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COST BREAKDOWN OF RUSSIAN STATE DEFENSE ORDER PROCESSES FOR R&D WORKS

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ABSTRACT

In this article, for the first time, a methodological approach has been developed for the formation of the aggregate cost of the economic risk of the State Defense Order, which allowed us to develop a methodology for the formation of the aggregate cost of the state defense order process (SDO) taking into account risks. An approach to the segmentation of public defense processes into risky and risk-free conditions is proposed. The classification of the total cost of the state defense order process (SSprots.goz) for risky and risk-free conditions of public defense was developed. The classification of the total cost of the State Defense Order process in risky and risk-free conditions will reflect the budget spent taking into account the risky and risk-free stages of the life cycle of rocket-karmic equipment.

Disciplinary: Risk Analysis, Military Studies.

1. INTRODUCTION

Frequent disruption of R&D due to the implementation of the different nature of risks gradually leads to the need to understand the nature of the risk of the State Defense Order, their continuous accounting, assessment of their levels, and consequences.

Initially, accounting and risk assessment acquired quantitative forms, mathematical expression, and only after that they got a high-quality implementation, for example, they began to be used to select the best option from a variety of solutions to problems, study the impact of risks on certain

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aspects of the progress of research and development (R&D) (Smirnov and Gorbunov, 2013).

Proposals for the state defense order and its main indicators are developed by state customers by the regulation on state regulation of prices for products delivered under state defense order, approved by the Government of the Russian Federation.

The main indicators of the state defense order are a set of parameters for financing the corresponding expenses of state customers established by the federal law on the federal budget for the corresponding year. However, the existing classification of costs does not allow to reflect the essence of the process and the complexity of R&D. The way out of this situation is possible only if there are appropriate scientific developments made taking into account their specific conditions. Therefore, the development of theoretical, methodological, and practical foundations, individual provisions for managing economic risks, tools and methodological support for analysis (at the stages of the feasibility study of research and development), and assessing the effect and effectiveness of their consequences is an urgent, modern and timely problem.

An analysis of the theoretical foundations and practical experience of analysis, management of economic risks, methodological support for assessing their consequences in military-economic activity, including economic security, shows that the studied issues are reflected a certain extent in a small number of scientific developments, the basis of which are fundamental work on the theory and methodology of risks, assessment, analysis of risks and the effectiveness of their consequences are reflected in scientific research in microeconomics, economics on organization, financial management and several other economic and mathematical disciplines.

The possibilities of applying the risk management procedure when executing the State Defense Order are described e.g. in the works of Anischenko (2015), Vikulova (2016). The problems of choosing a solution in the uncertainty conditions of the risk consequences and the issues of assessing and modeling economic risks are reflected in the works of Sherstyuk (2018), Tsisarsky (2013).

At present, the problem of developing effective methods for managing the processes of creating rocket and space technology in the face of foreign policy risks is being increasingly taken into account. This is reflected in the work of scientific schools: 46 Central Research Institute of the Ministry of Defense of the Russian Federation, Military Academy of Logistics Army General A.V. Khruleva of the Ministry of Defense of the Russian Federation.

The key competencies of the R&D project control service are presented in the works of Lavrinov (2010), analyzed the activities as part of the process of control and monitoring of R&D projects of the state defense order. Lavrinov (2010) carried out “Risk Management in the State Defense Order System” with an extensive review of the existing methods of risk assessment and the definition of risk weights based on the probabilistic assessment of the failure of the project. Tsisarsky (2013) and Orlov and Tsisarsky (2013), Latyshenko et al. (2015), Kuzmin (2018) offer a multiplicative risk assessment model taking into account factors affecting the stages of the R&D life cycle.

2. MATERIALS AND METHODS

Various materials were used to analyze the failures of experimental design work, as well as state standards for the development of rocket and space technology:

- GOST R 56649-2015 Space rocket technology. Foreign-made electronic component base (Zubova et al.2018);

- GOST R 56648-2015 Base electronic component for rocket and space technology. Incoming inspection and additional tests. General provisions of GOST R 56648-2015 of foreign and domestic production (Lurie, 1955).

In this article, program-targeted and adaptive approaches were used, which allowed taking preventive measures to work risks and risks of supply of electronic components. The article also uses the method of expert assessments, which allows assessing the level of threat and the likelihood of risks at a particular stage of production of rocket and space technology (Charushnikov, 2015).

3. RESULTS AND DISCUSSIONS

Modern technology is changing rapidly. A review of the scientific literature shows that the authors propose to use the method of expert assessment of the severity of consequences; apply the recorded previous experience for forecasting; carry out economic assessments of possible risks; adaptation of new technology for further advanced research, development, and innovation.

But all the proposed methods aimed, as accurately as possible, to assess the uncertainty, that is, the likelihood of risk.

The proposed approach by the author is fundamentally different - to assess the possible severity of consequences with the total cost of risk, including economically, that is, in essence, assess the price of risk to overcome possible negative events. But unlike the insurance approach, risks are assessed for the most significant factors, and not for all possible and not for anyone.

For decades, there have been discussions in the scientific community about the content and form of expression of the concept of “risk”. There is still no consensus on this issue. Many scientists define the concept of “risk” as a possible loss or damage, as well as the uncertainty or likelihood of adverse events. In many cases, the nature of the risk is not determined directly, but indirectly, for example, through its consequences (loss, threat, damage, etc.) or probability, which is the degree to which a particular event can occur in specific conditions, and no risk. It has been revealed that the substantial part of the risk is disclosed unilaterally, for a specific scientific field in which the scientist conducts research. Probability acts as a representation of the subject about the possible effect of the consequences of a perfect risk (action) or refusal of risk (inaction).

Based on a review of the content and form of expression of the concept of “risk”, we express our point of view from the general scientific, philosophical positions: risk is the adoption by a subject of a possible or forced decision in the face of uncertain consequences. Risk is a possible or necessary action, a possible or necessary reaction of a subject in conditions of uncertainty. Why is it possible or necessary? The subject may be in conditions in which he can choose to take risks or not, for example, playing roulette. Here, the decision-making by the subject is possible. When the subject finds himself in a situation without alternatives - you only need to take risks, it is impossible to exclude risk. In this case, the decision is forced. And the risk situation is a condition of uncertainty, i.e. an insufficient level of awareness of a particular situation in the subject, the outcome of which becomes the known result of the consequences of risk. The probability here appears as the subject's idea of possible events

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(process failures) that entail certain consequences; thus, the subject is at risk.

Based on the author's definition of risk, we have developed a mathematical form of an indicator of the total cost of the economic risk of the State Defense Order and a method for calculating it.

In this regard, the authors propose an approach to estimating the total cost of the State Defense Order process (SSgoz), segmenting the totality of R&D processes into the cost of risk-free processes occurring under conditions of complete certainty (SSPred) and the total cost of risk processes proceeding under conditions of uncertainty (SSRneopr):

$$SSgoz = SSPopred + SSRneopr \quad (1).$$

Classification of the total cost of risks will allow identifying indicators that are influenced by certain reasons that have reduced the level of actual (forecast) risk tolerance of the executing enterprise and the risk tolerance of the state during the implementation of state defense orders, and take promptly appropriate preventive measures.

The aggregate cost of the risk processes of the State Defense Order (SSRneopr) represents the total costs of the entity associated, respectively, directly or indirectly risk, risk costs, and other expenses associated with the results of the consequences of risks:

$$SSRneopr = TsRetap + IR + Rpr \quad (2).$$

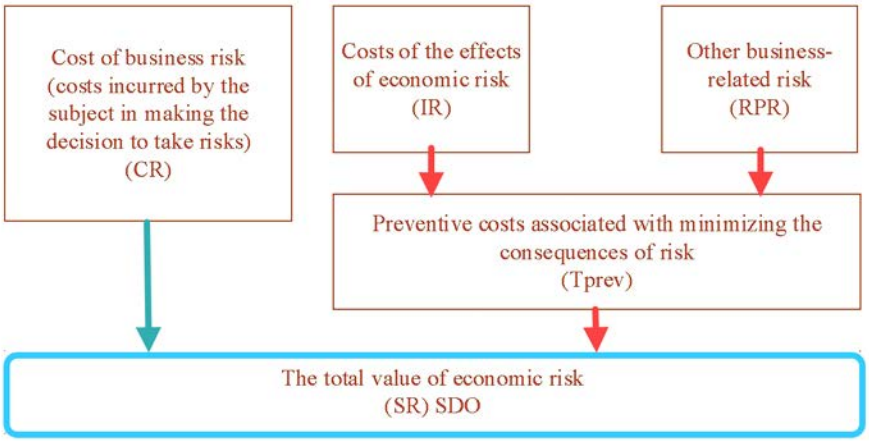

Figure 1: Structural-substantive scheme of the concept "Total cost of economic risk" during the implementation of the State Defense Order.

Then the total cost of the risk processes of the State Defense Order, taking into account the costs associated with minimizing or eliminating the consequences of economic risk (Tsprev) of the State Defense Order (SSRneopr.prev), will be (Fig. 1):

$$SSRneopr = TsRetap + IR + Rpr + Tsprev \quad (3),$$

Where:

Tsprev - costs associated with minimizing or eliminating the consequences of economic risk;

SSRneopr - the total cost of the economic risk of the State Defense Order;

TsRetap - the price of economic risk at a certain stage;

IR - costs of the consequences of economic risk;

RPR - other expenses associated with economic risk.

Based on the variety of ongoing processes under the State Defense Order: scientific, production, organizational and managerial, financial and economic, processes for the provision of services by third parties (including supplies), the authors propose a new classification of indicators (Table 1), which can reflect the level of risk for defense industry enterprises and the state in the event of failure of state defense processes, to identify and evaluate destructive trends (risk-generating factors and development processes) taking into account the R&D life cycle.

The developed classification of the total cost of risk of the State Defense Order of the Republic of Kazakhstan consists of the total cost of the production and technological risk of SRproiz.tehn, the total cost of the scientific risk of SR scientific, the total cost of the organizational and managerial risk of SRorgan.upr, and the total cost of the financial and economic risk of SR financial.econom. and the total cost of risk with external co-executors of the SR ex. Monitoring the implementation and management of government contracts, taking into account the total costs of the risks of ongoing processes, will allow us to reflect what exactly caused the decrease in the actual risk tolerance from the planned one, to minimize the possible cost of budget funds, to determine resource characteristics and to choose the appropriate total cost of preventive costs. Table 1, classification of the total cost of risks will help to identify the reasons that reduced the level of actual (forecast) risk tolerance of the executing enterprise and the state during the implementation of the state defense order and take appropriate measures.

Table 1: Classification of total risk cost

SDO processes	The total cost of risks SSRgoz SSgoz = SPopred + SSRneopr								
	The total cost of risk-free processes occurring under conditions of complete certainty (CSPopred) of the implementation of state defense orders				The total cost of risk processes occurring in the face of uncertainty (SSRneopr) implementation of SDO				
	∑ (SSPopred)	Process price	Process costs	Other process costs	∑SSR	Risk price	Costs preventive	The cost of the consequences is risk.	Other expenses of risk
Production and technological	SSPproiz.tehn	CPproiz.techn.	Iproiz.tehn.pr.	Rproiz.tehn	SSRproiz.techn.	Production Center	Tsprv	And production tech.	R production technology
Scientific	CSPnauchn	CPU scientific	Sci.	R scientific	SSR	TsPRprev. scientific	Tsprv	Ir. scientific	Rp. scientific
Organizational and management	SSPorgan.upr	CPU org.	Iorgan.	Roorgan.pr	SSRorgan.upr	TsPRprev. org.	Tsprv	Ir. org.	Rp. org.
Financial and economic	SSPfinan.ekon	CPU finance econ	Ifan.Econ.pr	R finance.	SSRfinan.ekon.	Tsprev. finance econ	Tsprv	Ir. finance econ	Rp. finance econ
Processes for the provision of services by third parties (including supplies).	CSP	CPU prov.	e.g. Yokaz company	R prov.	SSR	Tsprev. prov.	Tsprv	Ir. prov.	Rp. prov.

4. CONCLUSION

This work emphasizes the cost breakdown of state defense order processes for R&D works for the cases of risk and risk-free processes. Classification of the total cost of risks will help to identify the causes that have reduced the level of actual (forecast) risk tolerance of the executing enterprise and the state during the implementation of the state defense order, and take appropriate measures. This study is important for Russian rocket and space R&D budget management and allocations.

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5. AVAILABILITY OF DATA AND MATERIAL

Information can be made available by contacting the corresponding author.

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