tasks implementation is based on the design of probability values of parameters characterizing economic sustainability. This justifies their merging into the forecasting function. Its realization affords formation of a result in the form of an assessment of the acceptability of the parameters designed probability values, after comparison with their planned values and the set limits of acceptability. Ascertaining of unacceptable probability deviations provides the necessary information base for the next subsystem operation- on the input.

III. Design of alternative solutions for impact on unacceptable deviations.

A. Tasks:

• Projection of probability alternative decision. The implementation of this task is based on the two methods already examined in the deviation assessment system. These methods are applied in a similar way, but with the difference that they are used here to design alternative solutions for impact on the assessed unacceptable deviations. The design of probability alternative solutions is based on the input interval parameters defined by the management responsible for taking management decisions related to economic sustainability. Defined parameters refer to: different limits of acceptability of the target parameters deviations and different width of the input parameters intervals in the DuPont model - the lowest hierarchical level indicators (on the input);

• Ranking of the projected alternatives. Arranging of generated alternative solutions for impact on unacceptable probability deviations shall be performed according to the criteria set by the management involved in economic sustainability management. Such criteria may be: at least deviation from the target parameters at the highest level, achievement or approximation to a specific value of the parameters from lower hierarchical levels in the logic deductive system;

• Reporting of results. The result of the implementation of the previous two tasks shall be introduced in the form of a formalized report developed according to the accepted standards for document filing in the respective manufacturing plant.

B. Function and results.

The above three tasks implementation shall be seen as a continuation of the analytical actions carried out in the previous system. This enables tasks in the current system to be integrated into information-analytical function. The results from this function applying are rational alternative solutions for impact on unacceptable deviations from the target parameters. In this case, rational shall mean alternative solutions that do not jeopardize achievement of strategic goals in a strategic aspect - relying on expertise and more general management awareness when defining input dimensions for projections.

IV. Assurance of taken management decisions.

A. Tasks:

• Assisting transformation of the taken management decisions into changes in the system of plans - whether they are based on alternatives developed by risk-controlling mechanism or are the result of an independent management decision. Managing decision-making shall not be necessarily based on an alternative designed by the mechanism for impact on unacceptable deviations. This is due to the advisory role of the risk-controlling mechanism in managing economic sustainability. Whether the decision is based on a designed alternative to the mechanism or is the result of a self-management decision, it shall be transformed as a change in an plant's development plans. If the taken management decision is based on a developed alternative by the risk controlling mechanism, it shall deliver the designed values of the alternative solution to the controlling system. It shall coordinate the changes in the plant's system of plans. If the taken management decision is a result of an independent management action, the mechanism shall record the data of that decision. The purpose of this registration is collection of historical information for the needs of future analytical actions related to risk in managing economic sustainability;

• Monitoring on the implementation of the taken management decisions – assessment of probability deviations. Risk controlling mechanism monitors whether decisions are taken on the basis of an alternative designed by the mechanism or are the result of an independent management solution. Monitoring is proactive. It consists in periodic design and assessment using Monte Carlo and DuPont methods of probability deviations from the parameters set for achieving the management decisions taken in regards to compensating inacceptable deviations.

• Reporting of the monitoring results. This task implementation is to report the results of the monitoring carried out according to the established form to the management.

B. Function and results.

The above-mentioned tasks implementation is conditioned by changes in plans and monitoring. This gives a ground for their integration into planning function. The result of the planning function implementation shall ensure continuous, proactive balancing of unacceptable deviations from the target values of the executed management decisions.

V. Self-assessment.

A. Tasks:

• Preparing of quantitative assessment for the achieved effectiveness by the application of the risk-controlling mechanism. This task implementation consists in carrying out periodic measurements of the deviations from the set target values as a result of the application of the risk controlling mechanism. Measurements shall be made by calculating the following quantitative indicators:

- Index with constant basis for determining the quantity of the deviations;

- Average value of deviations;

- Variation range as an absolute value;

- Costs for management work related to management decision-making on economic sustainability management.

• Preparing of qualitative assessment for the achieved effectiveness by the application of the risk-controlling mechanism. This task implementation is based on application of the method of expert assessments, the method of in-depth unstructured interviews, the method of the surveys, the application of rank, rating and Likert scales (interval), as well as weighting coefficients;

• Performing of comparative analysis. It is envisaged its application to be based on a prior period for both types of assessments, and it is also possible to take into account the achievement of the objectives set for the mechanism effectiveness. The comparative analysis of qualitative measurements provides for comparison of the rating scores obtained and the maximum possible rating (sum of ratings) that can be obtained during the evaluation. This maximum rating plays the role of a standard and allows the distance of the given rating scores to be investigated;

• Preparing of a report to the subject with recommendations for improvement of the risk-controlling mechanism. The self-assessment results are formed in a report to the subject according to an established form. In addition to reporting the results obtained, the report shall also contain suggestions for further improvement of the risk-controlling mechanism.

B. Function and results:

The examined above-mentioned tasks carry out self-assessment and reporting actions on the measured effect achieved by functioning of the risk-control mechanism. This justifies these tasks to be included in the implementation of an integrated control function. This function implementation shall not only provide a purely controlling nature, such as a comparison between plan and report, but it shall also provide guidance for improving the risk-control mechanism performance in managing the economic sustainability of the manufacturing plant. In this way, the current system supports continuous improvement of the mechanism and management of economic sustainability.

3. RESULTS AND DISCUSSION

It is proposed positioning of a risk-control mechanism in the control system which is to be applied in managing the economic sustainability of the manufacturing plant. In this positioning, the mechanism is examined as a part of the controlling system. This allows mutual supplement between the two systems and increases the risk-controlling mechanism effectiveness and the management of economic sustainability.

In accordance with this positioning, a conceptual model of the risk-controlling mechanism is proposed that assists the management in managing the economic sustainability of the manufacturing plant. This model includes five interrelated systems that communicate with each other, with the controlling system and the management via an ERP system. The proposed model is an upgrade of the mathematical and software model developed by the author, based on the collaborative implementation of Monte Carlo and DuPont methods – designated for design probability values of ROI and total liquidity ratio. Assignment of input values is typical for this model which forms the empirical distribution in an interval pattern. This allows for more accurate reporting of the environment uncertainty dynamics in which the plant operates.

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5. SUPPLEMENTAL DATA

ГОСТ Р ИСО 31000-2010, ГОСТ Р ИСО/МЭК 31010-2011 and ГОСТ Р ИСО 9004-2010 are available in the PDFs of the following links:

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7. GLOSSARY

ERP – Enterprise Resource Planning, integrated management system.

ROI – Return of Investment.