Increasing Flexibility of Risk Management in it Projects with Isorisk Curves and Risk Mapping

G. Bubnov[1], B. Titarenko[2], S. Titov[1], and R. Titarenko[3]

[1] Moscow Technological Institute, Moscow, 119334, Russia.

[2] Moscow State Civil Engineering University, Moscow, 129337, Russia.

[3] Moscow State University for Economics, Statistics and Informatics, Moscow, 119501, Russia.

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Abstract. The article deals with problem of prioritizing IT project risks. The widely used tool of risk prioritization is so called risk matrix which sometimes called also as probability and impact matrix. This matrix includes two dimensions – probability of risks and impact of risks on a project. In many situations the more flexible approach can be applied with the help of the risk maps that are describe in the text below. The risk maps seem to be especially useful for IT projects which are characterized by the big number of various risks and very dynamic environments.

Introduction

Tools and techniques of project management are highly used in the high-tech industries of the modern economy, especially in IT industry [4]. One of the most important areas of IT project management is risk management. Within this area one of the most crucial tasks is risk prioritization. Even in simple IT projects the number of the identified risks can easily amount to as many as several hundreds. Obviously, all the identified risks have different potential impact on a project and should be treated differently. One group of risks can be considered as rather immaterial and therefore ignored. Some other risks may become the most important issues for the whole process of project management, despite of their initial seeming unimportance. The process of prioritizing allows distinguishing various risk categories in terms of their significance for the project and the most appropriate managerial approaches to dealing with them.

Currently, the widely used tool of risk prioritization is so called risk matrix which sometimes called also as probability and impact matrix (or chart). This matrix includes two dimensions – probability of risks and impact of risks on a project. According to the assessments each risk is plotted on this two-dimensional matrix [1]. Risks with insignificant probability and impact can be considered as unimportant. Risks with high probability and impact will be of high priority.

Limitations of the risk matrix

Despite the popularity of the risk matrix it has some limitations. First, the risk matrix implies that project managers have to define the risk categories (significant, moderate, unimportant and so on) before assessing and plotting the risks onto the matrix. Second, the risk matrix does not provide opportunities to map the risks and compare their probability and impact, especially if the project manager has to deal with dozens of different risks. And third, the risk matrix offers only discrete diapasons for different types of project risks. In some situations, especially when it is difficult to define in advance the possible risks categories (cells of the risk matrix) and the number of risks in each category, the risk matrix becomes not very flexible for practical use [2].

In such situations the more flexible approach can be applied with the help of the risk maps that are describe in the text below.

Risk maps and isorisk curves

The risk map is the space with two dimensions – probability and impact of risks. But in contrast to the risk matrix there are no cells that are established in advance. The impact of risks is usually

depicted as a horizontal axis. The impact of risks can be measured in terms of the negative (or positive) consequences for the project if the risk takes place. For example, these consequences can be associated with the potential additional expenses, or time delays, or deterioration of the quality. But only one measure should be selected in advance and applied to all of the project risks. Usually, the impact of the risks is measured in terms of the additional expenses occurring in the case of the risk happens. The vertical axis is used to measure the probability of risk occurrence. The standard approach here is to measure the risk probability along the scale from 0 (the risk is impossibly to happen) to 1 (the risk will definitely occur).

Each risk is plotted as a dot on this two-dimensional space according to its probability and impact estimations. In situations when it is very difficult to estimate the probability and impact of the risk with only two exact numbers the diapasons can be used. In this case the risk will be depicted not as a dot, but as a rectangle.

After all project risks are plotted on the map the risk categories can be defined and put on the map. The risk category definition should be based on the analysis of the number of the project risks in each areas of the map, the necessity to establish more detailed category system (project manager can easily introduce two, three or even more different categories), the scope and boundaries of each category. The risk categories can be put on the map with the help of the isorisk curves. The isorisk curve is a curve that consists of the dots with the same product of probability and impact. These curves comprise the potential risks with the same expected consequences for the project and can be used as the boundaries of different risk categories. Let us illustrate the application of the risk maps for a IT project.

In Table 1 the main estimations of the ten different project risks are given. These estimations include the probability of risk occurrence, the probability of the risks influence on the project, the overall probability of risks (the product of the probability of the risk occurrence and the risk influence), and risk impact on the project (defined in terms of the additional labor time needed to deal with the risk consequences).

Table 1: Data for the risk map for a typical IT project

Risk event	Probability of risk occurrence	Probability of risk influence	Overall probability of risk (2x3)	Impact of risk on project (additional man-days)
1	2	3	4	5
R1	0,7	0,9	0,63	25
R2	0,7	0,7	0,49	15
R4	0,7	0,9	0,63	5
R5	0,5	0,9	0,45	22
R7	0,3	0,7	0,21	13
R9	0,3	0,5	0,15	4
R10	0,1	0,5	0,05	25
R13	0,9	0,9	0,81	17
R16	0,9	1	0,9	22
R18	0,3	0,9	0,63	5

All risks are plotted on the risk map. The overall probability of risks is used to define position of a risk along the vertical axis and the impact of the risk on the project to define horizontal coordinates of the risks.

Assume that after the consideration of the data shown in Table 1 and the risk map the project manager decided to use only two risk categories – significant and insignificant risks. The risks with the expected additional labor time above 5 man-days should be considered as significant and the manager should elaborate the contingency plan to deal with these risks. The risks with the expected impact below 5 man-days can be considered as insignificant and due to this fact the project manager can ignore them and concentrate his efforts only on the significant risks.

The isorisk curve in this case goes through all the dots which coordinates on the risk map have the product equal 5. The coordinated of these dots are (5; 1), (10; 0,5), (20; 0,25) and so on. The

resulting risk map with the isorisk curve separating significant risks from insignificant is shown on Fig.1.
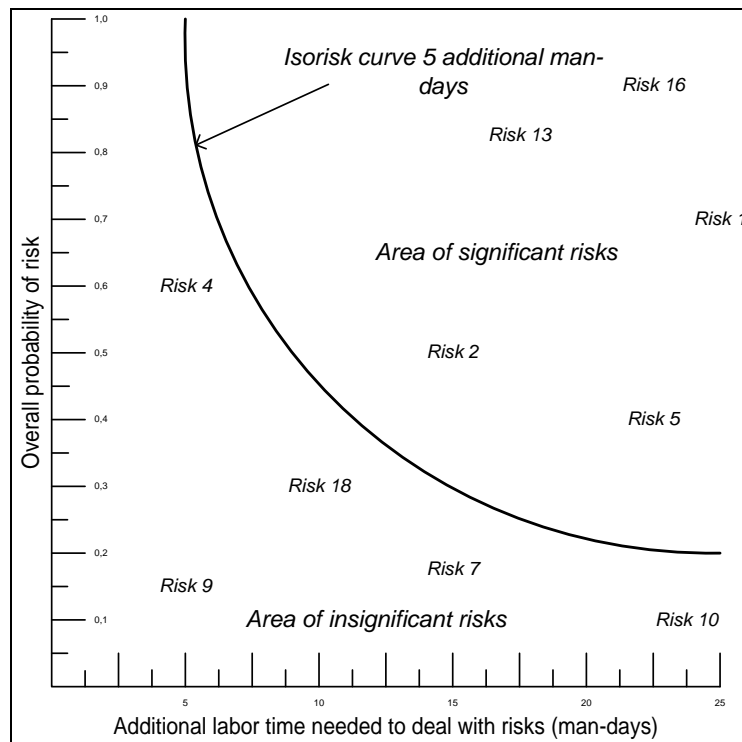

Fig. 1. Example of the risk map with two risk categories

From Fig.1 it is clear that such risks as R4, R7, R9, R10 and R18 are in the category of the insignificant risks. Risks R1, R2, R5, R13 and R16. But actually, all these conclusions could be made with the help of the risk matrix. The advantages of the risk map are connected with its flexibility. For example, if the project manager has significant reasons to change the boundaries between different risk categories, he or she can easily do it without the necessity to re-map the risks. The project manager can easily fine-tune the risk category boundary. For instance, the threshold between categories can be not 5 man-days, but 6 or 4 man-day. For changing the threshold the project manager can just change the position of the isorisk curve and see the result. In the case of the risk matrix the project manager has to change the whole risk matrix and introduce additional columns and rows into it.

Besides, it is not difficult to establish additional risk categories. If the project manager finds the necessity to distinguish all risks into four categories, he should define the boundaries between them. For instance, by depicting the isorisk curves associated with the thresholds of 5, 10 and 15 additional man-days he can identify insignificant, controllable, dangerous and extreme risks as it is shown in Fig.2. If it is needed, the categories with different scope (different areas) can be introduced, so that the zone of controllable risks would be larger than any other zones.
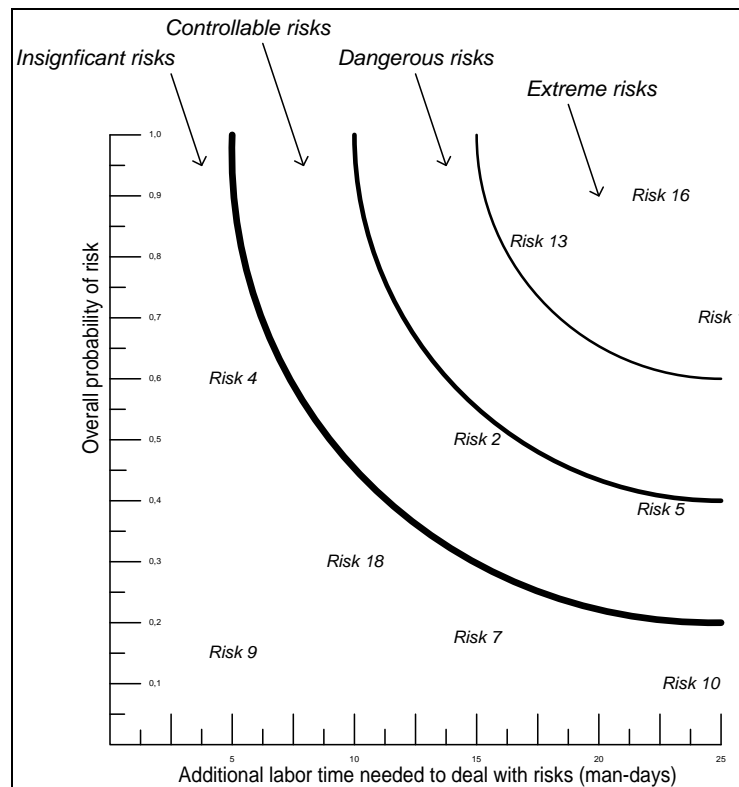
Fig. 2. Example of the risk map with four risk categories

In order to introduce new and different terms of the scope risk categories in the risk matrix the whole matrix should be changed which can be very time-consuming task, especially in the case with big number of different project risks which is usually the case for IT projects.

Summary

To conclude, the risk maps can be considered as more flexible and more robust tools for analysis and prioritization of project risks [3, 5]. The risk maps can be used instead of or in addition to the more traditional risk matrix. The risk maps seem to be especially useful for IT projects which are characterized by the big number of various risks and very dynamic environments.

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