

# Project and Risk Management in the Context of IT Projects

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**Abstract:** Currently, project management is penetrating to all fields including information technologies (IT). Its implementation as well as impact varies correspondingly to many factors. These include the experience and expertise of the managers as well as companies, type of business, type of project domain, extent of the project (from the perspective of financial, human, technical and other resources) and many more. Similar importance is recognizable in the field of risk management. It represents critical topic relevant for all domains no matter the sector, type and size of business, etc. This area is discussed intensively. Nevertheless, it is still omitted from various perspectives. The insufficient attention to the interconnection of two areas – project and risk management – in various types of projects still occurs. This could result in the serious impact on the project itself as well as on all stakeholders.

**Keywords:** organizational processes; project management; risk management

**JEL Classification:** D23; M10; M15

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## 1. Introduction

Realization of every project is a unique change within the organization which creates defined products and brings various forms of benefits. Each project also inevitably carries certain amount of risks and these can be (at least to large extent if the project management is done properly) identified and their probability of occurrence and/or impact can be reduced. Therefore, the efficient risk management strategy should be always included in the project management which is also pre-requirement described in basically every mainstream project management methodology currently.

This paper is focused on the issues of risk definition and types of risks in the context of project management, with more attention towards the projects related to IT field. The authors address (or rather point out) some interesting aspects of risk management which occurred during the literature review, related namely to topics such as discussion about prevention vs response, process design and product planning, and design flexibility within the project when delivering the products.

The paper is structured as follows. The second section deals with the topic of risk and risk management in more general perspective. The third section describes the process of risk identification and possible strategies how to approach it. The fourth section discusses some interesting open issues arising when dealing with risks in broader context, which are often omitted from the methodological point of view.

## 2. Risk Management in Projects

There are multiple sources of risks that can have impact on the project. The purpose of risk management strategy is to identify them, mitigate the impact or reduce the probability of risk event occurrence. The PRojects IN Controlled Environments (PRINCE2) methodology proposes several ways how to approach the risks, as indicated in Figure 1.

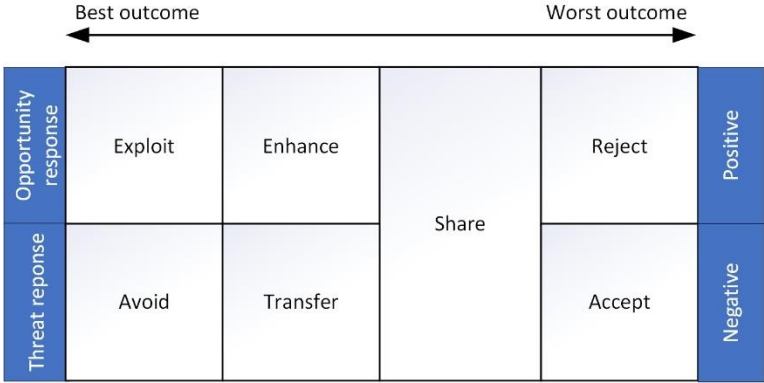


Figure 1. Responses to risks. Own elaboration based on PRINCE2 methodology (Bennett & AXELOS Limited, 2017)

These responses (see Figure 1) are reflected later in the strategic approaches focused on how to deal with the risks, as they are described by Bannerman (2008). These are discussed in more detail in section 3. When considering the importance of particular risk, a matrix representing possible impact and probability (Figure 2) is often used. Bannerman (2008) also provides more formal specification of such matrix as: " $R = P \times I$  where  $R$  is the risk exposure attributable to a particular risk factor,  $P$  is the probability the undesirable event will be realized and  $I$  is the impact or magnitude of the loss if the event occurs."

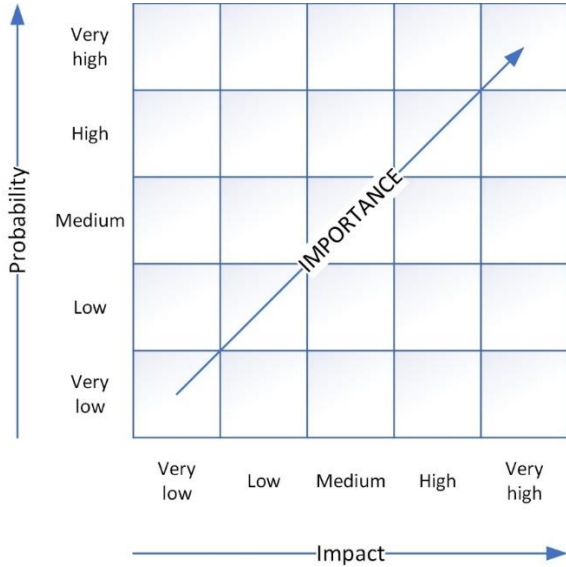


Figure 2. Matrix representing probability and impact. Own elaboration based on PRINCE2 methodology (Bennett & AXELOS Limited, 2017)

The risk exposure in case of a risk event is usually measured in money or time, especially in commercial projects. In this context, it is important to accentuate that risks should be identified before the risk event occurs. It is the matter of proper risk management strategy to identify as many risks as possible, and the process of risk identification lasts during the whole realization of the project.

In the past, risk management was significantly underestimated. For a long time, risk management was done ad-hoc (Fairley, 1990), without systematic thinking and analysis (Chapman, 1997). The authors intentionally use older resources at this point to stress the longevity of the systematic risk management problem. Even decade later, Kwak (2004) states: *“In many organizations, the tendency to ‘shoot the messenger’ often discourages people from bringing imminent problems to the attention of management. This attitude is the result of a misunderstanding of risk management... most software developers and project managers perceive risk management processes and activities as extra work and expense. Risk management processes are the first thing to be removed from the project activities when the project schedule slips.”* Although Kwak’s study is focused primarily on the software development, it is to be expected that situation was similar in other types of projects as well.

Modern approach is more systematic and risk management is in most cases even integral part of the project documentation and monitoring in general. Especially when funded by public sources – most project calls require risk analysis to be a part of project proposal and risks are considered since the beginning. Monitoring reports also often include section for description of risk-related information. This development may be perceived as thoroughly positive.

### 3. Risk Identification

Risk itself is defined as the ‘the exposure to loss/gain, or the probability of occurrence of loss/gain multiplied by its respective magnitude’ (Jaafari, 2001). Within the project management, various situations might happen. These endanger the fulfilment of the project objectives. Usually, there is the difference between the plans and the reality. During the course of action, some projects might struggle with time delays, human resources, technical issues, particular unexpected situations, etc. These can be either internal or external. Some specific risks are exemplified in the following list (Jaafari, 2001):

- promotion,
- market related to the sales and price setting,
- political connected with many aspects such as legislation, taxes, political regime, geopolitical situation, etc.,
- technical including not only technical standards, but also cybersecurity, etc.,
- financing and cost estimate,
- environmental considering the environmental impact of the project,
- organisational addressing the processes and their flow, etc.

No matter the type of risk, all require significant attention and proper treatment.

If the problem of risk identification arises, it is worth notice that some of them are (i) independent on the project domain of expertise, others are on the contrary (ii) derived specifically from the context of the area of expertise, social environment, organizational environment, etc., and third category is derived from (iii) personal context. While the first category is usually related to occurrences of more general issues which any project may face, such as personal changes or data/document loss, other risks are usually quite specific for the project domain. The third category is related to various personality features, experience, and soft skills in general of the people involved in the project, and especially the project manager him/herself. Factors in the third category, potentially severely influencing the way how the risks are approached, are often completely omitted from the methodologies of the project management such as PRINCE2 (Bennett & AXELOS Limited, 2017). Nevertheless, others such as International Project Management Association (IPMA) standard, are taking these aspects into consideration.

Every project and every process consider the critical assets and the connected threats. There are more attributes and aspects to be followed and continually monitored. These include the so-called CIA Triad represented by the Confidentiality, Integrity, and Availability. Moreover, there are issues connected with the value of the assets and the extent of General Data Protection Regulation (GDPR) relevant for the particular asset. The project inputs like data, processes, technologies, humans, etc. are not usually assessed from the perspective of the abovementioned attributes.

Usually, within the project management context, it is important to consider the threats/risks as well as their importance. Any project and domain area should both consider and reflect the risks. There are various approaches addressing the risk identification as well as its treatment during the project. The appropriateness as well as relevance of the theoretical, methodological, practical, and organizational knowledge and skills are very important for the successful and efficient project management. Furthermore, these risks can include the cybersecurity ones which only rise in importance with pervasive nature of digital technologies and data storing technologies.

No matter the methodology of the project management (waterfall, agile, lean, Scrum, Kanban, etc.) or project management standards (PRINCE2, IPMA, Project Management Institute (PMI) - Project Management Book of Knowledge (PMBok), etc.), the importance and impact of risks pertains. The level of the risk might be added too. Simple table including these details might be prepared. Nevertheless, there are more structured ways how to manage and illustrate these details. For example, within the PRINCE2 methodology, the matrix – including the probability and impact of the risk – is employed (for the simplified version see Figure 2). The risk should be analyzed as well as assessed. Then, the calculations follow. From the project management perspective, there is the need to analyze the risks both quantitatively and qualitatively. Without the respect to the type of risk analysis, the risks should be tackled properly. Therefore, the risk management plan is recommendable. Accordingly, the risks should be omitted/mitigated through the employment of the appropriate measures.

After the risk identification and assessment, the response strategy should be defined. The overall approach connected with the systematic risk management remains more or less

similar to the approaches implemented in the past (Fairley, 1989). The past as well as current authors and methodologies agree on the phases of the risk management process including these steps (Fairley, 1989):

1. Risk identification
2. Impact analysis
3. Contingency planning
4. Risk monitoring
5. Recovery management
6. Crisis management

Again, we used the older reference to (Fairley, 1990) here to show that basics are basically the same. Modern approaches such as PRINCE2 (Bennett & AXELOS Limited, 2017) or PMBoK (Project Management Institute, 2021).

The risk identification which should be project specific. Then, the impact analysis follows. This phase is discussed further above (within this section). There are more potential methodologies of how to assess and consider the possible effects of the identified risks, see practical examples in (Rodney et al., 2015; Rodrigues-da-Silva & Crispim, 2014; Shrivastava & Rathod, 2017). Afterwards, the contingency planning meaning the planning of the response to the risk planning represents the next step followed by the risk monitoring. As described by Rodney (2015), this can be extended to agile approaches as well. The monitoring identifies the risk factors and enables the consequent work on the contingency plan which represents the basis for the recovery management. The final step is the crisis management including the emergency response to the identified risk. These steps might be slightly modified. However, the basic principles remain the same. All these processes should result in the acceptable solution with as small impact as possible.

Bannerman (2008) describes particular risk response strategies differing in the approach to the circumstances, costs, threat or required resources for its solution. He identifies three basic objectives: limitation of the risk impact, reduction or elimination of the threat occurrence likelihood or the combination of the aforementioned.

Bannerman (2008) concludes four core strategies (freely adopted from Figure 1):

1. Avoidance - this strategy focuses on the prevention of the negative effects. It tries to eliminate the circumstances under which the risk occurs. It can also result in the redesign of the project in pursuit to omit the potential arise of the unwanted situation.

2. Transference - this strategy aims to pass the responsibility for a risk to the third party which should address it appropriately. This party should be more experienced in risk management. Nevertheless, the threat for the project is not considered properly and it is under control of the third party.

3. Mitigation - this action reduces the likelihood of the risk occurrence and consequently its impact even before it is revealed or identified.

4. Acceptance - this strategy concludes two potential approaches, passive or active one. The passive acceptance of the arisen situation represents the first option. This is suitable in case of small external risk impossible to be controlled. The contingency plans are usually

available within this strategy. These should include the calculations derived from the matrix above together with the availability of the extra funds or reserves and the guidance what to do in any case.

The appropriateness of these strategies is nevertheless dependent on the abovementioned aspects such as personal traits and experience of the involved people, the organizational processes including their interdependencies and structure, the current context, the availability of the resources, etc. Therefore, all mentioned approaches should be confronted with the current conditions and amended during the course of action.

The overall aim of the paper is to introduce the risks within the project management and the strategies how to manage them. All projects relating to all domains and all sectors face the threats of the risks which might endanger the fulfillment of the objectives. This can result in the particular delays together with the lack of the resources needed for the risk elimination or mitigation. The discussed strategies are limited variety too and therefore, it is critical to consider reflect many factors which are project specific.

#### 4. Open Issues

The modern era propagates internationalization of the projects and their teams. While the project consortiums are more difficult to be managed in general, increasing in difficulty with rising number of participating entities, cultural issues create specific subset of risks themselves (Liu et al., 2015). To highlight this problem, interesting study made by Shimizu (2014) describes differences in how risk events are being handled by project managers. The study compares situation within Korean and Japanese companies. It concludes that while Japanese approach is more focused on prevention, Korean is more focused on response to risks. The latter seems to be to some extent contradictory to various methodologies, such as perhaps the most frequently used PRINCE2. This expects risks to be identified beforehand and measures to be taken before they can occur. Only consequently, when such event happens, the impact is minimized but by previously prepared actions described in project management strategy. On the other hand, if the project is managed in more agile manner, many risks are more difficult to be identified since the work progress is more vague and product development is incremental. In any case, intensive project planning may be among the most important success factors in projects (Vujović et al., 2020).

The project planning is also closely related to the to the problem of process design and product planning. In order to handle projects of larger scale (and financial magnitude), certain level of organization maturity must be reached. This is even more important when distributed projects are considered (Shrivastava & Rathod, 2017). Process design is closely related to the security issues because process-oriented analysis (with use of tools such as BPMN (Business Process Model and Notation) shows clearly how the work with data objects and artefacts is done and who is the owner of such processes. Internal processes should be prepared for handling the risks. Product planning should – on the other hand - allow certain level of flexibility in reasonable extent. Decision making can be eased by utilization of decision support tools (Fang & Marle, 2012) or use of knowledge-based approaches (Alhawari et al., 2012).

As mentioned above, the certain level of flexibility in design is important to manage risks efficiently. Possibly surprisingly, even in quite rigorous and strict domain such as major infrastructural projects, the flexibility has its place. Study made by Gil (2011) describes case of London Heathrow airport's expansion. Strong co-operation between the developer and the customer plays important role there and promotes investments in design flexibility. Gil (2011) states that the risk management practices prevail when co-operation breaks down.

## 5. Conclusions

The basic management rules regarding handling project risks are built upon decades old principles. However, with growing internationalization of projects, IT-related threats, and more consideration to flexibility of the project realization, as well as other modern-day phenomena, various interesting topics arise as well, which were not originally addressed in depth. It is obvious that efficient risk management begins as soon as the project is being prepared, namely with activities such as process design and product planning. Also, the risk management strategy is a living document, meaning it is updated continuously as the project progress forward.

As has been discussed, mainly in section 4, even more rigorous (waterfall) project methodologies might allow certain level of design flexibility when handling dynamic world development influencing the project. Such flexibility might prove to be very useful for risk management effort. This also gives some traction to the trend of making standard project management methodologies slightly more "agile". Another trend can be seen in more attention being given to personal (mental) attitude towards handling the risks. It is to be expected that there is a logical trade-off between the prevention of the risk and response to it. In the past, risk management was one of the areas which was neglected among the first things when project was delayed or in problems. It may be seen as positive that it is being given more weight nowadays. Hopefully, the future work will be more focused on risk management issues within both project management methodologies and daily practice itself.

Acknowledgments: The research has been partially supported by the Faculty of Informatics and Management UHK specific research project 2107 *Integration of Departmental Research Activities and Students' Research Activities Support III*. The authors also express their gratitude to Andrea Zvackova, a doctoral student, for her help in preparing the manuscript.

Conflict of interest: none.

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