UDC 338.27
DOI: 10.17747/2618-947X-2020-1-98-103

The risk management system is a tool for the successful implementation of international megaprojects

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ABSTRACT

The article is devoted to the optimization of the processes of organization and management of international megaprojects based on the formation of a risk management system.

Currently, the implementation efficiency of megaprojects remains low due to the emergence of many risks at various stages of project implementation.

In this connection, it is proposed to form an integrated risk management system, which implies a three-stage structure for introducing the 6 element risk management system into the project life cycle, into the main project management processes.

This article substantiates the need to form a risk management system in three stages in accordance with the key elements of a risk management system: (1) Planning – the block «Objectives and environment of the project»; (2) Approval of the project – the blocks «Identification», «Classification», «Assessment of risks and risk tolerance», «Risk management plan»; (3) Monitoring and control – the block «Control and monitoring of risks».

Thus, the proposed integrated risk management system provides: continuity of the risk management process based on the audit of the RMS; the ability to adjust RMS at the stage of forecasting a risk event; possibility of scenario modeling for forecasting risk reduction potential; risk management program, formed by current risks in order to increase the attractiveness of the mega-project for the investor.

It is also proposed to introduce an audit of risk management processes and procedures based on an adapted methodology for the following components of the risk management system: defining events and setting goals; the internal environment of the organization; organization risk assessment; risk control tools; responding to risks; communications and information; risk monitoring.

This technique allows you to take into account risks not only at the stage of project development, but also during its implementation, which ensures its feasibility, as well as an audit algorithm for risk management systems of a megaproject is developed and recommendations for improving the RMS through this tool are proposed.

KEYWORDS:

risk management systems, international megaprojects, the effectiveness of the risk management system.

FOR CITATION:

Shamin D.V. (2020). The risk management system is a tool for the successful implementation of international megaprojects. *Strategic Decisions and Risk Management,* 11(1), 98-103. DOI: 10.17747/2618-947X-2020-1-98-103.

The re-industrialization of the world industry in its post-industrial stage of development requires the implementation of megaprojects aimed at a qualitative update of the world economy. Besides, the general condition of national economy, which has developed as a result of sanctions and global crisis, presents the strategies of integrated approach, which combines the resources of different countries.

The megaproject is understood as an aggregation of investment projects, grouped by country, industry, region and other parameters, where it is expected that leading countries would play the active role in its implementation [Shamin, 2016].

At the present time this type of projects is included in the list of national projects under twelve directions for strategic development, determined by the Decree of the President of Russia dd. 07.05.2018 No.204 "On the National Goals and Strategic Objectives of the Development of the Russian Federation for the Period up to 2024", and all business processes and risks inherent with them will be characterized to certain extent in this article.

The base of a megaproject is a synergetic effect ensured by mutually beneficial cooperation between investors (government-controlled and private) and contractors. Based on modern global statistics we can conclude that the efficiency level of megaprojects implemented at the present time is insignificant, what is manifested in violation of the planned terms in 85% cases and in departure of their costs not less than by 20% from its historical cost [Flyvbjerg, 2014].

However, the fact of increase of the risk level due to underdevelopment of a new cooperation form for a significant number of investors and contractors being on conditions of equal partnership is not taken into account in the process of development and implementation of international megaprojects.

The implementation of international megaprojects is connected with many risks emerging at the phase of projecting and building, as well as in the period of running the objects[1].

The structure of the megaproject risk field includes the following risk categories:

- political;
- regulatory;
- natural and climatic;
- technological;
- social;
- connected with personnel;
- macroeconomic;
- market.

Calculations of the potential for decrease of direct losses in the process of project implementation were conducted for assessment of the management system efficiency; the effect from the implementation of the proposed methodology reaches the key value of 90% in the process of implementing the corrected scenario of the megaproject [Flyvbjerg, 2014].

[1] Riakhovska A.N., Arsenova Ye. V., Kriukova O.H. Foreign practice of anti-crisis management: a tutorial / ed. by A.N. Riakhovska. Moscow: Magister; INFRA-M, 2020.

Therefore it is necessary to develop an optimal methodology for the formation of the risk management system, which would be adjusted to the phases and decision-making points in the life cycle of a megaproject.

The megaproject risk management is carried out on practice pursuant to the following documents:

- FERMA risk management standards, 2020[2];
- COSO ERM framework "Enterprise Risk Management: Integrated Framework", 2004[3];
- a Guide to the Project Management Body of Knowledge, 2004-2020[4];
- GOST R 51897-2011: "Risk management. Terms and definitions"[5];
- ISO 31000: 2009 Risk management – Principles and guidelines[6].

However, the analysis of these documents and of practice in using the fragmented risk management system (RMS) made it possible to reveal a range of serious disadvantages:

- the management is carried out at operative level;
- no possibility of recording the emerging unplanned new risks;
- no possibility to diagnose and monitor the factual risk space;
- no coordination at all stages and business processes of the megaproject implementation in case of the emerging unplanned new risk;
- no possibility of auditing the risk management system of a megaproject itself;
- the use of the fragmented risk management system for megaprojects leads to the situation, when according to assessment made by consulting companies[7], 64% of megaprojects in the oil and gas sector have a budget overrun and 73% of megaprojects – a delay in commissioning.

The reason is that the fragmented risk management system does not allow taking into account the principal feature of contemporary megaprojects – the multiplicity of managed entities interacting on principles of partnership. Based on it, the following algorithm for the formation of an integrated risk management system for an international megaproject seems appropriate.

It is offered that the formation process of the management system is to be built in three steps.

- The first step is Planning, which corresponds to the "project goals and implementation environment" block.
- The second step is Approval of a project, which includes four blocks:
  - identification;
  - classification;
  - risk assessment and risk tolerance;
  - the plan of risk management.
- The third step is Monitoring and Control, which corresponds to control and monitoring the risks.

At the phase of Planning the following tasks are solved:

- the formation of operative and strategic results of the megaproject;
- the description of proposal matrix, which takes into account results of the analysis of the project risk environment;
- the formation of enlarged matrix for assessment of results regarding the decision-making points in project.

At the phase of the project Approval the following takes place:

- the formation of the project budget;
- the formation of criteria for assessing the project performance figures taking into account a dynamic model of project risks;
- making decision about further implementation/ close-out of the project based on the integrated risk management system.

The primary objective of the second phase is the formation of a dynamic risk model for the megaproject, based on which a decision about the further organization strategy is made in compliance with the organization risk tolerance level for the whole project portfolio, also the insurance and non-insurance protection is formed.

The third phase – Monitoring and Control – includes:

- monitoring the implementation of strategic and operative project performance figures;
- reformatting the project (if necessary);
- auditing the risk management system.

The described algorithm makes it possible to form unified approaches to adjust the processes of the process management of the megaproject, including:

- management methods and tools taking into account identification, classification, assessment of risks and risk tolerance, plan of risk management.
- determination of qualitative and quantitative figures for the process management criteria, analysis of their parameters in the determined confidence intervals;
- methodology of qualitative and quantitative analysis of detected risks;
- determination of risk tolerance level, i.e. a confidence interval of the acceptable risk level;
- tools and methods for control of monitoring the risks forming the recommendations for building the business models belonging to hierarchical levels of the project management;

[2] URL: https://www.ferma.eu/app/uploads/2011/11/a-risk-management-standard-russian-version.pdf.
[3] URL: https://www.coso.org/Pages/erm-integratedframework.aspx.
[4] URL: https://www.pmi.org/pmbok-guide-standards/foundational/pmbok.
[5] URL: http://oac.rgotups.ru/misc/files/prof_risk/gost_R_51897-2011.pdf.
[6] URL: https://www.iso.org/standard/43170.html.
[7] URL: http://www.pmhut.com/is-it-time-to-rethink-project-management-theory.

Pic. 1. The main requirements
to the integrated risk management system

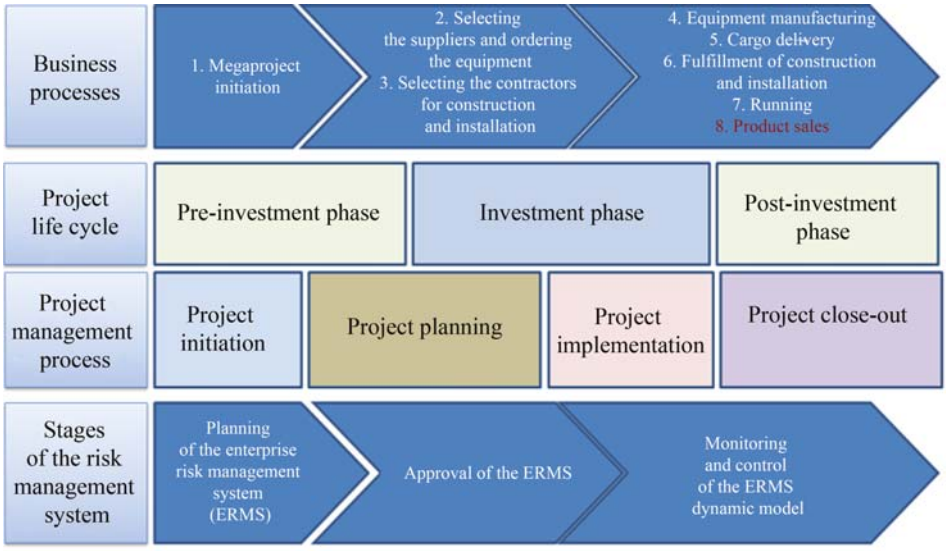
- algorithms for assessing the extent of elaboration and fulfillment of recommendation for risk management affecting the strategy.

As a part of fulfillment of this algorithm the decision-making scenarios for effective implementation of a megaproject is formed, which requires the megaproject risk management system to focus on maximization of effectiveness in fulfilling its phases and the most important – to ensure the benefits of the project taking into account the interconnection of the system constituent elements as an important factor in return of investments[8].

The main factor in the formation of the integrated risk management system is its full integration into the general system of organization and management of a megaproject, also a preventive possibility of risk response including the newly detected and emerging risk factors.

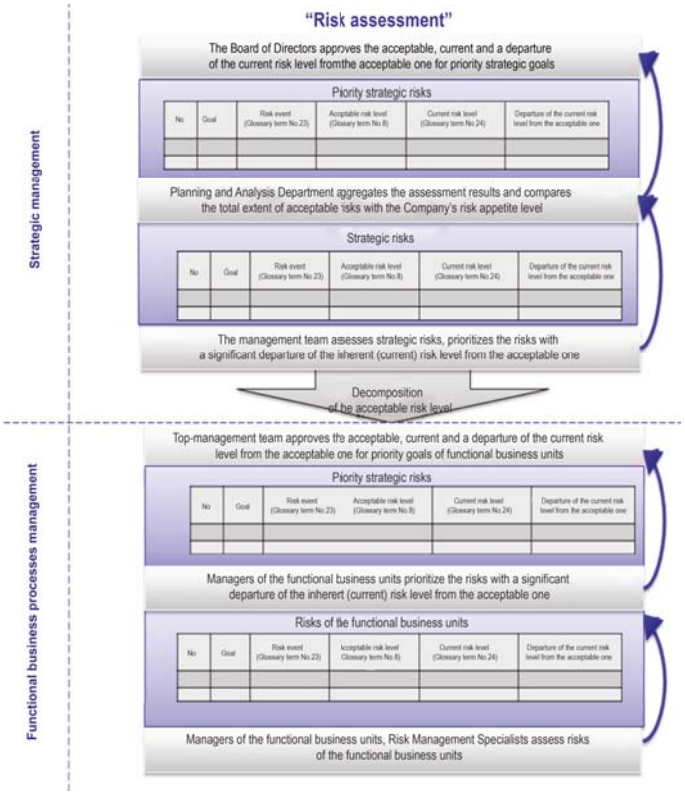
Proceeding from the proposed requirements to the risk management system (Pic. 1) and based on methodological processes of organization and management of megaprojects in international practice, the proposed three-stage algorithm is compiled into the general matrix of the project management

Pic. 2. Compilation of elements of dynamic risk management model in
processes of organization and management of a megaproject



[8] RMS-FERMA Risk Management Standard - Federation of European Risk Management Association.: http://www.ferma.eu/risk-management/standards/risk-management-standard/.

Pic. 3 Information support
for the "Risk assessment" element



(Pic. 2), what allows structural decision-making regarding the fulfillment of highlighted phases and project risk management to effectively achieve the results at strategic level [Kuznetsov et al., 2017].

The formed integrated risk management system includes the following elements:

- risk identification and classification, based on which the register of the project risks is formed;
- qualitative and quantitative risk assessment, the principles of which are based on alteration of the amount of investment costs, also the alteration of the project implementation schedule according to resource groups: it is price risks and assessment of unforeseen/ extraordinary event risks (non-price risks).

Content of the methodological and information support for the risk assessment is presented in Pic. 3.

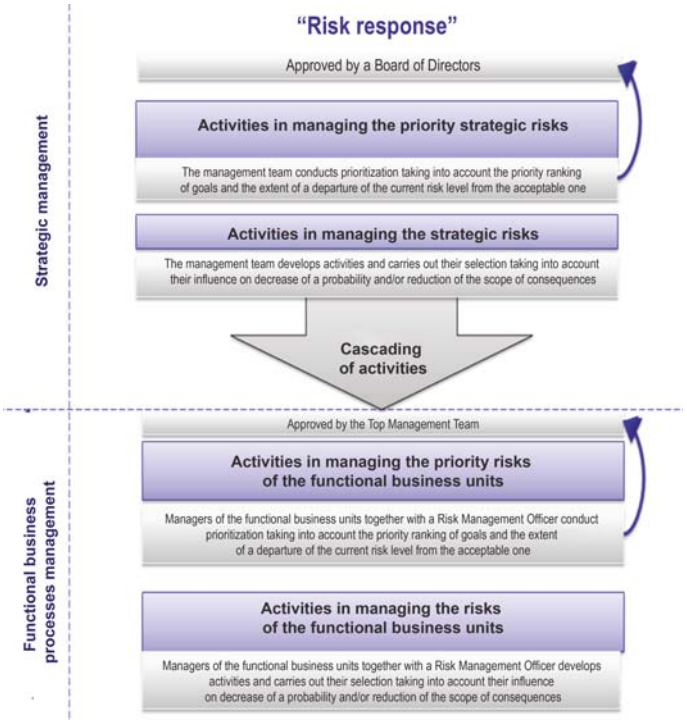
This organization mechanism for risk assessment ensures the development of recommendations for building of business-models and processes of project management, distributed according to hierarchical levels of project management;

- assessment of the risk appetite (risk tolerance);
- development of basic and correcting plans for risk management;

The content of the methodological and information support for the risk response is described in Pic. 4.

As a part of this element, conceptual recommendations for hedging the insured risks and administrative activities in

Pic. 4. Information support
for the element "Risk response"



Pic. 5 Information support
for the element "The means of control"

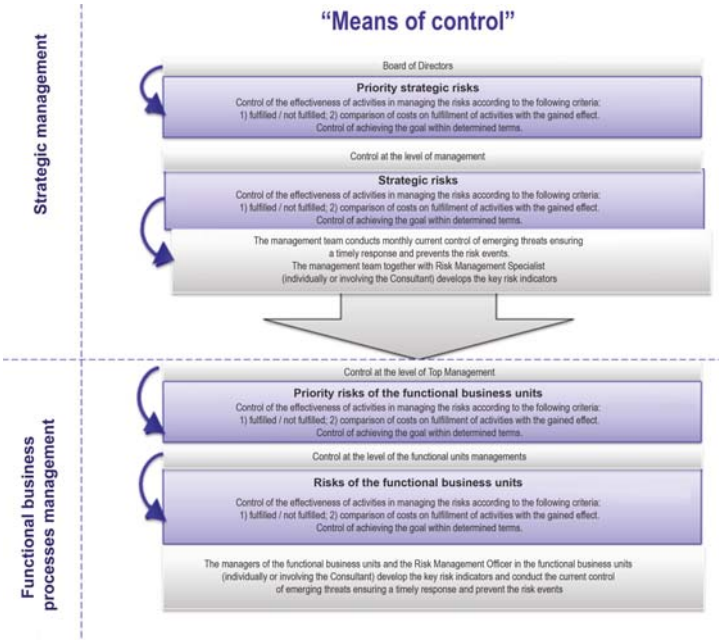


Table 1
Assessment of the RMS effectiveness

Name of a megaproject	Estimated cost of a project (billion RUB)	Number of elements of the risk management system (items)	Planned scenario of a megaproject			Corrected scenario of a megaproject		
			Loss (billion RUB)	RMS costs (billion RUB)	Risk mitigation potential (billion RUB /%)	Loss (billion RUB)	Increase in RMS costs (billion RUB)	Risk mitigation potential (billion RUB /%)
International project (NPP construction abroad)	600	6	10,5	1,4	6,7/63	4,2	0,15	3,8/90

Source: composed by the author.

management and minimization of uninsured risks of all the stages of the project are elaborated.

- risks control and monitoring.

The content of methodological and information support for the means of control is described in Pic. 5.

This element makes it possible to adjust the risk management system in order to detect the factors and reasons, which slow down the effective implementation of a megaproject, also to re-record the risks and to form the adjusted risk register taking into account the real situation.

For the purposes to ensure the effective implementation of an international megaproject it is necessary to form an integrated risk management system, which should be oriented to the implementation of a megaproject and ensuring the advantages of the interconnection of the system constituent elements as an important factor of the return of investments in the shortest period.

Advantages of the proposed mechanism for risk management involve:

1) permanent process of risk management based on the audit of the RMS;
2) the ability to adjust RMS at the stage of forecasting a risk event;
3) possibility of scenario modeling for forecasting risk mitigation potential;
4) risk management program, formed by current risks in order to increase the attractiveness of the mega-project for the investor

Thus, the proposed integrated risk management system allows taking into account the risks not only at the phase of development of a megaproject, but also in the process of its implementation, what ensures its implementability.

As a part of assessing the effectiveness of the risk management system, the potential for reduction of direct losses in the process of the project implementation reaches the key value of 90%, however the probability of alteration of confidence intervals for reduction potential is very high.

It is necessary to audit the management system itself in order to timely adjust and correct the RMS.

The proposed methodology for the formation of the risk management system takes into account the correlation effect, which implies the distinction of phases and points for making decisions concerning further implementation throughout the life cycle of a megaproject. At the same time, special attention should be paid to the process and methodology of auditing the risk management system itself, also the formation of confidence levels for possible values of risk tolerance of the organization itself in the process of managing the portfolio of megaprojects.

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