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# Management of High-Tech Project Risks in the Condition of Economic Crisis

Mukhtarova, Karlygash S.<sup>1</sup>; Kozhakhmetova, Assel<sup>2</sup>

## Abstract <sup>1</sup>

In this paper considered possible risks of high-tech projects and analyzed the impact of the economical crisis to risk management of Kazakhstan projects. In the current study analyzed the significant dependence of project success on risk factors which appear during crisis. The study found that good management of these factors and using new methods and technologies can help to achieve high efficiency in risk management. The manager of the high-tech project must continuously monitor (control) the situation at each stage, responding in a timely manner to the "weak signals" of the likely risk despite all the methods and techniques used to reduce the risk. If we miss the beginning of the development of a risky event, then, despite the subsequent correct actions, the losses will be much higher than if anticipating the impending danger. This is the "golden rule" of anti-crisis management. The manager should remember that risks can cause losses not only to the organization, but also to him through showing the level of efficiency of his work.

**Keywords:** High-tech Project, Project Risk Management, Crisis Management, Kazakhstan.

## 1. Introduction

Every project inevitably carries risks of failure. Even the most experienced and qualified project manager will not be able to eliminate them. No matter how sophisticated in planning there will always be the possibility of occurrence of accidental and undesirable risky events. Many authors have investigated project risks, their consequences and risk management practices (Fabricius & Büttgen, 2015; Mentis, 2015; FathiZahraei, 2015).

They decided that risk is the likelihood of an unwanted event and all its possible consequences in the context of project management. It is impossible to foresee the development of the project in all the details. Risks are always present and increase if:

- the project is long-term;
- the project team is inexperienced, has not faced in the past with projects of this type;
- there is a large time interval between the completion of planning and the beginning of the project;
- the project is innovative and based on new technologies (2016, <http://studme.org>).

It is impossible to imagine a project which completely devoid of project risks. Another thing is that some risks from the projects which most characteristic for a certain type can be envisaged and take

measures to minimize damage in case of their occurrence. However, there is always the possibility of manifesting risks that belong to the class of emergency circumstances and are not susceptible to foresight and accountability in project planning. Fortunately, most project risks can be foreseen and provide for measures to overcome the consequences of undesirable events.

## 2. Research Method

The data shown in the following table helps for full understanding of high-tech projects risks (Chernjak, Jeriashvili, & Barikaev, 2015).

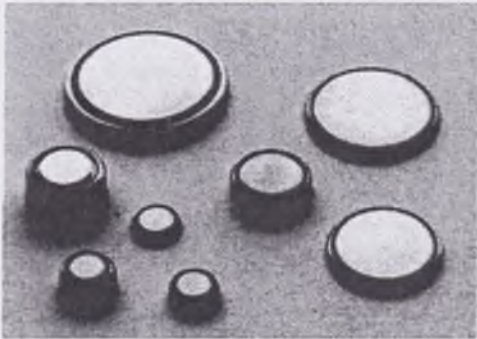
<Table 1> Risk factors in various phases of the high-tech project

Phase of project	Risk factors
Determination	The origin of the idea of the project is unclear. The project arose as a result of a spontaneous decision, not a weighted reflection. The feasibility of the project was not sufficiently studied. The experience of implementing similar projects by other organizations was not taken into account. A comparative analysis of costs and results was not carried out.
Planning	Project limitations are not defined or defined unclear. Planners do not have experience working in similar projects. The parts of the plan are missed, additional work is required for planning The executors did not take any part in the development of plans for the execution of the project. Stakeholders who are not familiar with the plan are constantly in doubt. The project management was not formed on the team principles of work and is not aimed at fulfilling the tasks of the project. Procedures for conflict resolution have not been developed
Implementation	The project uses new, unverified methods of performing works. The work descriptions are not detailed enough. The project involves new or untrained personnel. Changed the needs of the customer. Inaccurate and contradictory reports on the execution of works. Contractors do not cope with their obligations. There have been changes in the project stakeholders. Prices for materials and services have changed.
Concluding	There are no methods for assessing the planned results. The customer does not accept certain types of work of the project. Administrative bodies are delayed with the issuance of permits. Project personnel are dismissed until completion of the project
At all phases	The management of the organization is not very interested in the project. The resources allocated for the completion of the phase are not enough. The project goes on to the next phase without completing the previous one. The project requires a large number of scarce specialists.

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It is very important to take into account these risk factors and know how to manage them. For this we considered one of the Kazakhstan's high-tech projects. This project is called "Innovative lithium-ion sulfur batteries" and aimed to produce "green" batteries which will be much cheaper in comparison with existing analogues. In comparison with other existing batteries, they are smaller by volume. They can be used even in electric vehicles, even for storing energy from renewable sources and so on. The project team consisting of scientists is working on improving the technology and creating a prototype battery, the theoretical capacity and operating time of which is 10-15 times higher than that of the current analogues.



<Figure 1> Innovative lithium-ion sulfur batteries

The first batteries will be used in electronics, electric transport, renewable energy. And lithium-ion-water batteries will mainly be used in renewable energy for large-scale storage systems (Bakenov, 2016). The main focus will be on batteries for renewable energy, more specifically a storage system for solar, wind energy. The first type of battery has a very high capacity, so they will work very long - theoretically 10 times longer than existing batteries. A lithium-ion-water batteries - they are safe and eco-friendly, there are no heavy metals and aggressive solvents, and they are not flammable". The current lithium-ion batteries in phones and laptops are expensive, toxic and dangerous. You know, probably, the case with Boeing (Delays and cancellations of Boeing 787 Dreamliner flights due to battery fires - Author's note). This was due to the fact that used organic electrolytes and they were smoking. Our batteries will not lead to such consequences, because there simply is not anything to burn inside.

It is worth noting that the consequences of the economic crisis can significantly affect the fate of the project. As in any country, the economic crisis in Kazakhstan brought its own order and made appropriate adjustments. It had a negative impact on the economy. There was an increase in interbank loan rates, capital began to flow out of the country, which served as the basis for weakening the national currency. Thus, you can list the following risks of this project:

- The currency risk. There is a danger of currency losses associated with the change in the exchange rate of the USA dollar against the national currency in the conduct of foreign economic, credit and other foreign exchange operations. Since we know that at the moment the tenge is not stable against the USA dollar. This can affect the progress of the project, as the particles for the manufacture of batteries are imported in foreign currency. The growth of the USA dollar against the tenge may increase the cost of production. Because raw materials imported from other countries and bought in USA dollars.

- Commercial risk. This type of risk may be associated, in particular, with the unpredictability of changes in the purchase price of raw materials, increased costs of handling, losses and damage to raw materials, materials and equipment during storage and transportation. Elementarily new batteries may not be accepted by buyers or can't withstand competition.
- Investment risk. Everyone knows that innovative and high-tech projects are at greater risk than traditional projects. Because it is difficult to manage them Products may not fully pay off or under the influence of other causes and risks do not justify investments.
- Production risk. This risk may arise in the production of a defective product. This is likely, since the project is high-tech and specialists can make a mistake. Also, this risk can be correlated with the risk associated with the lack of highly qualified specialists in the development of new batteries.
- Economic risk. The success of the project can be affected by various economic factors, such as the level of solvency of the population, a change in the level of demand and so on. Deteriorating indicators of these factors can significantly reduce the profit from the project.
- Systemic risks. These risks can appear in the path of any project. For example, a sudden war, inflation or the economic downturn in Kazakhstan. This point directly connected with economic crisis.

### 3. Discussion

We suggest the following methods and techniques to manage risks: 1) insurance, 2) hedging; 3) diversification; 4) option; 5) futures; 6) formation of a reserve. In detail:

- Insurance is the most common and quite effective method of risk reduction. There are many types of insurance. The insurance can be subjected not only to the project itself or its individual stages, but also to the intellectual property objects included in the project.
- You can also use the hedging method - this is the distribution of risk between the project participants, the transfer of a part of the risk to co-executors, partners. Since the development of new batteries is a complex high-tech project, it is possible to share risks and responsibilities. This can be counter commercial, credit and other claims and liabilities. Almost all transactions are hedged in one way or another: they are insured by mutual obligations.
- We can use the option method after the development of lithium batteries. This is a stock exchange transaction for the sale of goods at a fixed price during a certain (contractual) period. You can find such buyers, let's say domestic partners, consumers like "Kazatomprom", "Samruk-Energo". There are such companies as "Astana Solar", "Kainar AKB" - a battery factory. We can use their capabilities to test batteries, also as well as use in their devices. Option contracts must be concluded with suppliers of raw materials, components, materials, with other organizations (for example, transport) that provide innovative production.
- Futures - a contract with a deferred period of performance under unchanged conditions. Futures contracts even more than options, reduce the risks of supply and



collateral in business. Both options and futures contracts can be subject to sale (on stock exchanges).

The formation of a reserve of resources is a traditional operation to prepare for possible negative consequences of risks. Programs are developed to manage inventory in a particular industry. For radical innovative products, this prediction of the required reserves presents special difficulties. As a rule, expert methods are used here to determine the required reserves—the size of the reserve of resources.

#### 4. Conclusion

The manager of the high-tech project must continuously monitor (control) the situation at each stage, responding in a timely manner to the "weak signals" of the likely risk despite all the methods and techniques used to reduce the risk. If we miss the beginning of the development of a risky event, then, despite the subsequent correct actions, the losses will be much higher than if anticipating the impending danger. This is the "golden rule" of anti-crisis management. The manager should remember that risks can cause losses not only to the organization, but also to him through showing the level of efficiency of his work.

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