

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Management



Diploma Thesis

**Analysis of risk management practices in day-to-day
work of project managers**

Bc. Martin Winkler

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DIPLOMA THESIS ASSIGNMENT

Bc. Martin Winkler

Economics and Management
Economics and Management

Thesis title

Analysis of risk management practices in day-to-day work of project managers

Objectives of thesis

This diploma thesis will provide a detailed analysis of the risk management practice of a specific organisation operating in the information technology sector.

The analysis will be based on an evaluation of the risk management guidelines, its tools applied in day-to-day work of project managers and empirical data gathered from project managers.

The result will provide a structured evaluation of the organisation's practices, as well as proposals for future improvements.

Methodology

Body of this diploma consists of two main parts:

The theoretical part is based on the review of current literature and will focus on the area of project risk management and its methods and tools used in the contemporary organisational practice.

The Practical Part will be based on an analysis of the organisation's risk management guidelines and a survey of project managers, who are risk management practitioners in the organization.

Finally, the thesis will conclude the analysis and propose how to improve the current risk management practices applied in the organisation's project management.

The proposed extent of the thesis

Approx 60 – 70 pages

Keywords

risk management, risk, project management, strategic management, project manager

Recommended information sources

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The Diploma Thesis Supervisor

Ing. Richard Selby, Ph.D.

Supervising department

Department of Management

Electronic approval: 27. 2. 2020

prof. Ing. Ivana Tichá, Ph.D.

Head of department

Electronic approval: 28. 2. 2020

Ing. Martin Pelikán, Ph.D.

Dean

Prague on 05. 04. 2020

Declaration

I declare that I have worked on my diploma thesis titled "Analysis of risk management practices in day-to-day work of project managers" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on April 6, 2020

Bc. Martin Winkler

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Analysis of risk management practices in day-to-day work of project managers

Abstract

This diploma thesis is focused on the analysis of risk management practices in the day-to-day work of project managers in the organisation operating in the information technology industry. To provide the analysis of the risk management processes, a literature review of contemporary best practices was conducted to set up a base for the comparison with the organisation's practices. Completed research showed that project managers in the organisation have access to the internal project management methodology, which includes activities related to risk management, covering even more areas than recommended by contemporary academic and professional literature. However, its endeavour to achieve maximal universality in the application is based at the expense of its specificity. An important input for the conclusion of the analysis was empirical data gathered from the questionnaire survey of project managers from the organisation of focus, including self-evaluation of project managers in the field of risk management. Despite project managers' satisfaction with the adopted methodology, the rating of its current implementation in the organization was rated rather negatively. Thus, the organisation was given with a set of feasible recommendations on how to improve the current process. One of the recommendations proposed to the organisation was the inclusion of quantitative risks analysis into the day-to-day work of project managers, as it is considered the most reliable method for assessing overall risk exposure.

Keywords: risk management, project management, project manager, PMBOK, PRINCE2, risk, opportunity, uncertainty, IT company, risk log

Analýza praktik v oblasti řízení rizik používaných projektovými manažery

Abstrakt

Tato diplomová práce je zaměřena na analýzu praktik pro řízení rizik, které jsou využívány projektovými manažery během jejich každodenní práce v organizaci, která figuruje v sektoru informačních technologií. Pro účely vytvoření analýzy procesů pro řízení rizik byla zpracována rešerše současné literatury obsahující nejlepší praxi v oboru, která položila základ pro následné srovnání s metodami implementovanými ve vybrané organizaci. Srovnání přineslo zjištění, že projektoví manažeři mají přístup k interní metodologii projektového řízení, obsahující ještě podrobnější metodiku řízení rizik, než je ta navržená odbornou literaturou. Avšak její snaha o dosažení maximální univerzálnosti je vytvořena na úkor její specifčnosti v případě obsažených metod. Důležitým vstupem pro podpoření dané analýzy byla empirická data získaná dotazníkovým řešením mezi projektovými manažery společnosti, včetně přiloženého dotazníku pro sebehodnocení znalostí v oblasti řízení rizik. Přesto, že jsou projektoví manažeři spokojeni se současným stavem metodiky, hodnocení současného stavu v rámci její implementace bylo spíše negativní. Z toho důvodu byla navržena sada uskutečnitelných doporučení pro organizaci, jenž mají za cíl zkvalitnit současný proces řízení rizik. Jedním z doporučení navržených organizaci bylo zahrnutí metod pro kvantitativní analýzu rizik, jenž přináší nejspolehlivější nástroj pro zhodnocení celkového rizika projektu.

Klíčová slova: řízení rizik, projektové řízení, projektový manažer, PMBOK, PRINCE2, riziko, příležitost, nejistota, IT společnost, registr rizik

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List of abbreviations

APM	Association for Project Management
BU	Business Unit
EV	Earned Value
KPI	Key Performance Indicator
NPS	Net Promoter Score
PESTLE	Political, Economic, Social, Legal, Ecological
PM	Project Manager
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
RBS	Risk Breakdown Structure
RMP	Risk Management Plan
RMS	Risk Management Summary
SLA	Service Level Agreement
SWOT	Strengths, Weaknesses, Opportunities, Threats
TPM	Technical Performance Measurement
UPM	Unified Project Management
WBS	Work Breakdown Structure

1 Introduction

Risk management frameworks and guidelines are in the contemporary corporate environment, often considered as irritating processes. They are only bringing additional paperwork to management, project team members, and especially to project managers, who are in charge of the implementation of these guidelines. However, such guidelines provide all organisational stakeholders with information, how to act if they experience some risk situation, which risk mediator to reach out, or how to mitigate these risks themselves. A proper set of actions is always needed to assure smooth, time and cost-effective project success.

Negligence of risk management practices can have irreversible impact on the project and even on the organisation as whole. That could be caused by the situation where the project manager ignored potentially risky situation, did not plan or executed any response measures and then the risk became a reality which had negative impact on the project delivery with consequential additional costs.

This diploma thesis aims to provide the reader with a comprehensive analysis of the chosen organisation's risk management practices. The organisation analysed in this thesis is project-based, operating in the sector of information technology industry. The focus will be mainly paid to the work of project teams in their day-to-day work and their compliance with the internal project management methodology, which is featuring risk management practices.

2 Objectives and Methodology

2.1 Objectives

The objective of this diploma thesis aims to prepare a comprehensive document mapping risk management processes in the organisation of choice. The main focus will be paid to the project management risk, as the analysed organisation could be identified as a “project-oriented organisation” providing its services to clients on the project basis. The paper will, from the risk management point of view, cover the whole project life cycle and map project managers’ ability to follow implemented guidelines. In order to conduct the analysis, research of the contemporary risk management literature will be provided. As the result, set of industry best practices will be identified as a benchmark for the comparison with the processes implemented in the organisation. Supporting data for the analysis will be provided with prepared questionnaire survey of project managers which will present a unique empirical data. The result will provide a structured evaluation of the organisation's practices towards industry standards, as well as proposals for future improvements.

Following hypotheses were formulated in the initial stage of writing this paper:

H1: Project risk management guidelines are developed in the organisation. However, their implementation is not being executed properly.

H2: Assessment of project-related risks is being based on defined standards, but is quantification is missing.

H3: Risk management capabilities of project managers are interrelated with their experience in project management.

2.2 Methodology

Risk management practices applied in project management are, in most cases, included in project management methodology. Project management practitioners have presented in the last 30 years a variety of different approaches to managing projects. We can talk about Agile Project Management, PRINCE2 methodology, Project Management Body of Knowledge (PMBOK) or Waterfall Project Management methodology. It could be argued that the project methodologies mentioned above are sharing some similarities. At the same time, they are different. In order to assure that the comparison of methodologies in the practical part with the ones mentioned in the literature research, the PMBOK Guide was chosen as the methodology which will be paid the most significant focus.

The organisation of focus in the practical part of this diploma thesis is a small business unit of approx. 100 employees, belonging to the worldwide spread group with the presence in 40 countries and employing more than 200 thousand professionals. Thus, project management and risk management methodologies have been already implemented, in order to assure methodized approach to day-to-day work of project teams and teams towards project risk management, striving to endure probability of successful project delivery. All the company processes related to project management are outlined in the internal company project management documentation called the Unified Project Management Method (UPM), stemming from the methodology proposed by the Project Management Institute's Project Management Body of Knowledge (PMBOK), and CMMI® Development proposed by CMMI Institute. Already implemented processes within the organisation of choice will be compared to the theoretical frameworks described in the theoretical part of the diploma thesis and recommendations on how to enhance them will be provided.

Concerning the understanding of the overall attitude of stakeholders of the organisation towards risk management methods, and tools applied during their day-to-day project work, project managers who are in charge of the implementation of risk management tools were surveyed. In order to comprehend the risk management practitioners, set of legit questionnaires were prepared to gather additional, unique empirical data about the nature of the organisation and its approach towards risk management. While creating the

questionnaire, the focus was paid on the usage of close-ended questions, to survey project managers about their risk management related habits. In addition, self-evaluation form of project risk management skills was designed. The form was split into 10 questions, each valued on the scale between 0 to 10. Gathered set of the empirical data set was then used to complement the critical analysis of the risk management process. Moreover, the data was used to recommend the best practices which could lead to the overall process improvement.

3 Literature Review

3.1 Project management

Projects are, by nature, usually a long term and complex organisms, which are also evolving in time. Every project is unique, takes place over an extended period and requires various monetary and non-monetary resources. These are, for example, people, finance, facilities, materials and intellectual property. In most cases, projects have already defined vision, objectives and goals (Cooper et al., 2005).

Project management is a discipline, which could be, according to Munns and Bjeirmi (1996) defined as: “the process of controlling the achievement of the project objectives”. This concept is further developed by Lock (2016), who argues that the purpose of project management is to assure that the particular project will be completed successfully. The completion of the project is achieved by assuring right planning, organising and controlling all activities, despite all the difficulties and risks the project can face. A good starting point for a project is a definition of the business case, which outlines the project itself, presents all forecasts of the associated investments and expected benefits. Approval of the business case is crucial before assigning monetary, or any other type of resources used to fund and run the project. As even the planning part of the project could cost a considerable amount of money and this figure grows proportionally with the size of the project.

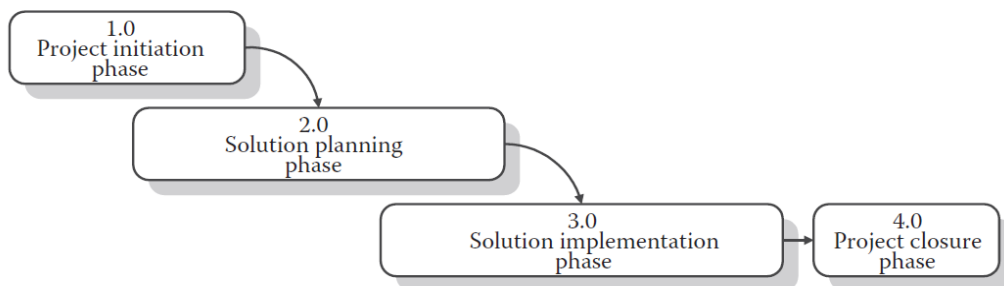
Especially in IT projects, there have been rational and strategic decisions made to make the project happen and deliver it in good quality, on time and also within the assigned budget. These criteria should be sustained, and the project manager in charge should control their assurance. However, these criteria are more client-oriented, but the delivering organisation also has to supervise and assure that the particular project delivers the expected return on investment. To make sure that the project will bear the expected and wanted fruit, projects have to be aligned to the defined organisational goals. Some of these goals could be, for example, the alignment to the organisation’s objectives that fit into the defined budget. Also, aligning all the necessary resources which will ensure the maximum returned value to the organisation. (Morales and Anderson, 2013)

For providing a standard and repeatable process to guide project performance, a standardised methodology has to be implemented within a specific organisation. There are various project management standards available “on the market”. The organisations can differentiate between technical (technical methodology assures the right technical aspects of work are implemented) and project management methodologies. For instance, it can be a Guide to the Project Management Body of Knowledge (also known under abbreviation PMBOK) developed by the Project Management Institute (PMI). The project management methodology is crucial for the project management environment, as it is sensible to the needs of the project team and other associated stakeholders. It can guide them via crucial activities of the project management within the whole project life cycle. As the result, each project manager is not required to create new frameworks and trainings for each project team and its members. Thus, possibility of cross-functionality of project teams and their collaboration is embraced (Hill, 2014).

Hill (2014) divides the project life cycle into four parts:

- Project initiation,
- Solution planning,
- Solution implementation, and
- Project closure.

Figure 1: Four-phased generic project life cycle



Source: Hill (2014)

Project lifecycle classification, according to PMBOK Guide (PMI, 2017), created by Project Management Institute (PMI), is almost identical to the one proposed by Hill (2014). However, its taxonomy varies a little. The project life cycle is split between four parts:

- Starting the project
- Organizing a preparing
- Carrying out the work
- Ending the project

In order to better understand the nature of each project, PMBOK Guide further splits project processes (see the diagram below) into five process groups:

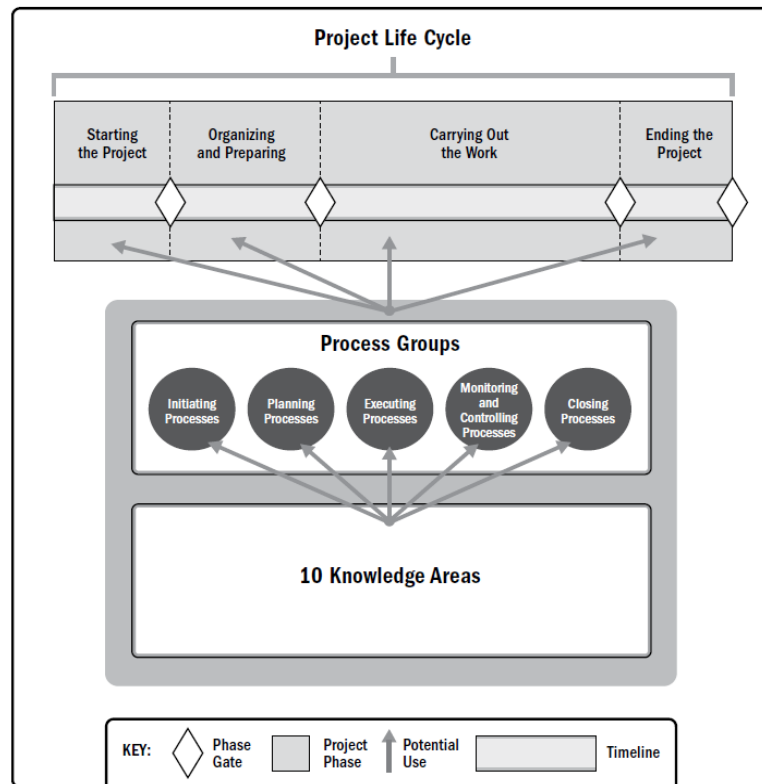
- Initiating processes
- Planning processes
- Executing processes
- Monitoring and controlling processes
- Closing processes.

PMBOK Guide is, in the contemporary business environment, being used by many organisations of all sizes. Standardisation of project management processes is a cost-effective way for organisations on how to adapt frameworks. They are helping them with overall project management and situations they experience in daily organisational life. The decision-maker in charge of the go/no-go decision has to possess the information about the project's feasibility. With feasibility, we mean describing the project's probability to be implemented and operated efficiently, with a good value for money and satisfying all stakeholders involved.

Project's probability of being feasibly is increasing after the project team successfully deals with all identified problems and risks (Allport, 2011). Majority of projects are facing various factors of uncertainty, which could be used as an opportunity. However, they put the project to possible downside risk as well. Thus, organisations and project teams

have to apply risk-based decision making in order to execute all significant decisions. Starting with all possible risk identification and continuing with frameworks of their management. This discipline is defined as risk management.

Figure 2: Interrelationship of PMBOK Guide Key Components in Projects



Source: PMI (2017)

3.1.1 Managing IT projects “traditionally” or agile?

Organisations have been transforming from a hierarchical model to project management-based organisations, in order to be more collaborative and flexible in case of adjusting to newly emerging challenges and opportunities. However, every project has to be managed according to preferred methodologies of the particular organisation, nature of the projects and skillset of assigned project managers.

3.1.1.1 Traditional project management methodology

Hass (2007) describes “traditional” project management methodology as a linear approach to managing projects, where the project management team wants to have everything done at one time. This approach involves much preceding detailed planning. Traditional methodologies (such as PMBOK) are also considered more burdensome on processes and rely on waterfall type development life cycle. The waterfall is defined as: “the sequential execution of projects with clearly defined deliverables for each stage” (Thamhain, 2014). Thus, a high level of auditing has to be involved in project management, in order to ensure that desired results have been delivered and that the project can proceed to its next phase.

These methods are thus more predictable, as their deterministic approach breaks down the whole project on specific tasks, categorised for each phase. Due to this structure, more stability in case of requirements gathering, process analysis and design is provided. Such rigid structure assures better project controlling and compliance with chosen methodology (Fitsilis, 2008). Hence, traditional project management processes are defined and described in an exhaustive way. PMBOK is an excellent example of “traditional methodology”. Where outlining the whole methodology by the presentation of 44 different project processes, each of them described in the form of input (i.e. documents, plans, design, other data), outputs (represented by documents or products) and a set of techniques. Techniques can be described as a set of mechanisms applied to inputs, in order to produce desired outputs. Despite its lack of specificity, such methodology provides practitioners with enough guidance to apply such processes with an ability to modify them according to the specific need of the organisation (Fitsilis, 2008).

3.1.1.2 Agile project management models

Thamhain (2014, p. 15) defines agile management as: “the execution of projects in a highly flexible and interactive manner, in opposite to the waterfall method”. That provides the opportunity to put agile management models in the direct opposition of traditional project management models. Thus, agile way of project management provides superior flexibility

and collaboration, where just a limited amount of planning is done before the project kick-off (Hass, 2007). All the planning is, however, done after finishing each iterative planning and development cycle. Agile project management processes are not as explicit as traditional project management processes. Thus, they are more “empirical” in nature and require more project managers’ involvement and professional experience (Fitsilis, 2008).

Fernandez and Fernandez (2008) found out that projects governed according to agile methodologies are able to define complete project requirements. The particular project processes are done in repeating iterations and hence reducing and partly eliminating uncertainty. However, agile methodology is an interactive and flexible system which requires cooperation. Flexible execution of each iteration is the key feature of this methodology, requiring project team to work as one entity and as a complex and adaptive system (Thamhain, 2014). Especially in IT projects, incremental work can bear better results in case of solution delivery, as partial results are always consulted with the client. (Fernandez and Fernandez, 2008)

3.1.2 Project failure

Not every conducted project brings desired or expected outcomes. Some of them might even fail and have adverse effects on the organisation as a whole. According to Dalcher, featured in the publication of Ruhe and Wohlin (2014, p. 28), project failure is usually described as “the inability to meet the time, cost, and performance constraints”. The extent of project failure is mainly applied in the area of software project management. Where we could find a variety of cases where project failed because of late deliveries, exceeding allocated budget, mediocre functionality of the delivered solution or questionable quality. In which, the worst-case scenario results in project cancellation, changes of the project scope or significant change requests. This phenomenon is perceivable, especially in high volume IT projects which are characterised by a broad scope, many stakeholder’s involvements and with overall application size. Thus, projects’ success can be measured by meeting all budget, schedule and functionality criteria. It is one of the most important roles of project managers to guarantee that these criteria are correctly balanced. Moreover, the project delivery finds correct equilibrium between quality, time of the delivery and costs. (Ruhe and Wohlin, 2014)

UK Cabinet Office report on common causes of project failure released in January 2012 (cited in McLaughlin et al., 2016). They identified a broader scope of reasons why projects fail or are problematic to deliver. The following reasons might cause potential failure:

- Lack of understanding of what matters in the planning and execution of a project
- Failure to understand the underlying risks and root causes of risks
- Little appreciation of vested interests
- Little appreciation of the project as a system
- Difficulty in recognising these common issues in the current project
- Lack of stakeholder engagement and understanding
- Lack of understanding about the project.

Another potential obstacle to the successful project delivery are risks which accompany the particular project. According to de Bakker et al. (2010), there is evidence that risk factors have a negative impact on the overall project success. Authors further argue that simply following risk management practices cannot ensure project success but can contribute to its improvement. This is achieved by the involvement of its stakeholders, especially management members. That is supported by the opinion proposed by McLaughlin et al. (2016), about the involvement of micro-management, assuring that the project is appropriately aligned with a clarity of purpose and proper governance. Thus, the absence of insensitivity towards potential risk situations in a project can increase the chance that the project will be delivered in compliance with prearranged time, cost and performance conditions. In order to assure, or the least increase, the probability of the project's success, proper risk management has to be applied in every project. The non-existence of risk management practices in project organisations might lead to project failure, the dissatisfaction of the client and reputational damage as a consequence (Larkin, 2003).

3.2 Risk management

The concept of risk and its assessment is not a newly discovered phenomenon. Its history reaches back to more than 2400 years ago when Athenians were proving their ability to assess risks before making decisions. Its evidence can be found in the book written by Greek historian Thucydides named “History of the Peloponnesian War”, which described Athenians’ risk awareness and their consideration before taking necessary, even life-and-death situation, decisions. However, these forms of risk assessment were only qualitative, since Greeks did not have developed quantitative approach towards this phenomenon. (Aven, 2003)

Modern risk management began to be studied in 1960’s when first publications regarding risk management were published. Authors were covering all sorts of enterprise risks, but entirely excluded risks from the financial point of view. Thus, the main focus of new risk management was on operations (Dionne, 2013). An essential milestone for risk management as an integral part of risk management was its addition to Project Management’s PMBOK framework in 1987. Since then, risk management has been one of the core knowledge areas of project management (Stretton, 2007).

In a simple way, which is also adopted by PMBOK, risk management can be defined as: “*an act or practice of dealing with risk*” (Kerzner, 2017, p. 604). Association for Project Management (APM, 2020) provides more deep-dive definition of risk management, arguing that it is: “*a process that allows individual risk events and overall risk to be understood and managed proactively, optimising success by minimising threats and maximising opportunities*”. Hence, the definition provided by APM reflects the full focus of the risk management process and its complexity.

Especially contemporary IT organisations are facing constant technological change bringing up all sorts of complexities and uncertainties, which surround technological change itself and its management. However, proper risk management can be a highly powerful tool for dealing with these complexities and uncertainties. Today IT has already become an integral part of every organisation, and thus, its smooth functioning is necessary (McKeen

and Smith, 2013). Project risk management is based on the identification of all foreseeable risks, assessing the probability of their occurrence, their severity, and provides guidelines for stakeholders involved for reducing their impact on the project or for their avoidance (Lock, 2016). Some authors (e.g. Goncalves and Heda, 2014) consider risk management a method used for dealing with unfavourable outcomes and their consequences on a project.

3.2.1 Fundamental terminology explained

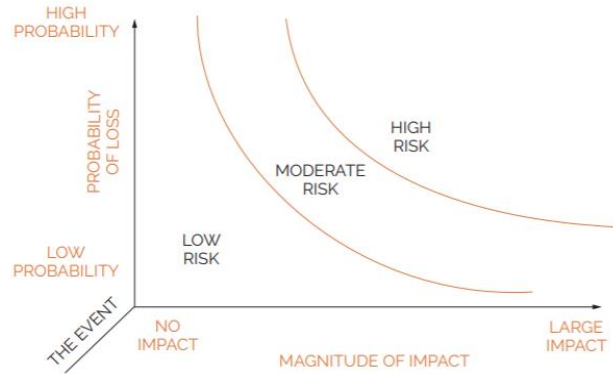
This section aims to introduce and define fundamental terminology associated with risk management.

Risk

Oxford Dictionary (Lexico, 2020) defines risk as a: “situation involving exposure to danger”. This definition is explicitly bearing negative connotation of risk, which is considered as a dangerous and possibly adverse situation. Macmillan Dictionary (2020) adds to this definition the word “possibility”, meaning that these foreseeable adverse events are supposed to happen in the future. However, the risk from a project point of view can be defined as a measure of the probability and consequence of not achieving a defined project goal (Kerzner, 2017) or the effect of uncertainty on defined objectives (Green, 2016).

Comparing general and project-specific definition, it could be argued that both options provide similar meaning. Nevertheless, the project-focused one represents a measuring unit which holds the information about the possibility of the appearance of these unfortunate events, representing non-achievement of project goals. Even though the majority of literature considers risk only as a matter with a negative effect, authors like Chapman and Ward (2003) see risk as a potential opportunity in project management.

Figure 3: Risk as a function of its components



Source: Kerzner (2017)

Uncertainty

Allport (2011) defines uncertainty as an incomplete knowledge, which could bring exciting project related opportunities if identified correctly. On the other hand, uncertainty could also be defined as a situation where it is not possible to assign a probability to the likelihood of occurrence of some specific event (Raftery, 1994). Thus, uncertainty can be associated with both positive and negative situations.

Probability

Probability is defined by Williams et al. (1999) as: “the chance that particular impact will occur”. Aven (2003) argues that probability is often a subjective expression of the degree of belief or sort of an evaluation of uncertainties covering facets like vagueness and ambiguity. Hence, the probability or likelihood that some event will happen is an important feature influencing the whole risk management process, since it helps to categorise and prioritise risks and their exposure to projects.

Proximity

Proximity is an indicator which is measuring when a risk might occur, as well as how the probability of a risk and its impact varies over time (Hinde, 2018). Definition provided

by PMBOK (PMI, 2017, p. 424) is more straightforward. It describes it as: “the period before the risk might have an impact on one or more project objectives”.

Risk tolerance

Tolerance of risk is one of the most fundamental parts of risk management, influencing management decisions on various organisational levels and potentially helps to reassess project scope or viability (Kerzner, 2017; Bissonette, 2016). Hinde (2018) identifies it as: “a threshold level of risk that, if exceeded, needs to be escalated to the next level of management”. Thus, if the level of risk tolerance is exceeded, project managers hand the project related decisions to their subordinates to reassess the project viability and scope.

3.2.2 Risk categories

Benefits of risk categorisation are undeniable as it provides risk management practitioners with some foundation for potential risk identification. One of the methods for risk categorisation applied to project risk management can be PESTLE analysis, standing for Political, Economic, Social, Technological, Legal and Environmental. This framework provides a reasonable basis for spotting potential issues by splitting them between these six areas, showing how broad is the risk focus in each of these areas. Lack of expertise in some of these areas could also advise project managers to involve subject matter experts, like a lawyer in case of a legal risk. (Hinde, 2018). McKeen and Smith (2004, cited in Uhl and Gollenia, 2016) divided potential IT risks between the following categories, based on the classification according to the source of the risk:

- Financial
- Technology
- Security
- Information
- People
- Business process

- Management

PMBOK methodology (PMI, 2017) considers risk categorisation fundamental for conducting a good risk management plan. The recommended way of categorisation of project risks is using risk breakdown structure (RBS). RBS is a hierarchical distribution of individual risks between different groups according to their sources. Sample RBS table is visible in Figure 4, but every organisation can customise its categories according to their needs.

Table 1: Example of risk breakdown structure table

RBS LEVEL 0	RBS LEVEL 1	RBS LEVEL 2
0. ALL SOURCES OF PROJECT RISK	1. TECHNICAL RISK	1.1 Scope definition
		1.2 Requirements definition
		1.3 Estimates, assumptions, and constraints
		1.4 Technical processes
		1.5 Technology
		1.6 Technical interfaces
		Etc.
	2. MANAGEMENT RISK	2.1 Project management
		2.2 Program/portfolio management
		2.3 Operations management
		2.4 Organization
		2.5 Resourcing
		2.6 Communication
		Etc.
	3. COMMERCIAL RISK	3.1 Contractual terms and conditions
		3.2 Internal procurement
		3.3 Suppliers and vendors
		3.4 Subcontracts
		3.5 Client/customer stability
		3.6 Partnerships and joint ventures
		Etc.
	4. EXTERNAL RISK	4.1 Legislation
		4.2 Exchange rates
		4.3 Site/facilities
4.4 Environmental/weather		
4.5 Competition		
4.6 Regulatory		
Etc.		

Source: PMI (2017)

3.2.3 Project life cycle and risk occurrence

Lock further argues that project teams can face risk during any stage of the project. However, according to Hill (2014) and his four project phases (as seen in Figure 1), risk occurrence in any form can especially persist during **the solution planning phase, solution implementation phase and project closure phase.**

In the case of the solution planning phase, the project risk assessment should be conducted by the team which is working, for example, on the tender process for winning a project over the competition. Thus, it would be a component of business risk management. These assessments include determination of the probability and impact of potential adverse effects on the project management performance and the project's success. Hence, a basis for a formal risk management plan is prepared in order to identify and track these events. Subsequently, the full risk management plan is developed during the project plan preparation activity of the planning phase.

The solution implementation phase involves risk management in project tracking and control activity. When the project management office conducts project monitoring, controlling schedule, costs and overall resource utilisation. Besides that, quality assurance of the product is being controlled, and newly experienced, or identified risks are being reported and further mitigated.

The project closure phase provides a chain of processes contributing to the wrap-up of all project activities, both on the delivery side (the project team) and the client-side. Activities which usually include risk-related reporting in the project team closeout documentation and project documentation disposition, where also associated performance reviews are done, risk mitigation outcomes and lessons learnt are discussed. All the information regarding risk are then stored in a permanent or semi-permanent storage as a historical data. This sort of data can be used for future project estimating and planning purposes. (Hill, 2014)

3.2.4 Risk typology

There are multiple different ways of how to classify risks according to their types. One classification is proposed by Bissonette (2016), who divides risks between known and unknown. **Known risks** also called “known unknowns”, are easier to grasp, and its handling is based on their identified severity. Thus, high severity-level risks are calling for proactive and timely responses and low severity-risks, which are usually put on a “watch list” and not being handled yet. **Unknown risks** also referred to as “unknown unknowns”, are risks which

cannot be identified before the project kick-off. These risks commonly appear during the project delivery, and the whole team has to be prepared to mediate their existence to the person in charge. Hence, their occurrence is unexpected, and their mitigation is more challenging than in case of risk, which had been already identified ahead of time.

Classification of types of risks proposed by Chapman and Ward (2003) is based on the assumptions that risks can be either considered as negative or positive. Following this assumption, the authors then classify these two types of project risk as threats and opportunities, respectively. **Threats** are defined as uncertain events with a possible negative impact on project objectives and outcomes. However, **opportunities** are linked to project uncertainties with a positive impact on the identified objectives and outcomes.

3.2.5 Risk management process

Project risk management is, according to Kerzner (2017) and simplified PMBOK classification (PMI, 2017), consisted of conducting the following processes:

- risk management planning,
- risk identification,
- risk analysis,
- response planning, and
- monitoring and controlling risk.

Risk management procedure based on PRINCE2 methodology is not as straightforward as PMBOK. However, it proposes five generic steps every project manager should repeat on a regular basis, no matter what process he or she will use to handle project risk management. Due to the nature of this approach, PRINCE2 provides guidelines resembling an agile approach to project management. These steps are the following: **identifying risks, assessing risks, planning responses to risks, implementing risk responses and communicating risk situations to project stakeholders** (Hinde, 2018).

The main reason of the implementation of project risk management processes, resulting from the nature of this discipline, is to minimise the risks related to non-achievement of the objectives of the project, identification of all opportunities associated with them and ideally guidelines how to take advantage of them. Risk management can work as support available to project managers who are provided with assistance in case of setting priorities, resource allocation and implementation of actions and processes that reduce the risk of impacts of non-achievement of project objectives. Thus, we could identify risk management as a facilitator for high-quality business and project outcomes, providing insights, knowledge and exact base for decision making, planning and designing processes for preventing, avoiding and mitigating risks (Cooper et al., 2005).

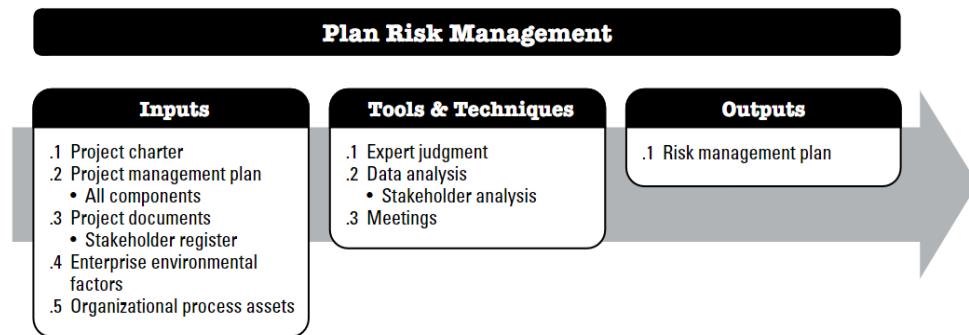
In order to make the whole risk management process viable and its implementation and execution effective, proper risk personnel has to be selected. Hence, the composition of the risk team led by the risk manager has a direct impact on the quality of risk management (Chapman, 2014). Chapman further argues that also senior management's commitment to project risk management is necessary and has to be visible across the organisation. If only because risk management practices are not adopted automatically, and their importance has to be "spelt out", in order to make the whole organisation and the project team risk-conscious.

3.2.5.1 Risk management planning

Every project is prone to risk at every stage, and proper planning of risk management has to be included in the project management plan. Especially IT projects are risk sensitives and importance of risks management planning is crucial (Goncalves and Heda, 2014). Risk management planning is the process resulting in a detailed description of a program of different actions for the management and mitigation of risk. Its purpose is to develop and document complete risk management strategy, determine suitable methods used for executing this strategy, and to plan for adequate resources needed (Kerzner, 2017). Thus, risk management planning phase provides both the process of risk management strategy and its implementation approach for every project. Marle and Vidal (2016) add that allocation

of responsibility and accountability for different risk groups have to be imposed in every project team.

Figure 4: Process of risk management planning



Source: PMI (2017)

Risk management planning is facilitated by the assigned project manager, who has to pile up data from various sources such as project management plan, project documentation, a project charter or organisational process assets, which might include useful breakdown structure of risk types, definitions of risk concepts, lessons learnt from previously encountered risks or organisational risk policy itself. The project manager is then using expert judgement, in order to be able to conduct planning of needed processes. Expert judgment is possible when the project manager is familiar with the organisation’s approach towards risk management and can tailor it up to the specific needs of the project. The project manager can also use methods of data analysis to determine the risk appetite of associated stakeholders. However, the planning can also be done at the project kick-off meeting, where all the project team members can contribute with their knowledge to help to conduct the planning. (PMI, 2017)

Essential outputs of risk management planning phase are **the risk management plan (RMP)**. RMP has to play a role of a “base plan” which provides a scenario for the whole project team in terms of how should the project go and how to act if risks and following project changes occur (Chapman and Ward, 2003). In order to add precision to the planning, risk appetite of stakeholders, high-level probabilities of risk occurrence have to be defined

and described, as well as unified forms of reporting and tracking methods have to be presented (PMI, 2017). A vital part of the planning phase is also proper training, which must be outlined with already prepared RMP and every particular member of the team has to know his/her role and responsibilities.

3.2.5.2 Risk identification

Risk identification is positioned as the second step in the project risk management process. It is a process when risks a particular project can face are identified, as well as their sources and following causes and consequences (Green, 2016). Its importance is even higher since risk identification has an impact on the whole risk management process, leading to the identification of overall project risk (PMI, 2017). Besides, ownership of each risk has to be clarified, in order to assure that mitigation of identified risks will be done without additional effort invested into allocating responsibility (Chapman and Ward, 2003). Chapman (2014) stresses the importance of proper risk identification, as the negligence in case of this process can lead to a negative effect on the project's health and its delivery. Hence, comprehensive risk identification, besides good corporate governance, can increase the probability of smooth project delivery without experiencing issues. This process should not be conducted only by the project manager, but as Kerzner (2017) recommends, involving the whole project team into risk identification leads to increased effectivity and relevancy of the whole process. As allocating just a small circle of people identifying risks can lead to bias and the situation when significant risks could be omitted.

There are many methods for the identification of individual project risks proposed by contemporary literature (e.g. Bissonette, 2016; Chapman, 2014; PMI, 2017 or Marle and Vidal, 2016). The most common methods are, e.g.:

- Brainstorming,
- Checklists,
- Expert judgement,

- Industry “best practice” reviews,
- Interviewing,
- Lessons learnt,
- RBS review,
- Root-cause analysis, or
- SWOT analysis

Experts have not agreed on the best possible method for risk identification. Still, Bissonette (2016) presented the most common approach as a combination of brainstorming, interviewing, and expert judgment. All methods mentioned require some level of expertise and are more interactive. However, fact-based inputs such as project management plan, resource requirements documentation, agreements, procurement documentation or organisational process assets improve the quality of the future risk identification output (PMI, 2017). Also, documentation including lessons learnt from previous projects can improve quality of risk identification, thus keeping a database of identified risk, their consequences and causes in any form is a must (Chapman, 2014). Example of such documents is, for example, previously created risk registers and risk reports.

The usual output of this process is **risk register** (also referred to as risk log). It serves as a database of identified risk events at the moment of creation of this document and risks identified over the whole project lifecycle (Green, 2016; Kerzner, 2017). The primary purpose of a risk register is to create a shortlist of risks which could have serious consequence on the project and the organisation itself, as well as mentioning potential risk owners and risk responses. The risk register can also be used as a tracker in case of risk handling when project management is given with proves that proper controls are in place, actions have been taken, and associated actions are appropriate to reinforce these control mechanisms (Chappell, 2014). Monahan (2008) argues that risk register has to cover all included areas of the risk landscape in order to be effective risk management.

Besides risk register, **risk report** is the document presenting information about overall project risk and summarised information on individual project risks presented in condensed form. Unlike risk register, risk report is usually presented as a text document indicating the most important drivers of overall project risk exposure. Both outputs of the process of risk identification are being updated in iterations during the whole project lifecycle (PMI, 2017; Chapman and Ward, 2003).

Despite the importance of risk identification, Green (2016) argues that being too exhaustive in risk identification might be more damaging for project management as being too brief in case of risk identification. Having too many identified risks in the risk register can disperse the project team's focus and restrain them from focusing on more essential risks in the pipeline. In opposition, Goncalves and Heda (2014) propose to identify as many potential risks as possible, yet choose only the most critical risks to be mitigated.

3.2.5.3 Risk analysis

For the estimation of the level of risk for identified and approved risks, the process of risk analysis has to be conducted. Analysing and prioritising risks is a crucial part of risks management because some risks can be considered as minor to the project itself. The project manager can focus on high importance risks with the potential to influence the project in both positive and negative direction (Heldman, 2005). Thus, risk response does not need to be performed for risks with low priority or low impact.

High quality risk analysis relies on proper risk management planning and risk identification. Chapman (2014) argues that significant pitfall of risk analysis, which needs to be avoided, is the optimism bias. Optimism bias can be described as a tendentious and systematic optimism of appraisers towards key parameters of project implementation, costs, time durations and benefits of deliverables. Such underestimation is a consequence of lesser risk planning and identification and non-effective risk management in general. Solution for optimism is to add a "healthy pessimism" to the output of risk analysis. Thus, e.g. estimated costs and durations are usually increasing and should be explicitly adjusted.

Project risk management literature (e.g. PMI, 2018; Kerzner, 2017; Heldman, 2005) splits risk analysis between two major approaches: qualitative and quantitative. Qualitative risk analysis could be described as the process which provides the assessment of probability and impact of individual risks by using qualitative means and is suitable when these parameters are difficult to calculate by using mathematical expressions. On the other hand, quantitative risk analysis is based on the mathematical modelling of estimation of individual risk's probabilities and consequent risk exposure (Marle and Vidal, 2016). These two methods should be combined holistically to conduct high-quality analysis, leading to proper risk prioritisation.

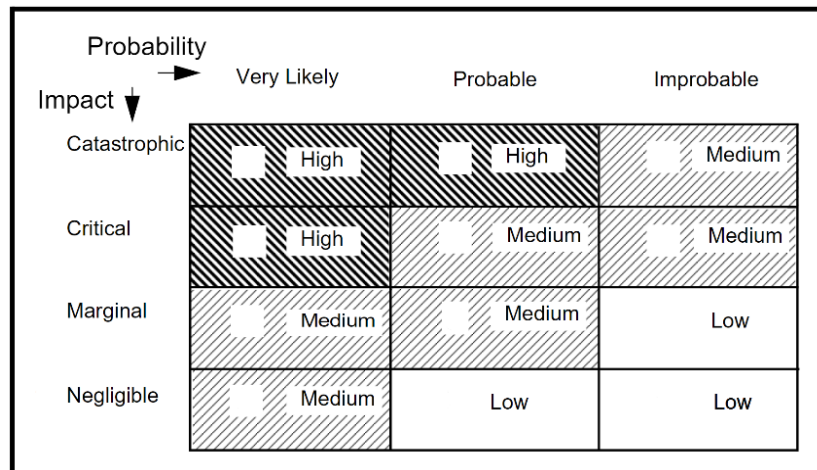
Qualitative risk analysis

Risk scales in case of qualitative risk analysis are created by assigning rank-order “verbal values” such as low, medium or high. These types of scaling measurements are called ordinal scale values. **Ordinal scale values** are a suitable method for analysing risk when used with appropriate lookup matrix which helps risk managers with the classification of risk exposure. The final output is then a function of the ordinal values of risk probability and impact. Although this method is based on subjective estimates, it provides a prompt way of qualitative analysing of risks. Please see the example of qualitative risk exposure matrix in Figure 5.

Heldman (2005) argues that qualitative risk analysis is a suitable method for risk analysis while developing small and medium-sized projects. Even though there are no direct initial costs, time is the most significant upfront investment, as designing scales for qualitative risk analysis might be time-consuming without prior experience. However, once the ordinal scales are designed within the organisation, they can be reused in similar prospective projects. PMI (2017) proposes that project team meetings, expert judgements and interviews with stakeholders help risk managers with gathering necessary data for performing qualitative analysis and with the definition of risk scales. Learning by doing assures that these scales are being developed and reviewed over time, as all project teams can relate to the risk tolerance levels of the particular organisation and its significance. Thus,

proper qualitative analysis can be used for ranking individual risks so project manager with his or her team can decide how to prioritise them.

Figure 5: Qualitative risk exposure matrix



Source: adapted from Williams et al. (2000)

Quantitative risk analysis

Quantitative risk analysis adds numeric values to both probability and impact of an individual risk situation. Thus, the overall risk score is represented by numerical value as well. A simplest quantitative method for risk analysis is the usage of cardinal scale values. **Cardinal scale values** are represented by numbers in the interval between 0 to 1. Probabilities and risk impact are both determined as numbers between 0 to 1 and multiplied. The result of this multiplication is the overall risk score, could be then looked up in risk exposure matrix according to the calculated value (Heldman, 2005). Example of such a matrix is given in Figure 6. In order to provide accurate values especially to the probability of occurrence, experience from previous projects and expert judgement of individuals or groups with specialised knowledge and training, or statistical data from previously delivered projects have to be taken into consideration (PMI, 2017 and Kerzner, 2017).

Figure 6: Quantitative risk exposure matrix

		Threats					Opportunities						
Probability	Very High 0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05	Probability	
	High 0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04		
	Medium 0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03		
	Low 0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02		
	Very Low 0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01		
		Very Low 0.05	Low 0.10	Moderate 0.20	High 0.40	Very High 0.80	Very High 0.80	High 0.40	Moderate 0.20	Low 0.10	Very Low 0.05		
Negative Impact						Positive Impact							

Source: PMI (2017)

Monte Carlo simulation (also known as Monte Carlo analysis) applied to risk management is a quantitative risk analysis method creating a sequence of probability distributions for potential risk events. It randomly samples these distributions and synthesising them into numerical value providing managers with useful intelligence about projects' costs, technical performance or time-management related risks (Kerzner, 2017). Monte Carlo simulation is the most prevailing simulation technique applied in risk management and probes both individual risks and riskiness of the projects as a whole. The main focus is paid on the schedule and cost-related risks, where these risks play a role of variables inputted into the model. Variables with pessimistic, most likely and optimistic values are plugged into the model for each of the packages from the work breakdown structure. The model then simulates outcomes of the project for each iteration, providing different ranges of schedules and costs for the project, and impacts of each variable on the project as whole. Thus, the primary purpose of the method is to determine the impacts of individual risks on the project as a whole. Depending on the impacts of individual risks, risk manager with his or her team can prioritise them and decide on proper risk response strategies (Heldman, 2005; Marle and Vidal, 2016). Monte Carlo simulation is being via specialised risk modelling software, which also provides users with quantified risk scores. It is the role of risk managers, represented by the assigned project manager, to set up the data

and to interpret the result data. However, risk modelling software can be an expensive tool, and its usage is recommended primarily during high volume projects (Chapman, 2014).

According to PMBOK methodology (PMI, 2017), quantitative risk analysis is the only reliable method for assessing overall project risk. Its assessment is done by aggregating results from already analysed individual project risks and considering other sources of uncertainty. Overall project risk assessment is usually needed by various project stakeholders to be used to analyse if planned project resources are acceptable in comparison to stakeholders' risk tolerance and willingness to cover extra costs. This analysis might consequently lead to changes in project objectives (Chapman, 2014).

Output of the risk analysis

Both qualitative and quantitative risks analysis provide project teams with new, additional information which should be embedded in risk management documentation. Examples of newly updated documents are risk register and risk report. Updating risk register involves inputting information about the probability and impacts of individual risks, their prioritisation or defined/calculated risk score. Risk owners for individual risks are nominated, and a watch list of low-priority risks can be set up for future purposes. With newly gathered data, risk report is enhanced with the reassessment of the most important individual project risks, in this case, represented by risks with the highest probability and impact or overall risk score. Risk report should also include the information from quantitative risk analysis about overall risk exposure of the project and the probability of achieving key project objectives. In order to make the risk mitigation process as smooth as possible, the risk manager should recommend risk response strategies for individual risks based on the gathered data. Thus, these recommendations will be used as one of the inputs for the planning process of risk responses (PMI, 2017; Bissonette, 2016).

3.2.5.4 Risk response planning

Risk response planning (also known as risk handling) is a process of designation for a set of methods and techniques used for dealing with both positive and negative risks. The process focuses on developing options, selecting suitable strategies, agreeing on specific

actions to address risk exposure, and monitoring their effectiveness. The ultimate goal of this risk management process phase is to reduce the overall project risk exposure at minimal cost, measured in both monetary and time-wise terms. (Kerzner, 2017; PMI, 2017; Marle and Vidal, 2016).

Risk response planning must be conducted in compliance with already prepared RMP and other additional project or organisational guidelines. Besides the selection of the proper methods and techniques, risk response planning also involves selecting a proper implementation approach for risk response strategies. The best practice is usually to implement selected strategies in case of risks with medium or high levels of importance. Combining specific risk handling option and its implementation approach is then called a risk response strategy. Previously proposed risk response strategies from the analytical part of risk management process are a valuable starting point for the real response planning process, as it includes hard data from both qualitative and quantitative risk analysis and measurements of risk importance (probability, impact or overall risk score). Besides that, project manager in charge of risk response planning can benefit from the advice of subject matter experts with desired experience, and/or hard skills from the area of the particular risk.

Some authors (e.g. Marle and Vidal, 2016 and Heldman, 2005) propose risk response methods towards adverse risk only. However, both positive and negative risks should be addressed, and proper reactive strategies should be planned. PMBOK methodology introduces approaches towards risk response which is depending on the risk typology based on the positive or negative nature of risks. Thus, the risk manager has the opportunity to plan risk response action separately for threats and opportunities. The summary of risk response actions based on this typology could be seen in Figure 7. Aim of this approach is to reduce the impact of adverse risks on projects on the one hand, and leverage possible opportunities on another (Bissonette, 2016; PMI, 2017)

Figure 7: Summary of risk response options based on risk typology

Risk and Opportunity Response Options		
Risk (Threat)		Opportunity
Avoid	↔	Exploit
Transfer	↔	Share
Mitigate	↔	Enhance
Accept	↔	Accept

Source: Bissonette (2016)

Avoidance is a risk response strategy aiming to terminate the risk by choosing an alternative approach within the current project scope and moving the potential risk away from the project. Thus, the project threshold might change as causes of potential risk or uncertainty are eliminated, changes of the project plan are made to protect project’s objectives from the risk, or avoidance of the risk altogether. It is usually a feasible and enviable response for handling project uncertainty (PMI, 2017; Chapman and Ward, 2005; Heldman, 2005). Bissonette (2016) further argues that implementation of avoidance risk response strategy leads to decreasing of probability to zero or the full elimination of the risk’s impact.

Risk response strategy based on delegating ownership to the third party is called **transference**. This strategy leads to scaling down probability or impact of a risk event by using third-parties as providers of insurance products, warranties or only by outsourcing specific project subprocess from the provider with more expertise in that particular field. By contractual agreement, the ownership and liability for risk are born by the third-party service provider (Hill, 2014; PMI, 2017). According to Heldman (2005), transference is the most suitable technique for dealing with risks of financial nature.

When project manager implements active measures aiming to reduce the probability of risk and/or its impact by taking preliminary actions, mitigation strategy is being implemented. It is the most common risk response strategy, which usually does not eradicate

the risk, but leave some low severity residual risk behind, which can be in practice disregarded (Bissonette, 2016). Thus, risk mitigation aims to reduce the probability of a risk situation and its following impact on the project to a tolerable level (Heldman, 2005). Risk can be mitigating by implementing proper project management processes which include, e.g. time and cost tracking regularly, choosing reliable suppliers of goods and services, process redesigning or realistic planning in all areas possible (PMI, 2017; Hill, 2014).

Acceptance is a strategy to assume management's knowledge about the particular risk event or opportunity, its implications and consequences. This strategy is based on management's willingness to accept the consequences of impact, without engaging in any direct reaction or efforts to control it. Application of this strategy is commonly applied in case of low probability and low impact risks and opportunities, (Hill, 2014; Kerzner, 2017)

Exploitation as a risk response strategy is used when the organisation aims to ensure that high-priority opportunities are realised. This strategy seeks to maximise the probability of success of the opportunity and take advantage of the possible increase in expected revenue or decreasing delivery time of the project. Examples of the implementation of this strategy in practice can be assigned the most skilled resources to the project or using new technologies which can support the effectiveness of the team. (PMI, 2017). Bromiley et al. (2015) argue that effective exploitation of opportunities brings competitive advantage to the concerned organisation.

Risk response strategy based on **sharing** opportunity is based on the involvement of a third party which can increase the probability or impact of opportunity. If such a risk response strategy is implemented, the organisation gives up a share of potential benefit (PMI, 2017). This strategy is usually leveraged via forming a joint venture, teaming agreement, or a strategic partnership (Bissonette, 2016).

Enhance is an analogous strategy to mitigation, but its application is being used contingent to the positive nature of risks (opportunities). Preliminary actions to risk occurrence are being implemented, aiming to increase the probability of occurrence of the particular opportunity or to enhance the impact of the outcome to the project. Example of

this strategy can be adding more resources to activities to deliver the project earlier, outsourcing some project activities, or re-negotiating project or product requirements changes (PMI, 2017; Bissonette, 2016)

After getting outputs of risk response planning, risk register, and risk report should be updated with the newly gathered information. In essence, risk response method of choice decided actions to implement to leverage the risk response method, resource budgeting, residual risks and stakeholders involved in the risk response process. Risk management documentation has to be also updated after the implementation of the risk response strategy for all risk of focus. (Bissonette, 2016; PMI, 2017)

3.2.5.5 Monitoring and controlling risks

Process of monitoring and controlling risks methodically tracks and assesses the overall effectiveness of risk management, especially the outcomes of implemented risk response strategies. Kerzner (2017) argues that outputs of monitoring and the controlling process can also be used as a basis for additional risk response strategies. They can update existing ones if they do not meet predefined success criteria. Due to the fact that risk management process is being executed in multiple iterations during the whole project lifecycle, known risk can be reanalysed and potentially new risks can be identified. This approach brings higher reliability to the whole risk management process. In addition, focus is also paid to secondary and residual risk which had been put off the sight of risk managers, monitoring of risk triggers and ensuring that all procedures are being followed from the project and operational point of view (Heldman, 2005). PMBOK methodology stresses the importance of key stakeholders' awareness about the current level of risk exposure and regular monitoring of new, changing and out-of-date project risks (PMI, 2017).

Monitoring and controlling risk, as a last step of the risk management process, which is not involving any problem-solving techniques and activities. Although proactively tracking and obtaining information about the progress of risk response measures which had already been implemented to reduce risk to an acceptable level or to leverage the potential benefits brought by opportunities. Outputs of these measures are compared towards

predefined KPIs of risk response strategies and evaluated (Marle and Vidal, 2016). These evaluations are usually performed mostly during risk review meetings of the project team or as a risk audit during routine project review meetings (PMI, 2017). Kerzner (2016) identified the most common methods used in risk monitoring and controlling as follows:

- **Earned Value (EV):** Cost/schedule data are used to evaluate a risk response program's performance.
- **Program Metrics:** Formal and periodic reviews of development processes and following corrective actions to achieve their objectives.
- **Technical Performance Measurement (TPM):** Set of engineering analysis and tests estimating values of technical performance parameters of the current product design, and it is influenced by risk response action. This method can find deviations from project scope which may indicate threats to the project delivery (Marle and Vidal, 2016)

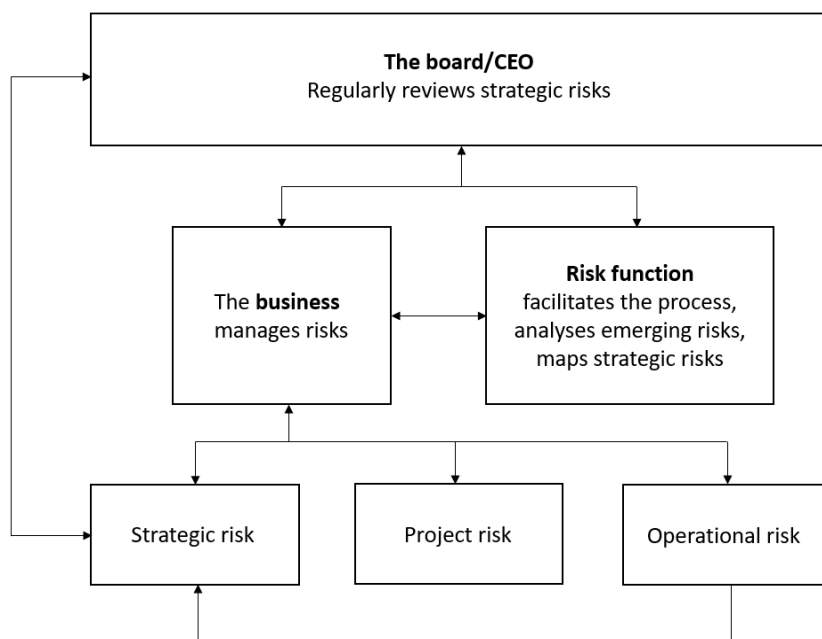
All findings are imputed in respective documentation: risk register and risk report. That can mean inputting additionally identified risks, updating the status of outdated risks, tracking the status of risk response strategies, and in case of risk report also conclusions and recommendation. This particular risk management subprocess possesses the power to influence risk management also from the organisational process point of view. As knowledge gained during this stage can be used for updating risk management documentation templates or structure of WBS table.

3.2.6 Outlining risk management with strategic management

Not only projects are considered as endangered with risks. Also, the organization's strategic management has to be aligned with proper risk management and mitigation practices. As Ngang Tang (2019) emphasizes, organizational executives have to play a crucial role in the whole process. He or she has to take measured risks and accept full responsibility for the consequences of all related decisions. Before that, the executive had already identified risks and responsibilities which can arise and had taken them in credit

while implementing appropriate strategies. Ngang Tang (2019) further argues that similar practices must also be implemented while conducting change management programs. During conduction of strategic transitions, executives play a crucial role of a leader who can guide his subordinates and help them succeed during these transitions.

Figure 8: Organisation for risk management



Source: Allport (2011)

As shown in the Figure 8, project risk management has to work besides risk management on the strategic and operational level. As risks occurring during project implementation are likely to influence organisational operations and as a result its strategic goals, unified approach towards risk management has to be implemented in these areas as well. Allport (2011) argues that an effective risk management on all levels requires specific organizational structure culture and culture, which is open, technocratic, encourages communication between stakeholders and is intelligent in case of its approach towards the unified risk management process. Chappell (2014) further develops this idea by proposing that risk management process has to fulfil the idea of timeliness, accuracy and appropriateness.

According to the research presented by Pagach and Warr (2010), adoption of risk management on the organizational level has a positive impact on the organizational performance, especially in case of reducing earnings and stock price volatility over the years. As further described by these authors, stabilized cashflow reduces uncertainty and risks related to strategic decisions of the particular organization. However, the appointment of Chief Risk Officer might bring some increased performance, but not visibly significant from the statistical point of view. That might be caused by the fact that not organizations of all sizes can benefit from these significant human resource investments into another executive.

4 Practical Part

4.1 Company introduction

After discussion with the organisation's local representatives about the sensitive nature of the internal directives, the author decided to anonymise the organisation's name. Thus, the organisation will be addressed as the Organisation XYZ in this paper.

Organisation XYZ, as a significant multi-national player in the consulting, IT services and outsourcing, plays a crucial role in the world market of technologies and shapes various sectors of the economy with their services. The whole group has a presence in more than forty countries and employs around two hundred thousand specialists in various areas. Czech business unit¹ (BU) of Organisation XYZ is with 100 employees, in comparison to the size of the group, relatively small. The organisation offers the following services both locally and abroad:

- IT consulting services
- Technology services to support business leaders in implementing technology enabled strategies and projects
- Outsourcing services
- Local professional services supported by custom software development capabilities

The focus of local business units can vary, as the skillset and local needs are different in every geographical or economic area. In case of the Czech Republic-based business unit, the central area of focus is the financial sector and their need to implement customized solutions for payments, reconciliation, clearing or legislative compliance (GDPR, BASEL II or

¹ Organisation XYZ uses expression "business unit" to address local branches of the organization abroad.

PSD2). Thus, delivering solutions and succeeding support to banks, insurers and investment companies is comprising the majority of local revenues.

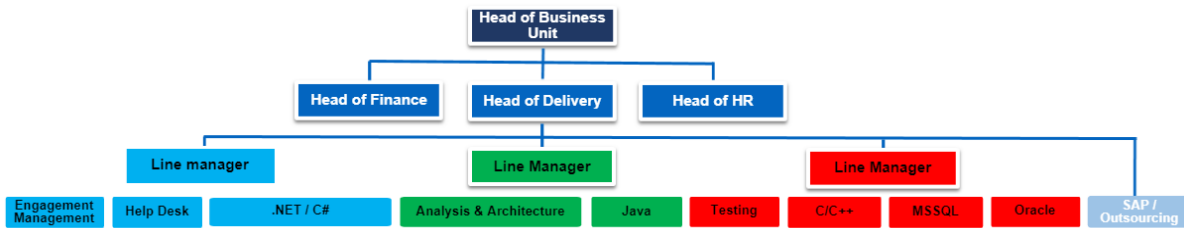
4.2 Organisational structure

To familiarize the reader with the functioning of the Czech business unit of the Organisation XYZ, organisational structure from the delivery point of view is presented in this chapter. The highest entity in the organisational chart is the head of the business unit, who is in charge of strategy, operations of the organisation and negotiation during strategic engagements. Other members of top local management, but one organisational level below the Head of BU are Head of Finance, Head of Delivery and Head of HR. The Head of Finance supervises all financial operations, forecasting and internal auditing. Head of HR is in charge of the human resource department providing the whole administration of the hiring process, contributes to the strategic planning of human capital and strategies learning and development of the organisation's employees.

Head of Delivery oversees if projects are delivered on time, in good quality and contribute to the strategic planning from the product and delivery point of view. It could be argued that the Head of Delivery is an ultimate project manager who facilitates periodical delivery meetings for every project. Thus, contributes to the risk management process as a supervisor and advisor. Besides that, Head of Delivery is direct manager of line managers who manage various teams depending on their expertise. The expertise is based on the knowledge of technologies used (specific programming language knowledge, database specialists, product specialists, etc.).

As seen in Figure 9, project managers are gathered in a separate team managed by one of the line managers. That brings the opportunity to make the training and supervision more efficient. This top-down approach assures that every project manager can then choose his or her team for the specific engagement, steer the project from the administrative and delivery point of view, and also act as a coach for the project team.

Figure 9: Delivery organisational chart of Czech BU of the Organisation XYZ



Source: own creation

4.3 Risk management in Organisation XYZ

The organisation has set up standard methodology which should be followed by all business units all around the world. This consistent approach assures that all business units can increase efficiency while collaborating during international engagements. While working from different locations and possible transfer of human labour is made more accessible. Since the employees do not need to learn new project management standards and methodologies, the methodology is named as Unified Project Management (also referred to as UPM).

Risk management is one of the activities included in the UPM methodology, and its positioning, among other activities, is visible in Figure 10. Risk Management is by the organisation understood as a process which begins in the sales cycle at the time of proposing a client solution. Furthermore, it ends when the project has been completed and delivered, including receiving final sign-off from the client-side. Thus, the process is implemented throughout the whole project lifecycle, as mentioned in Figure 1.

Figure 10: Project management processes according to UPM methodology



Source: adapted from the Organisation XYZ's UPM methodology (n.d.)

Sharing of knowledge, guidelines, templates and tools readily usable on any projects, UPM helps project managers to focus on urgent activities. To monitor progress and performance, to overcome risks and to resolve issues, ultimately ensuring that projects are delivered on time and at client expectations. Even though UPM comprises a comprehensive project management methodology, it assures compatibility with other industry standards such as PMBOK, ISO, PRINCE2 or CMMI DEV. Through the consistent use of UPM and its compatibility with other standards, clients have the confidence that consistent and effective project management is being applied, wherever in the world, their project might be. UPM provides a checklist approach of all the activities a project manager has to consider, right from the outset of a project to its conclusion. UPM ensures that project managers have all the support, tools and resources they need for their projects to succeed.

Because the centralised management of the whole group owning Organisation XYZ's Czech-based subsidiary, standardized risk management processes are implemented as mentioned in the group's UPM methodology. The most critical point contributing to the correct implementation of risk management processes in practice is an excellent theoretical and practical knowledge of UPM methodology by project managers. It is required from them and supported by a series of internal training and certifications. Application of the UPM

methodology in every responsibility engagement is mandatory. However, every business unit has the freedom to make modifications to them to tailor them based on local needs. To assure the proper execution of risk management process, database of risk management related templates of generic character is available to every project manager. However, the methodology encourages local business units to complement them with additional documentation of choice.

4.3.1 Risk management process in Organisation XYZ

Project risk management process in the Organisation XYZ is split according to the classification based on the internal project management methodology called UPM into the following activities:

- Initiate risk management
- Identify and assess risks
- Manage risks
- Complete risk management

In the case of offshore engagement, project management from the local business unit must reach consensus with the project manager from the offshore subsidiary on the selection of a common risk management framework and associated tools for the project. The delivery model of the organisation makes international collaborations during project engagements possible.

4.3.1.1 Initiate risk management

Initiation of risk management is an integral part of this process as the whole process design is conducted. The project manager plays a vital role in this process as he or she is in charge of steering the whole process, its execution and following control.

WBS breaks this process into three subprocesses:

- Collect existing risk information
- Review and tailor risk management procedures
- Select risk management tools

4.3.1.1.1 Collect existing risk information

At the start of the project, the project manager is responsible for reviewing risks existing before the project kick-off. This requires close participation with the sales team, which acts as a primary line of contact with the client and can help the project manager with gathering outstanding risks on the client-side. For this purpose, the project manager hosts a dedicated session called Contract Briefing. In this session, the project manager and other stakeholders review documentation that was developed during the sales process, such as the proposal, the contract itself and risk-related documentation presented by the sales manager. All possible threats to the success of the project that have been identified so far should be collected to assure more effective planning of actions to be taken. By following these guidelines, project managers increase the overall quality of the risk assessment and following support of the containment of the risks before they become issues².

After the identification of existing risks, project managers must manage the process to conduct a brief assessment all initial risks and identify the most significant risks (e.g. the top 3 - 6 risks), which may have the most impact on the project. The high priority risks must be highlighted as early as possible. So, they can be subjected to regular review by the project manager to ensure that they are fully considered. These reviews should be conducted at least on weekly basis. All the information gathered during this subprocess must be documented in risk log.

² Area of issue management is a concern of Issue Management project management activity of the UPM framework. Author recommends to focus on this problematics in further research.

The organisation XYZ uses a generic risk log template in MS Excel. This template includes information as assigned risk id, risk title, a brief description of the risk and impact, date of identification, risk owner, client visibility, risk category, priority, status or probability of occurrence, the severity of impact, trend, exposure, or planned mitigation actions. Risk log is the document which accompanies project managers for the whole project lifecycle, and it is being developed during the following stages of the risk management process.

4.3.1.1.2 Review and tailor risk management procedures

During the initiation of risk management, project managers develop a set of risk management procedures. They describe the approach and planning of risk management tasks for the project that should be tailored to meet specific project and client needs. So, the level, type and visibility match the likelihood of occurrence and importance of the project to the client and the organisation. These procedures are produced to establish and maintain an approach for identifying, analysing, and mitigating risks. It is crucial to address the specific actions and management approach used to apply and control the risks on the project. This includes identifying the sources of risk, the method used to categorise risks, and the parameters used to evaluate and control risks for effective handling. This standard approach is using relevant tailoring guidelines to meet the needs of the project and the specific client.

While reviewing and tailoring risk management procedures, every project manager must complete activities in the following checklist:

- **Determine risk sources and categories:** Risk sources are according to the intra-company conventions primarily divided between internal and external to the project. However, project managers are encouraged to identify additional sources of risk as the project progresses. Establishing categories to risk (e.g. based on WBS) provides a better organisation of risk management process and the following communication to the management
- **Define risk parameters:** Standard and consistent criteria for comparing the various risks to be managed. Example of these criteria can be, for example, probability of risk occurrence, impact and severity of risk occurrence or thresholds triggering risk

management related activities. These criteria are embedded in the risk log and help project managers with prioritising risks and decisions required for risk response planning.

- **Establish a risk management strategy:** Project managers take into consideration the success factors of a future project in terms of product which is delivered, its associated costs and suitability to meet expectations of the delivery. They further review the strategy with relevant project stakeholders on both delivery and client site to promote commitment and understanding. The strategy may include the scope of risk management, methods and tools to be used for risk identification, risk analysis, risk response and monitoring, definitions of risk measures, or time intervals for risk monitoring and reassessment. The project manager also agrees on specific risk management related responsibilities from the client-side. Such may include escalation mechanisms for identified risks at the client, SLAs (Service Level Agreement) or distribution of responsibilities.

By establishing the procedures, project managers ensure that the project team and other stakeholders understand the process involved and the expectations behind risk management. The procedures provide a baseline that should be maintained throughout the entire life of the project but should be revised if the standard processes are changed. The output of this process is a document called Risk Management Procedures, mapping all areas mentioned above.

4.3.1.1.3 Select risk management tools

Several inter-dependencies exist between risks, issues and project changes, so the management of these areas is best supported by a shared tool by all relevant stakeholders. Ideally, this tool should save time by facilitating risk reporting to the various parties involved and providing automatic integration with change and issue management functions. In addition, the tool should also improve risk management by enforcing the risk management procedures and reusing historical risk data and risk actions plans.

Jira is an issue tracking tool used by Organisation XYZ in the software development process. Although it is primarily used as an issue tracking tool, risks can be tracked there as well, as risks are predecessors of issues. For tracking risk from the project management point of view, shared MS Excel (e.g. risk log) and MS Word files (e.g. risk management summary) are used for better collaboration between project stakeholders. Despite the fact that these methods are currently being used, project managers have the flexibility to choose different tools which could lead to the risk management process improvement (i.e. checklists, log files or software tools).

All the selected methods have to be adequately recorded in the document called Risk Management Tools. Its purpose is to provide a placeholder for any kind of tool that helps to manage project-related risks. It includes tools' features, information about licensing (if the tool is a subject of licensing agreement), configuration documentation or manuals.

4.3.1.2 Identify and assess risks

The objective of this activity is to identify and record all risks for the project, to assess their potential impact and to define the risk mitigation actions to contain them. An initial project risk review needs to be carried out as early as possible on the project. Ideally, the risk review should be carried out as a group exercise within the project in order to explore the possible risks to the project entirely. The starting point for the exercise should be the risks identified during **collect existing risk information** activity described in chapter 4.3.1.1.1. It is the organisation's best practice to capture all potential hazards, threats and vulnerabilities that could impact the project.

This activity is split into the following sub-processes named:

- Identify and document risks
- Analyse risks
- Develop the risk control plan

4.3.1.2.1 Identify and document risks

Project managers strive to identify and document all possible risks to the success of the project as soon as possible. So, the appropriate mitigation plans can be implemented to eradicate risks before they become issues. An integral part of risk identification is the involvement of the client sponsor who can participate in the identification of residual risks which can be then eliminated at the outset of the project. For example, risks associated with decisions on project scope may be easily eliminated by the sponsor. Risks should be identified and documented in the risk log as soon as they become known so that effective action plans to mitigate or contain the risk can be implemented. Project manager controls and manages the risk log and makes sure that all entries are up-to-date. However, the risk log is accessible by all members of the project team, as well as nominated client representatives.

The best practice used in Organisation XYZ is to document risks in the risk log in a concise way, including the context, conditions, and consequences of their occurrence. Use of the categories and parameters developed in the risk management procedures, along with the identified sources of risk, can provide the discipline and streamline appropriate to risk identification. Since risk identification is an ongoing process which takes into account that risks that have been identified earlier might change or disappear. New risks might appear; it is being repeated throughout the whole project lifecycle.

Project managers use recommended methods for risk identification based on the internal UPM framework which are:

- Examination of each element of the WBS to uncover risks
- Interviewing subject matter experts
- Reviewing risk management efforts from similar projects
- Examination of lessons learnt documentation

Besides the methods mentioned above, project managers conduct formal risk workshop in the starting phase of the project where they invite all key project stakeholders to participate

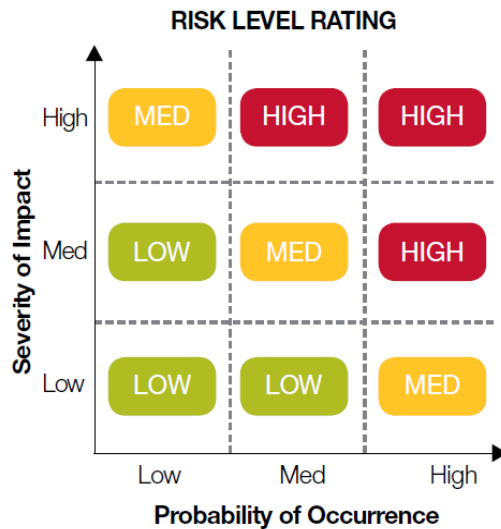
in the identification of the initial set of project risks. This process is being repeated on an agreed-on basis. It focuses on all key areas included in the project plan.

4.3.1.2.2 Analyse risks

After project managers identify a risk, it then needs to be analysed, categorised, and prioritised. Besides, the probability of risk occurrence and potential impact must be evaluated. Collecting accurate risk information is necessary for decision making and carrying out containment action before the risk turns into an issue. Thus, project managers in the organisation XZY use unified process consisted of the following steps:

- **Evaluation of identified risks by using defined risk parameters:** Each risk is evaluated and assigned values in accordance with the defined risk parameters which may include likelihood, consequence (severity, or impact), and thresholds. The assigned risk parameter values can be integrated to produce additional measures, such as level of risk exposure, which can be used for prioritisation. Project managers are in this case recommended inviting subject matter experts or project team members having previous experience with similar risk situations to participate in risk evaluation. The typical outcome of such session is qualitative risk rating using the ordinal scale (low-medium-high). Rating is based on the level of severity of risk's impact and its probability of occurrence. Conversion table in the organisation is shown in Figure 11.
- **Categorisation and risk grouping according to defined risk categories:** Project managers categorise risks based on defined risk categories, providing a means to look at risks according to their source. Related or equivalent risks may be grouped for efficient handling. Example of used grouping is having categories of internal risks (affecting only Organisation XYZ) and external risks (also affecting the client and can have an impact on the project delivery). Risks are also categorised by putting them into the following categories: sales, client, people, skills, delivery and technology. This approach can also save time as the actions to mitigate or contain one risk may also cover other risks in the category.

Figure 11: The risk level rating conversion matrix used in Organisation XYZ



Source: adapted from the organisation’s Engagement Manager’s Handbook (n.d.)

- Prioritising risks for risk response planning:** A relative priority is determined for each risk based on the assigned risk parameters. Ordinal values on the scale low-medium-high are used in this case as well. Prioritisation intends to allow the Engagement Manager to determine the most productive areas to assign resources to mitigate risk with the most significant positive impact for the project.

The process to review the initial capture and assessment of new risks is conducted regularly, usually weekly. In addition, it must form an integral part of the project’s monthly review, where the identification of new vital risks should be discussed with the broader account and project team. Ultimately, risk assessment aims to manage the most severe risks by eliminating them or reducing them to an acceptable level.

4.3.1.2.3 Develop the risk control plan

It is essential for the success of the project to define a detailed action plan covering both mitigation and contingency aspects for the project risks, together with the triggers for these actions, including their timing. The risk control plan is written in a coherent structure assured by the document template in MS Word format.

The organisation uses two primary approaches for controlling risks:

- Mitigation: actions that when taken aim to reduce the probability of the risk occurring, or to reduce the potential impact of the risk.
- Contingency: actions that will only be taken when the risk occurs. If the risk never occurs, then no action will be taken.

The decision between using mitigation or contingency actions is based on the likelihood and consequence of the risk occurring. For a high probability, high impact risk the approach is to reduce or remove the likelihood and consequence of the risk materialising and as such is best supported by a mitigation plan. Whereas the approach for a low probability, low impact risk where the level of consequence could be acceptable to the project, then a contingency plan is more appropriate. Some risks can only be monitored regularly to see if their probability or impact changes (e.g. external factors, such as new legislation, or an environmental impact, such as flooding).

To ensure that an assigned team takes the right risks mitigation or consistency actions, the project manager conducts its assessment from the point of the impact on project scope, time, cost and quality. This is being tracked in comparison to predefined KPIs. It is in the competency of each project manager to define the interval at which the risk status should be reviewed and determine the triggers for any actions to be taken. Besides that, project manager accordingly to the risk response action identifies resources needed in terms of time, human capital and monetary costs.

Project managers are not further advised to use any particular risk control methods. It is up to each project manager and his or her skills to decide which risk response action will be used for every high priority risk. Its selection is conducted in cooperation with appropriate subject matter experts who have a deep understanding of the problematics or by analysing project documentation of previously encountered risks in similar projects at the organizational level. It is essential to add that the risk management process how it is designed in the Organisation XYZ focuses only on negative risks and their mitigation. Positive risks (opportunities) are not in the organisation considered risks.

4.3.1.3 Manage risks

The ongoing monitoring and control of project risks involve keeping track of the identified risks, monitoring residual risks, identifying new risks, ensuring the implementation of risk mitigation/containment plans, and evaluating their effectiveness in risk management.

Risk monitoring and control in the organisation XYZ is an ongoing process performed throughout the whole lifecycle of the project. Project managers make sure that monitoring of outstanding risk has been implemented as risks change with project maturity (risks can change or disappear), and new risks might develop. Proper risk monitoring with implemented control processes provides project managers with information on an ongoing basis that assists them in decision making in advance of risks occurring. Besides that, the findings of this activity have to be appropriately filed in the project documentation.

If these processes are implemented correctly, project managers can determine if:

- Risk action plans have been implemented
- Risk action plans are effective as planned
- Risks have changed since identified
- Risks are present that were not previously identified.

Project managers in Organisation XYZ split this activity into two subprocesses:

- Tracking risks
- Producing risk status report

4.3.1.3.1 Tracking risks

Project managers review risks periodically what allows them to re-examine their possible sources and the changing conditions that could uncover sources and risks previously overlooked or non-existent. This approach provides an option on how to monitor the

progress of implemented risk response actions, their efficiency and the commitment of the resources. However, it can also be used to review and implement new risk-handling options. In addition to reviewing existing risks, this approach can also result in the identification of new risks.

Previously conducted risk analysis and subsequent prioritisation of risks provide project managers with the subject for regular review. The primary input for the regular review (conducted during weekly project review or during sessions focusing purely on risk management while delivering the complex project with international overlap) is high priority risk entries in the risk log. Status of these risks is tracked, risk response actions are being evaluated with the contribution of project team members, as well as the likelihood of risks to turn into issues. In addition to the weekly reviews, their findings are being an integral part of monthly project review meetings where they are also communicated to the management of the organisation responsible for the delivery process and account management. All findings made during the risk tracking process are inputted in the risk log.

To conclude the risk tracking process, project managers usually follow these key steps:

- Reviewing risk log and progress of agreed risk response actions
- Reviewing, assessing and amending existing risks as required
- Checking actual ownership of risks
- Raising issues if risk occurs
- Escalating risks if required

4.3.1.3.2 Producing the risk status report

Risk status report is MS Word format document which is being used to inform the relevant parties about the status of the project risks and the corresponding action strategies. The document provides a summary of the most critical risks, key risk parameters (such as likelihood and impact of the risks), the status of the risk mitigation efforts and performance of these actions. This information will be used for both checking if the current risk

management tasks are adequate and for early preparation for potential risk impacts. Risk status report acts as a sort of insurance against risk occurrence, which could reduce risks' impact or even erase them. It could be argued that the document is made of information already inputted in the risk log, but more elaborated and understandable to stakeholders who are not involved in the project delivery. The audience of this document is the top management of the organisation, which can track the development of the project from the delivery side since risks can constitute causing issues to successful delivery.

4.3.1.4 Complete risk management

The purpose of this activity is to ensure that the risk log is up-to-date that any outstanding risks are handed over to the appropriate recipient for ongoing management. Moreover, the project approach to risk management has been summarised. This process is conducted in the closure phase of the project. It is a fundamental part of project delivery practices of the Organisation XYZ. Completion of project risk materials and their good quality is further used by teams providing post-implementation support to the delivered solution. Another user can be the account manager responsible for the particular account as he or she is able, to some extent, to predict change requests caused by issues stemming from outstanding risks at the client-side.

This process is split between two interconnected activities the project manager has to execute:

- Create a handover of outstanding risks
- Produce the risk management summary

4.3.1.4.1 Handover of outstanding risks

At the end of the project, the project manager will either close down the risk management process, or hand it over to the person responsible for warranty, or who will be maintaining the solution. In any case, it is crucial to ensure that the risk log is up-to-date, in terms of risks identified and their status.

Depending on the agreement with the client, a regular risk handover workshop organised during the close-down phase of the project can be organised. Risk handover workshop is attended by key stakeholders (including the client) to participate, deciding on the ownership of outstanding risks and next steps. The up-to-date risk log is used for this purpose. However, only external risks are in the pipeline for this session.

4.3.1.4.2 Producing the risk management summary

The Engagement Manager should collect evidence, such as work products, performance measures, results and improvement information derived from the risk management stream and document the material in the summary in order to support the future use and improvement of the planning and risk management process in general. Fundamental prerequisite for high quality and accurate risk management summary is finalised, accurate output from the handover of outstanding risk activity, up-to-date risk log with all information filled in.

The Engagement Manager should collect evidence, such as work products, performance measures, results and improvement information derived from the risk management stream and document the material in summary in order to support the future use and improvement of the planning and risk management process in general. A fundamental prerequisite for high quality and accurate risk management summary is finalised, accurate output from the handover of outstanding risk activity, up-to-date risk log with all information filled in.

4.4 Questionnaire survey of project managers in Organisation XYZ

In order to gather empirical data about risk management processes in the work of the Organisation XYZ's project manager, a questionnaire survey was sent to members of the department called Engagement Management (see organisational structure chart in Figure 10). The department consists of nine project managers and one supervising line manager who is acting as project manager during critical engagements as well. Author received 9 responses to the survey which were used as the input for this analysis. The questionnaire survey was designed both in Czech and English language variation to assure that each project

manager fully understands the given question in case of a language barrier. The survey was structured into two major parts with following subcategories:

1. Questionnaire about risk management practices of project managers in Organisation XYZ
 - a. General information about respondents
 - b. Risk management practices as a part of project management in Organisation XYZ
 - c. Project managers' approach to project risk management practices in their day-to-day work
2. Self-assessment form for project managers about their knowledge of risk management practices

Self-assessment form embedded in the survey aims to provide a quantified score of project managers capability in case of knowledge and implementation of risk management practices during project management. The form consisted of 10 questions split between 4 categories based on best practices of the organisation's risk management process (risk management initiation, identification and risk assessment, managing risks, and completing risk management). Each project manager could grade his or her knowledge on the scale from 0 to 10 when 0 corresponds with low-level knowledge and 10 with proficiency in the particular field. Thus, every project manager could get a maximum of 100 points in the overall rating. See Appendix 1 to get familiarized with the whole questionnaire.

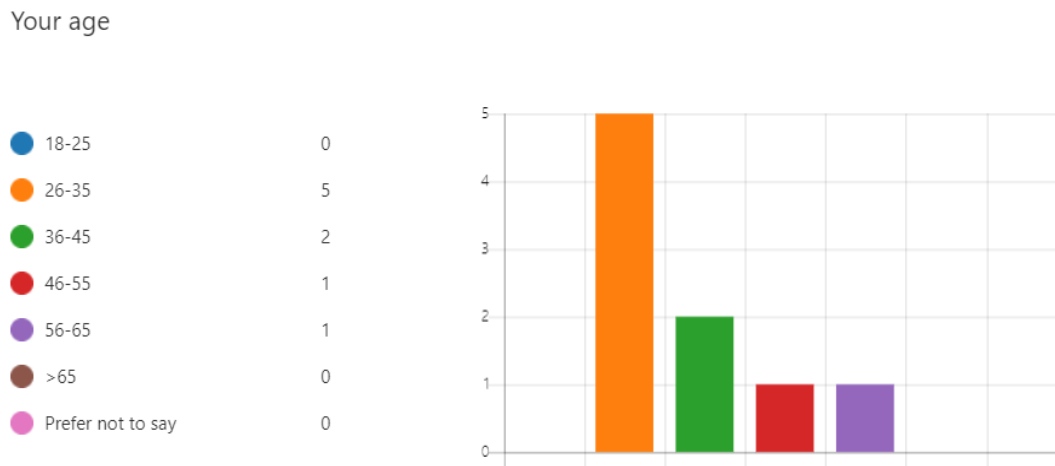
4.4.1 General information about respondents

Section surveying general profile of project managers from the Organisation XYZ was focused on their segmentation into categories based on age and project management experience. In order to provide respondents with full anonymity, the question about respondents' gender was not included in the survey, as only one project manager in the organisation is identified as female.

Age distribution as visualised in Figure 12 varies from 26 to 65 years. The most dominant age group among project managers was identified as between 26-35 years with five respondents. The following with age group of 36-45 years old and age groups marked

as 46-55 and 56-65 with one respondent each. By fact, with nine respondents participating in the survey, more than 55% of risk management belong to the age group 26-35. With such a predominant age group among project managers, the organisation could leverage the opportunity of developing their talent into employees with top management potential.

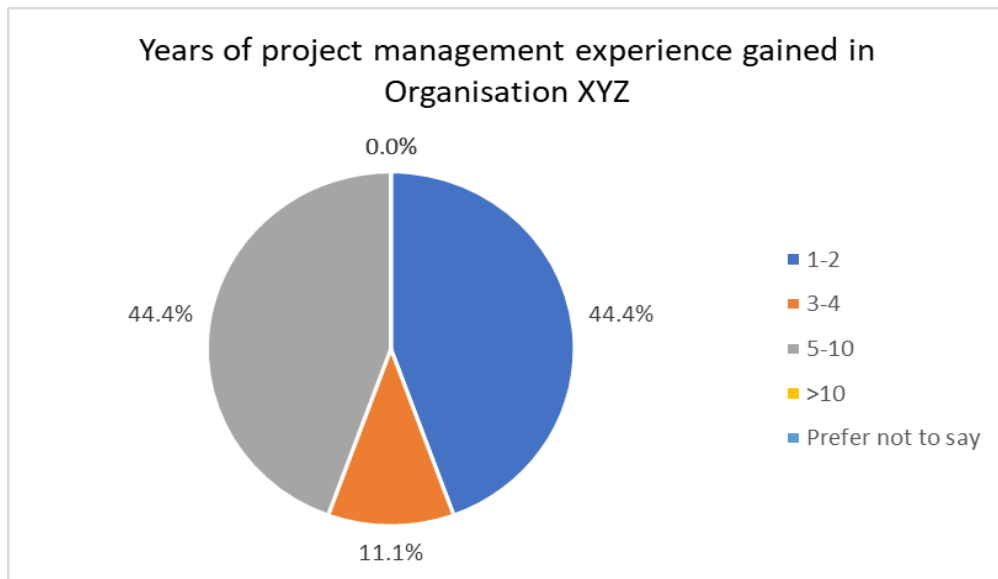
Figure 12: Age distribution of project managers



Source: own research

As shown in Figure 13, there are two main groups of project managers in Organisation XYZ split according to their gained experience in the organisation. 44% of respondents have gained 1-2 years of experience in project management, as well as 44% of respondents have between 5-10 years of experience as project managers with the organisation. Thus, two major groups are formed with project managers with junior competency and the other one with project managers on a senior level. It could be argued that the organisation can retain their project managers and build their competency in time. Besides, none of the project managers surveyed has stayed with the organisation for more than ten years.

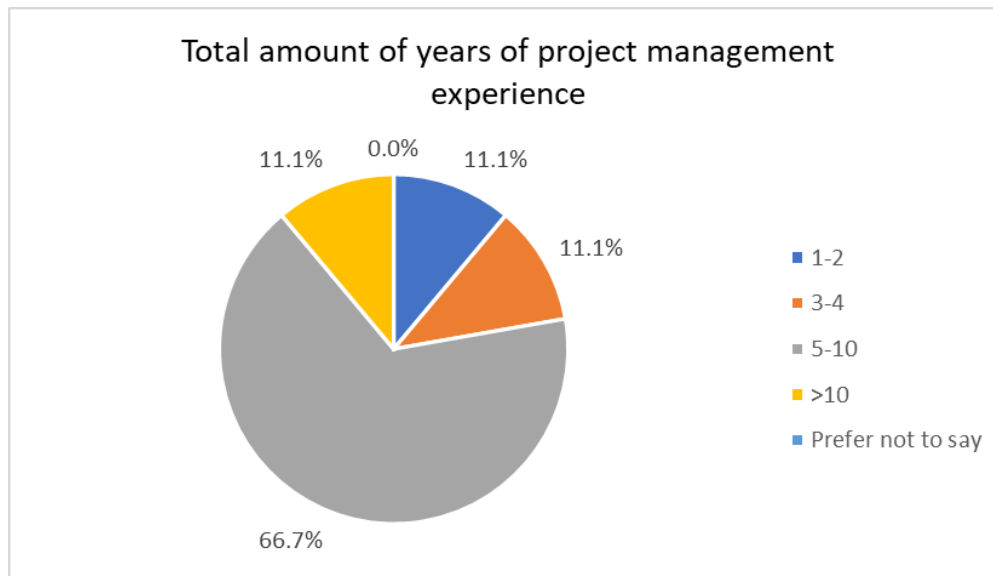
Figure 13: Years of project management experience gained in Organisation XYZ



Source: own research

Figure 14 reveals that some project manager had gained their competency also outside the organisation. In this case, the most dominant group are project managers between 5-10 years of experience, who form almost 67% of the respondent base. Furthermore, experience groups of 1-2, 3-4 and >10 years in project management form 11.1% of the respondent base each. Respondents also had the option not to disclose the number of years in project management. However, all respondents shared their data.

Figure 14: Total amount of years of project management experience



Source: own research

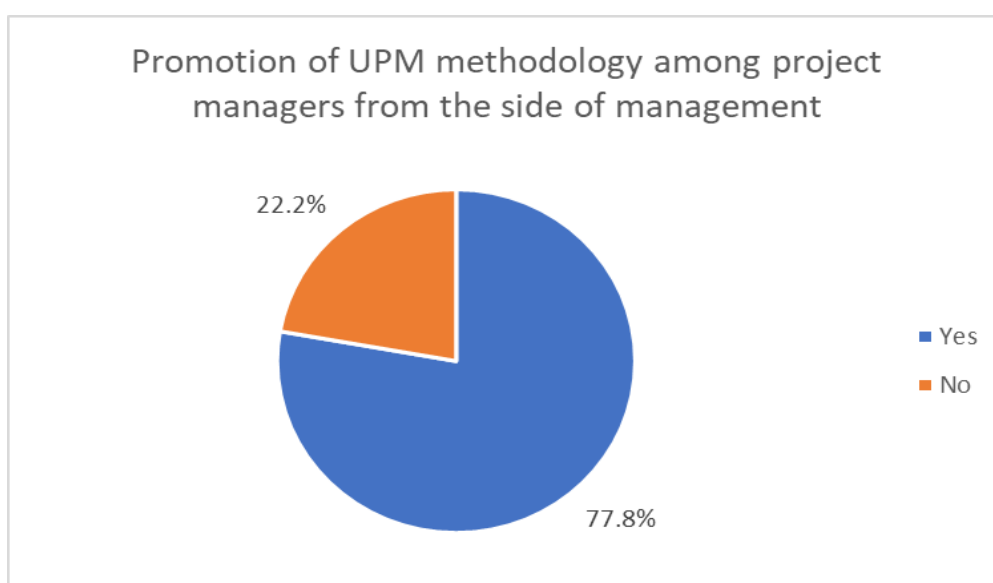
4.4.2 Risk management practices as a part of project management in organisation XYZ

Project managers were asked if the UPM methodology provides a comprehensive set used in risk management as a part of the project management process. All project managers surveyed consider UPM a guideline providing a solid base for managing risks during project engagements, which provides coverage for all essential areas of the risk management process. Even though all project managers approved this methodology's suitability, one respondent argued that the complexity of the methodology is assured at the expense of its maximal generality and lack of specificity. Thus, the methodology is considered as suitable for risk management procedures. However, some project managers could struggle with its universal applicability, in case of gaps in their project management skillset.

In case of UPM methodology's promotion by the corporate among project managers, almost 78% of project managers (see Figure 15) think that the organisation's management encourages them and stresses the importance of usage of this universal project management framework for managing project risks during every engagement. Surveyed project managers

supported their statements with additional information about this promotion. Project managers argued that compliance with UPM methodology is embedded in project managers' responsibilities outlined in the internal set of directives and its knowledge and usage is one of the project manager's KPI used for tracking of their performance. Furthermore, knowledge of risk management activity of UPM is one of the fundamental parts of internal project management certification, which has to be passed by every project manager.

Figure 15: Promotion of UPM methodology from the side of Organisation XYZ's management

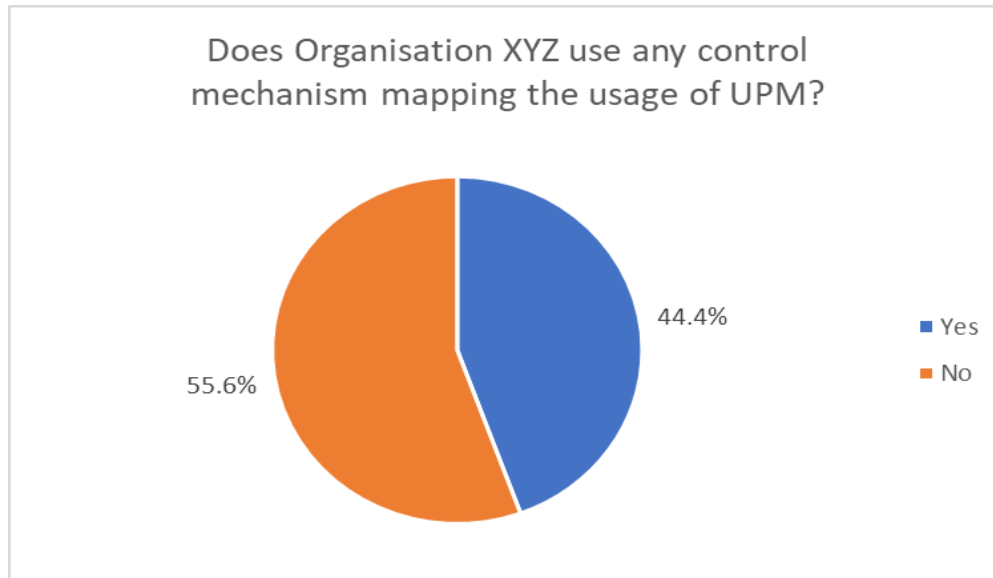


Source: own research

Usage of UPM methodology in project management and consequently in risks is firmly anchored in the organisation's guidelines. Project managers were asked if the organisation implements any measures on how to assure that the UPM methodology is followed and applied in the day-to-day project work. The results have shown a non-consistent result. 44.4% of project managers surveyed agreed that the Organisation XYZ uses control mechanisms to assure that the guidelines are being followed. All respondents argued that control is being executed during sessions called M-Review. M-Reviews are monthly project meetings held by a line manager who is managing all project managers, aiming to track a current development of projects and assurance of usage of best practices.

However, 55.6% of project managers do not think that any control mechanisms are implemented at all (see Figure 16).

Figure 16: Control mechanisms for usage of UPM methodology among project managers



Source: own research

Project managers in Organisation XYZ were asked for providing rating of the current state of the organisation's project risk management practices on the scale from 0 to 10, when 0 corresponds with poor and 10 representing superior quality of risk management processes. Opinion about the quality of the organisation's risk management processes was diverged. The most critical opinion towards organisation's processes was graded by two project managers with 3 points, however the most satisfied one graded the quality with 8 points. The average rating given by project managers was 5.56, which could be interpreted via Net Promoter Score³ (NPS) as an opinion of detractors who are not satisfied with the current system and could be identified as detractors according to the NPS conversion grid. Please

³ NPS uses rating scale from 0 to 10, sorting respondents into following three groups according to their rating (9-10 = promoters, 7-8 passives, 0-6 detractors).

the full results in Table 2. Results of this survey show that project managers observe some shortcomings of the internal risk management processes.

Table 2: Rating of project management practice of Organisation XYZ done by project managers

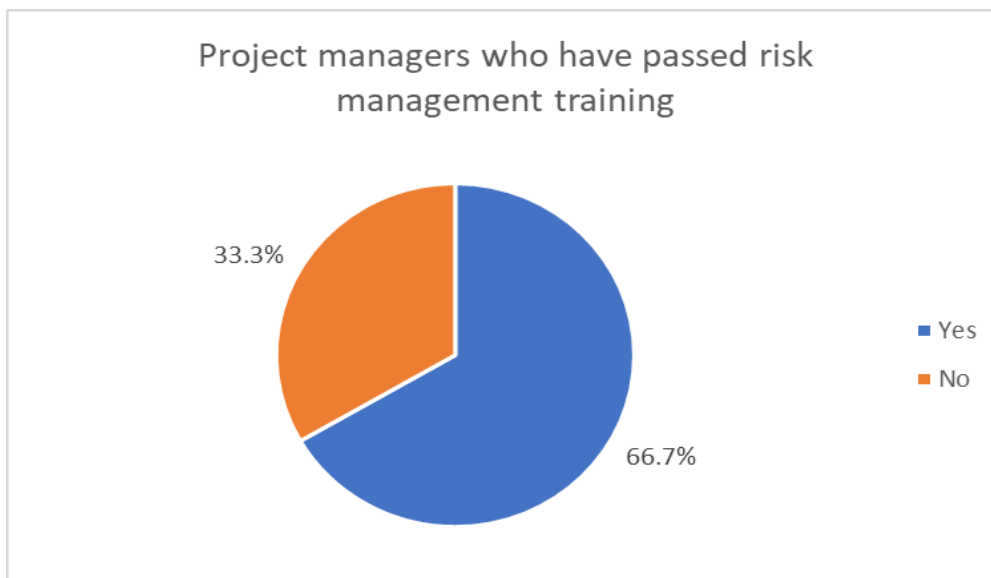
	N	MIN	MAX	Mean	Std. Deviation
How would you rate the current state of project risk management in Organisation XYZ?	9	3	8	5.56	1.71

Source: own research

4.4.2.1 Project managers' approach to project risk management practices in their day-to-day work

Even though project management and consequently, risk management processes can be learned by doing, proper trainings are required to enhance the capabilities of all risk management practitioners. According to the survey conducted among project managers from Organisation XYZ, almost 67% of them have received any sort of formal risk management training. Rest of respondents claimed that the organisation had not provided them with any training per se. Project managers who received risk management training to some extent were asked if they consider themselves better risk managers with broader skillset. However, 67% of such project managers suppose that their risk management skills were not augmented, regardless of the received training, and that it did not prepare them to be “good risk managers”. Such a conclusion can be justified either by the lack of participation of project managers or by the structure of the training, which did not reflect the needs of project managers and contemporary project engagements.

Figure 17 - Project managers who have passed risk management training



Source: own research

Despite the mandatory internal project/risk management certification provided by Organisation XYZ, some project managers educate themselves beyond the required level. As shown in 55.5% of survey project managers claimed that they had passed an additional professional exam or certification from a third-party authority. All project managers who passed an external certification or professional exam added that they obtained the PRINCE2 Foundation project management certification, which has project risk management activities as one of the core propositions. As mentioned earlier in this paper, the PRINCE2 methodology is compatible with the UPM project management framework used in Organisation XYZ and thus, going the extra mile to gather additional knowledge could enhance the overall process quality and give project managers better insight into the problematics of each project.

Figure 18 - Risk management certification of project managers from third parties



Source: own research

Importance of the value of risk management as a part of project management cannot be ignored. According to the questionnaire survey conducted with Organisation XYZ’s project managers, project managers rated the importance of risk management process during project management as very important. In order to provide respondents with easier way of expression of their opinion, numerical measures on the scale between 0 to 10 were used. Mean value of respondents’ expression of risk management’s importance was quantified as 9.22 (please see Table 3). Thus, project managers are aware of the importance of mastering risk management to reinforce the probability of project’s success.

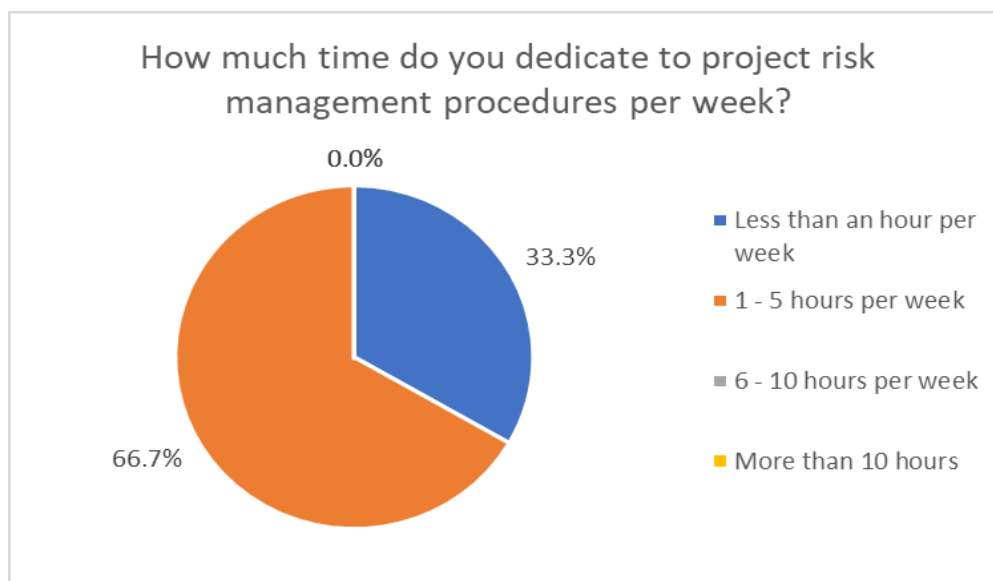
Table 3: Rating of project risk management's importance

	N	MIN	MAX	Mean	Std. Deviation
Rating of risk management importance during project engagements as a part of project management	9	7	10	9.22	1.23

Source: own research

To measure the engagement of project managers in risk management processes during their project management practice, project manager from Organisation XYZ were asked about the amount of time they spend with risk management procedures every week. The majority of project managers (66.7 %) dedicate time between 1 to 5 hours to risk management procedures on average. One-third of surveyed project manager dedicate less than an hour to risk management per week as a part of their project management duty. As shown in Figure 19, all project managers from Organisation XYZ spend less than 5 hours per week with risk management activities. It could be argued that with all the workload connected with updating project documentation about risks, time spent with risk management procedures is not sufficient.

Figure 19: Time dedicated to risk management procedures



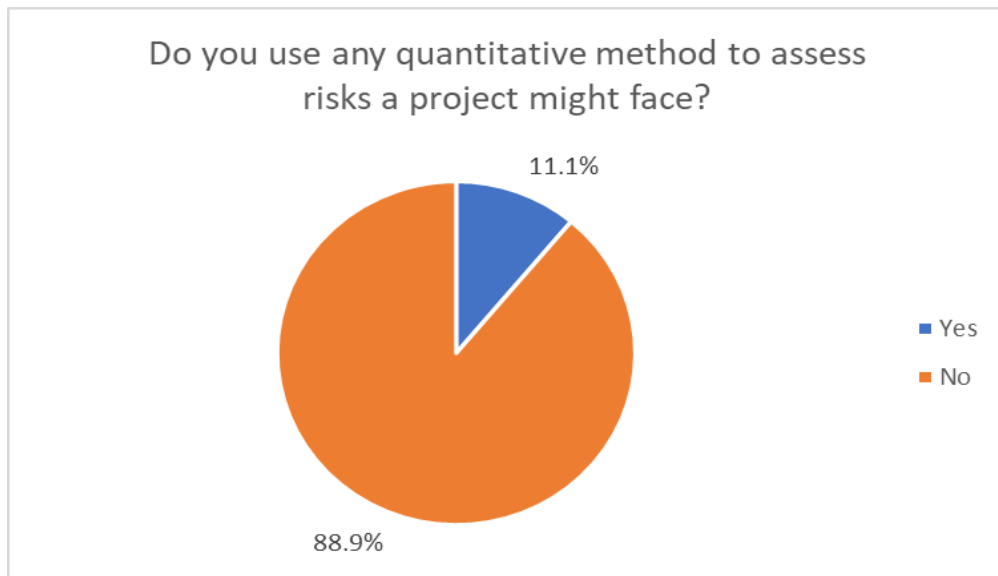
Source: own research

However, mean values of the time dedication to risk management provided by project managers can be biased because of the individuality of each project. Only 22% of project managers apply the same approach towards risk management while disregarding the size of the engagement, and 11% of project managers disregard the complexity of every project. Thus, the majority of project manager takes into account a complexity and project's size when executing risk management processes. On the other hand, a personalised approach to

each project based on its complexity and size provides better risk management from the planning point of view and further fitting applicability of selected approaches and methods.

Professional literature (e.g. Chapman, 2004) dealing with the phenomenon of project risk management argue that quantitative risk analysis is essential for managing risks during high volume strategic projects. Quantitate methods are based on mathematical models and thus, more sophisticated methods for risk analysis, helping to increase the probability of successful project delivery. Despite this fact, 89% of project managers in the Organisation XYZ do not use any quantitative risk analysis methods. In fact, response bias might have appeared in the data, as one project manager representing 11% of the sample mentioned SWOT analysis as the quantitative method he/she uses during Identify and Assess Risks risk management activity. However, regular SWOT analysis is not considered a quantitative method by not using any numerical values when conducting an assessment per se.

Figure 20: Usage of quantitative methods for risk analysis



Source: own research

Risk review sessions are considered a fundamental method applied in various risk management processes both by the literature (e.g. PMI, 2017) and internal UPM methodology. However, only 22% of surveyed project managers organise risk review

session regularly. Project managers who conduct such sessions further elaborated that they discuss any risk that may occur during a project at regular project status meetings which are held weekly. Another project manager argued that he/she organises such sessions depending on the project and its strategic importance to the organisation. Thus, the only time when all project managers have a chance to discuss potential project risks is during the previously mentioned M-Review with management, which is usually not attended by the broader project team.

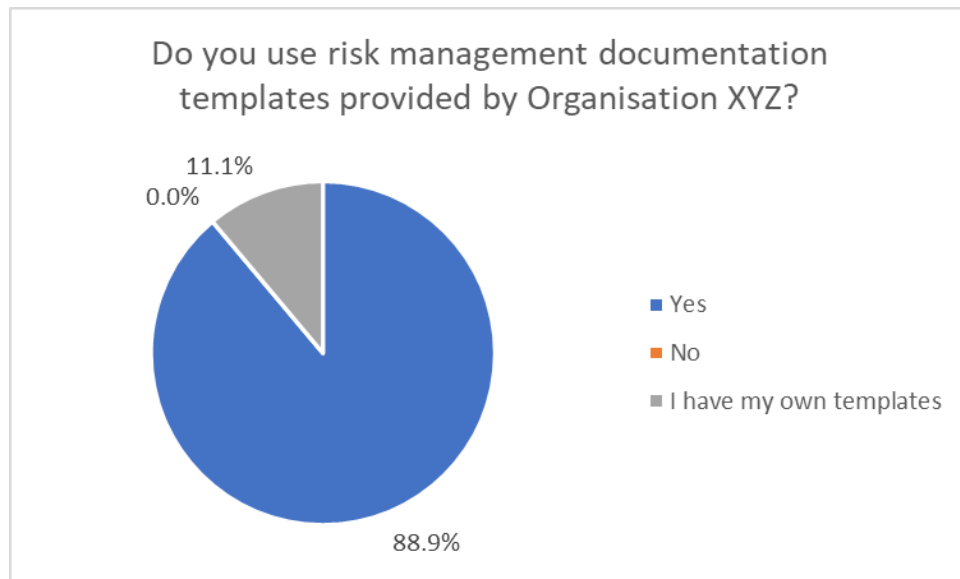
Figure 21: Organisation of risk review sessions



Source: own research

As a best practice, project managers are expected to use appropriate project documentation dealing with project risks. The organisation has a wide range of risk management templates varying from Risk Log, Risk Status Report or Risk Management Procedures. Project managers who are in charge of keeping project documentation up-to-date were surveyed about the usage of template documents provided by Organisation XYZ. 89% of project managers surveyed do use templates provided by the organisation and 11%, meaning only one project manager in absolute numbers, use their risk management documentation templates.

Figure 22: Usage of Organisation XYZ's risk management documentation templates



Source: own research

4.4.3 Self-assessment of project managers' risk management capabilities

This section of the paper provides the reader with the assessment of risk management skills of project managers in organisation XYZ. The assessment was conducted in the form of self-assessment done by project managers, where they rated their knowledge and performance during implementation of risk management processes. Project managers were given with ten questions, each rated on the scale from 0 to 10. Thus, the most performing project manager could reach up to 100 points from the self-assessment. Each rated skill was based on the UPM methodology and its breakdown of the risk management process used in Organisation XYZ:

- Initiate risk management
- Identify and assess risks
- Manage risks
- Complete risk management

Full scope of the self-assessment form is attached as a part of questionnaire survey in Appendix 1.

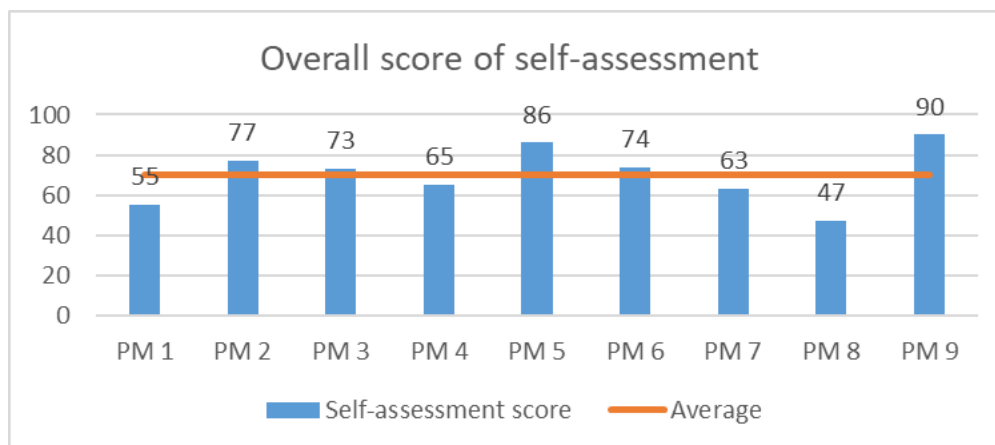
Table 4: Self-evaluation of risk management capabilities of project managers

	N	MIN	MAX	Mean	Std. Deviation
Sum of points from the self-evaluation	9	47	90	70.00	13.16

Source: own research

Data with self-evaluation from project managers were gathered and analysed (see Table 4). Mean value of the total risk management capability score among project managers was quantified as 70. However, individual self-assessment scores varied among project managers, as expressed in Figure 23, from 47 up to 90 points. As seen in the figure, 4 out of 9 project managers underperformed in case of overall risk management assessment score, in comparison to the benchmark represented by the average project manager’s performance.

Figure 23: Overall score of risk management self-assessment

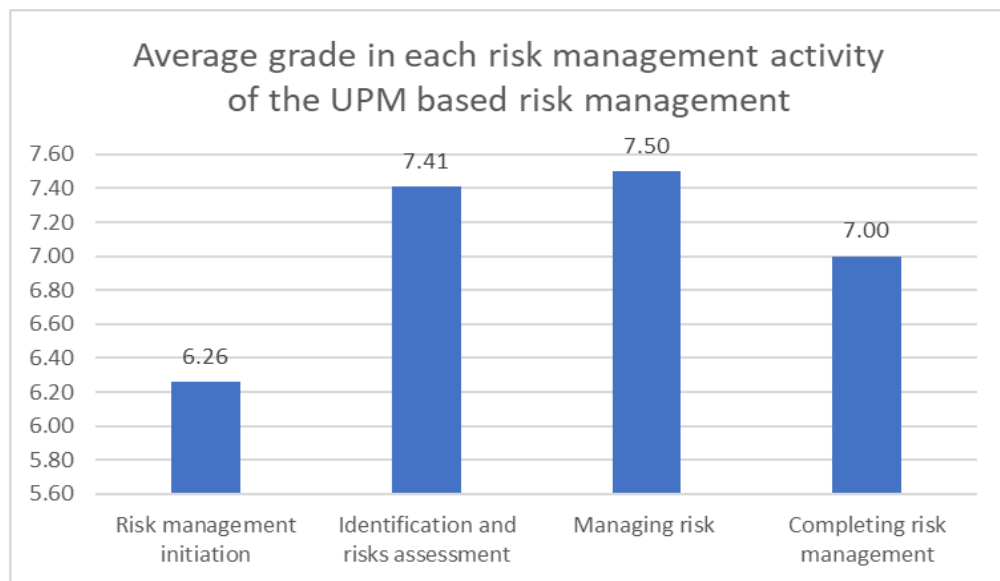


Source: own research

In average, project managers were performing worst in case of Risk Management Initiation activity, where their average grade from respective sub-activities was 6.26 points

out of 10. On the other hand, project managers were confident about their skills in activities covering Identification and Risk Assessment and Managing risks. Project managers quantified their skills and experience in these two activities as 7.41 and 7.50, respectively. Furthermore, project managers rated their experience with Completing Risk Management with 7 points on the 0 to 10 scale on average.

Figure 24: The average grade received in each risk management activity



Source: own research

5 Results and Discussion

5.1 Analysis of the implemented risk management process

This section of the paper aims to analyse the current state of the risk management practices executed by project managers of Organisation XYZ and compare it to best practices introduced by scientific and professional literature. Although UPM methodology used in Organisation XYZ is stemming from PMBOK methodology introduced by PMI, the structure of the risk management process outlined in both methodologies slightly differ. To see a comparison of these two methodologies from the breakdown structure point of view of the risk management process, please see Table 5. It is evident that the breakdown of the risk management process in both methodologies slightly differs, however full coverage of all recommended best practices of Organisation XYZ will be compared to the methodology proposed by PMBOK.

Table 5: Comparison of risk management processes

Simplified PMBOK methodology (Kerzner, 2017)	UPM methodology adopted by Organisation XYZ
1) Risk management planning	1) Initiate risk management
2) Risk identification	2) Identify and assess risks
3) Risk analysis	3) Manage risk
4) Risk response planning	4) Complete risk management
5) Monitoring and controlling risks	

Source: own creation

Table 5 shows only a high-level breakdown of the risk management process based on UPM methodology. In comparison to PMBOK, UPM methodology provides a more detailed decomposition of the risk management process, which can be seen in Appendix 3. Having the whole risk management process broke down to more elements could be beneficial for project managers who prefer to use a checklist approach in their day-to-day

work, as they can perform risk management activities from their pipeline step by step and can follow the state of the whole process in more detail.

Risk management planning

Risk management planning as identified in PMBOK guidelines and other respective literature is used to prepare a comprehensive document which provides project teams with envisioning and strategic planning of the risk management process for a project. The whole process is facilitated by the assigned project manager who prepares this documentation. Furthermore, responsibilities and accountabilities are allocated among project team members who provide more effective risk planning during following activities of the risk management process. Besides that, the risk appetite of project stakeholders is identified, and initial data from the project management plan, RBS and lessons learnt are a base for producing RMP. Risk management plan also a handbook with scenario show should the project go and how to act if the risk occurs.

On the other hand, Organisation XYZ does not have correctly embedded category for project risk planning and thus does not create any document like RMP. However, some part of project risk planning is covered in Collect Risk Management Information sub-activity of Initiate Risk Management process. Project managers hence identify already existing risks at contract briefings where representatives of the client and other stakeholder from the Organisation (e.g. sale, top management) are present. Other activities conducted in Organisation XYZ as a part of risk management planning are a part of Review and Tailor Risk Management Procedures. The organisation thus identifies suitable risk management procedures prior they are a necessity. Even the planning is not formalised in a final document like RMP, and processes are rooted in separate documents.

Risk identification

Best practice recommended by literature includes identification of all potential risks and assigning of risk ownership for future mitigation purposes to correct stakeholders. Its key deliverable is that the whole project team is involved in this process. Unlike the approach following UPM guidelines used in Organisation XYZ, PMBOK includes a set of different

methods which can be used for sufficient risk identification. Focus is also paid on the usage of historical data which could be used to save time and use approaches which had already been successful in past engagements. In addition to risk log, risk report with deep-dive information should be created based on PMBOK recommendations.

In organisation XYZ, risk identification is mostly the domain of the project manager. However, the project team is also included to some extent. Third-party experts are not used for risk identification due to the sensitivity of needed information to share. However, external stakeholders are acceptable according to PMBOK methodology. Using internal resources entirely could, after all, engage project team members and build their expertise for their future usage. Organisation XYZ's "shortlist approach" towards risk identification bear fruit as WBS table is followed. Hence, all potentially influenced project work activities are assessed, including their sensitivity to risks.

According to PMBOK, risks should be categorised appropriately and segmented. However, organisation XYZ does not conduct risk categorisation as a part of the risk identification process.

Risk analysis

Process of risk analysis in Organisation XYZ is included in more heavy risk management activity called Identify and Assess Risks, which is bulkier in comparison to Risk analysis activity of PMBOK. Besides the analytical part also includes risk identification and their further mitigation. Unlike best practices recommended by the literature, quantitative risks analysis is not established as a work item in their internal documentation and only ordinal values are used for risks rating as a consequence. Both approaches rely on the risk exposure matrix as on the fundamental analytical tool.

Quantitative analysis of risk embedded in the PMBOK framework provides more scientific, data-based insight into the phenomenon of project risk. Its non-existence in the analysed organisation might be counterproductive in case of strategic engagements of large scale, where quantitative analysis is recommended (Chapman, 2014). Despite higher costs of quantitative tools, this investment could lead to an increased probability of successful

project delivery, which is needed notably in case of strategic engagements. Also, PMBOK methodology (PMI, 2017) states that quantitative measures used in risk analysis are the only reliable method of how to measure overall risk exposure. Thus, avoidance in case of usage of quantitative methods might lead to biased results of the project risk exposure, as deficient methods are being used.

An important part of risk analysis in Organisation XYZ is an extensive categorisation of risks which is based on already defined risk parameters and processes included in WBS. Organisation XYZ does not consider opportunities as risks with positive connotation as the literature. Thus, opportunities are not managed as a part of risk management in the Organisation XYZ.

Risk response planning

Risk management's ultimate purpose is to reduce the overall risks of exposure to the project. A set of methods assures it aiming to mitigate prioritized risks and thus to reduce their following impact on the project and the organisation as a whole. For project managers in Organisation XYZ it could be hard to follow recommendation based on the PMBOK methodology, as it is not a convention to prepare a risk management plan for each project engagement. RMP is an integral part of risk response planning based on PMBOK processes, as it represents a handbook used for selecting the appropriate method.

PMBOK offers a wide variety of different mitigation strategies to use (see Figure 7), both for threats (negative risks) and opportunities (positive risks) in order to fit a variety of risky situations. Internal methodology UPM, on the other hand, defines only two types of risk response actions: mitigation and contingency. Thus, risk response planning in Organisation XYZ relies on the skillset of each project manager, in order to assure proper risk response planning and the consequential implementation of chosen measures.

Monitoring and controlling risks

Based on industry best practices, the overall effectiveness of risk management is analysed by continuous tracking and assessment of risks and effectivity of risk response

strategies. This activity is, both in Organisation XYZ and industry best practices, used to keep risk log updated by reassessing identified risks, changing their status (some risks might have disappeared in the later phase of the project) or changing non-effective risk response strategy. The implemented measures are, unlike PMBOK recommended best practices, are also tracked as a part of Develop Risk Control Plan activity either during weekly project status reviews or monthly M-Reviews. However, more intensive tracking is conducted during the risk management activity named Manage Risks (see Appendix 3).

A shortcoming of this approach adopted by Organisation XYZ's project manager is the fact that the methodology tells them during which session to conduct the controlling but does not explicitly advise which methods to use like PMBOK. Thus, the quality of control is highly dependent on the expertise of each project manager and their willingness to follow a checklist with a few steps outlined in the UPM documentation (see chapter 4.3.1.3.1 Tracking risks)

In PMBOK best practice toolset, Monitoring and Controlling Risk is a very last activity of the risk management process. However, the approach followed by Organisation XYZ devotes one extra risk management activity to the finalisation of project risk management. The activity is called Complete Risk Management and involves processes specifically designed to assure that outstanding risks are transferred to correct stakeholders. Thus, project managers are required to finalise outstanding risk register and risk management summary (RMS) and provide involved stakeholders with this documentation. Another purpose of RMS is to serve as a lesson learnt material for future projects.

5.2 Hypotheses testing

In the initial phase of writing this diploma thesis, three core hypotheses were identified. In this chapter, all defined hypotheses will be tested by considering gathered empirical data from the questionnaire survey. In pursuance of testing the statistical significance of the data tested in hypotheses 3, the null and alternative hypotheses were set as well.

Hypotheses 1: Project risk management guidelines are developed in the organization. However, their implementation is not being executed properly.

After the analysis of risk management practices used in the Organisation XYZ, it could be argued that the organisation has provided its project managers with comprehensive, universally applicable, a methodology for the purposes of risk management during project engagements. After comparison of the internal standard used for project management with industry best practices provided in the theoretical part of the paper, it could be argued that all activities described are covered in the UPM methodology. Furthermore, UPM provides specific activity for the completion of risk management process used for the risk management data backup and as a way how to hand over a report with outstanding risks to respective stakeholders.

However, research between project managers revealed that their assessment done via self-evaluation forms fluctuates among all respondents. Moreover, project managers do not have consistent performance in risk management implementation. This could be caused by the evidence of missing specificity of UPM methodology, which strives for maximal universality, without providing project managers with specific, recommended methods and expect their prior knowledge of risk management principles.

Hypotheses 2: Assessment of project related risks is being based on defined standards, but is quantification is missing.

Defined standards of UPM methodology for conducting a risk analysis is embedded in the sub-activity Analyse Risks, which is a part of Identify and Asses Risks activity. Despite the broad scope of the risk methodology in Organisation XYZ, quantitative risk analysis is not embedded in UPM risk management guidelines. This fact was backed up by the result of questionnaire survey among project managers.

Results of the survey revealed that the majority of project managers in Organisation XYZ, represented by 89% of respondents, do not execute any quantitative methods when performing analysis of prioritised individual risks. On the other hand, PMBOK guidelines

from Project Management Institute identifies quantitative risk analysis as one of the activities with high importance during the assessment of overall risk exposure.

Hypotheses 3: Risk management capabilities of project managers are interrelated with their experience in project management.

H₀: There is no statistically significant relationship between the amount of project management experience and risk management capability score of project managers

H_a: There is a statistically significant relationship between amount of project management experience and risk management capability score of project managers.

To test this hypothesis, the Pearson product-moment correlation was used to determine whether these two variables (project management experience and risk management capability score) tend to change linearly together or not. Figure 25 shows the results of the test performed in RStudio. The correlation coefficient is 0.3439 based on nine samples.

The p-value is calculated by comparing the test statistic $t = 0.96915$ to a t-distribution with 7 degrees of freedom. The p-value for the hypothesis test is 0.3648.

Figure 25: Results of the Pearson's product-moment correlation

```
Pearson's product-moment correlation

data: N.points and experience
t = 0.96915, df = 7, p-value = 0.3648
alternative hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 -0.4149531  0.8206236
sample estimates:
 cor
0.3439557
```

Source: own research

Since the p-value is higher than a significance level of 0.05, it is not possible to reject the null hypothesis. There is not enough statistical evidence to conclude that there is no statistically significant relationship between the amount of project management experience and risk management capability score of project managers. As a consequence of the finding of the statistical test, it could be argued that the organisation cannot rely on organic growth of risk management capabilities of their project managers. Thus, the organisation might have to take some specific actions to elevate its competencies in risk management.

5.3 Recommendations to the organisation

In this chapter, recommendations leading to the improvement of current risk management practices applied in the day-to-day work of project managers of Organisation XYZ will be discussed and proposed. Although the organisation already uses comprehensive risk management methodology, as a part of their internal project management guidelines called UPM, gaps in their implementation and structure were identified in the analytical part of the paper.

Focusing on opportunities (positive risks) during risk management

Unlike typical risk management processes like PMBOK, project managers in Organisation XYZ and guidelines used in the organisation do not consider opportunities as risks. Opportunities are, like threats (adverse risks) linked to uncertainties experienced during every project engagement. Even Association for Project Management (APA, 2020) includes the word opportunity in their definition of risk, advising practitioners to minimise threats and to maximise already mentioned opportunities. Thus, the organisation could be in the position of “free rider” in case of adequately leveraged opportunities. By applying proper response actions proposed by PMBOK (PMI, 2017) as seen in Figure 7, the organisation can “meet the opportunity halfway” and take actions to increase the probability of occurrence of the particular opportunity.

In fact, only by adequate allocating internal human resources, when the most suitable candidate is chosen for the project can contribute to the decrease in the delivery time of the project and consequently save organisation’s cost and increase its profit margin. The same

effect would be hiring third party subcontractor who would help the project team with the project delivery. Especially in an IT company like Organization XYZ, subcontractors typically comprise a significant share of the organizational workforce.

Tailor UPM methodology according to needs of the Czech BU

Czech business unit of Organisation XYZ does not have any modified version which would fit local conditions. Local conditions could be different in case of the market for IT products itself, different cultural and working habits. Organisation XYZ promotes the universality of UPM methodology and its standardized structure which was deployed worldwide. However, the primary intended use of UPM methodology was to provide high-level guidance without explicit listing of specific methods which should be used. One of the organisation's project managers mentioned that the maximal effort of the UPM methodology to be universal deteriorates its specificity. That might result in a hypothetical situation when the project manager know what processes should be implemented but does not know which risk response strategy to use.

To add more specificity to the risk management process in Organization, XYZ could collaborate with project managers with broader skillset (56% of surveyed project managers are certified PRINCE2 practitioners) could work on the customisation of the methodology so it could be grasped easily also by junior level project managers. As mentioned in chapter 4.3, introducing the project management approach of Organisation XYZ, UPM methodology is compatible with leading project management methodologies, including PRINCE2.

Promote usage of UPM methodology

One of the questions aiming at project managers was included to find out if Organisation XZY promotes the usage of UPM methodology among project managers and if any control mechanisms are set up from the side of the organisation. Data gathered from project managers were somewhat ambiguous, as 56% of project managers perceived implemented mechanism of UPM usage control and 44% did not perceive any. Project managers who perceived implemented control mechanisms mentioned M-Review sessions held by their line manager as the example of such a mechanism. However, these sessions are

not purely focused on the risk management problematics, and thus, its real impact could be questionable.

Project managers are shared the information about internal UPM certification, which is one of performance KPIs project managers are required to fulfil. Nevertheless, the level of detail and difficultness of the certification has not been measured and identified. For this reason, the organisation should include at least one monthly session in addition to the M-Review, which would be focused only on the implemented methodology for project management used in the organisation. The session would be held by the line manager responsible for Engagement Management department (project managers), supported by senior-level project managers who could help to shape the renaissance of the internal methodology.

Provide project managers with additional training

Although 67% of project managers have taken part in risk management related trainings, only 33% of them found them helpful in case of becoming a better risk manager. This finding reveals that the project manager does not think that provided training was useful and applicable in day-to-day work. Thus, envisioning training which would besides general best practices of UPM methodology also include practical applications of different risk management methods and tools. As shown in Figure 24, project managers have the most significant gaps in risk management execution in case of the initiation of risk management and its completion. Thus, the author recommends the Organisation to focus on these two activities in the first place.

As external training could be costly, the organisation could call for support from its mother company to aid them in case of project management methodology envisioning. As proper project risk management and significant risk mitigation increase the success rate of cost-effective project delivery, the group might consider this option. As McLaughin et al. (2016) argue, not understanding risks and their root cause might even result in project failure. Combination of the group's resources and skillset of senior-level project managers would lead to the augmentation of project managers' risk management skillset.

Make quantitative analysis part of the risk management process

Results of the survey conducted among project managers of Organisation XZY revealed that the majority of project managers (89% of respondents) do not use quantitative methods for risk analysis. Considering the fact that quantitative risk analysis is not explicitly embedded in UPM risk management guidelines, project managers' non-proactive usage is not unforeseen. However, contemporary risk management literature recommends to use quantitative methods in case of high volume projects and PMBOK (PMI, 2017) even identifies quantitative methods as the most suitable ones for overall risk exposure a project can face.

Based on the results from the questionnaire survey, the majority of project managers modify their approach towards risk management based on projects complexity (89%) and size (78%). Since project managers are responsive to a project's complexity and size, standardized method of quantitative risk analysis should be agreed on during a discussion of project managers with their line manager and the head of delivery of the organisation. Besides, the resources of the mother company could be used for helping the local BU to augment its risk management processes used in day-to-day work.

Literature (Chapman, 2014) mentions a higher cost burden associated with quantitative modelling software. However, after taking into consideration, the nature of the company, risk modelling tool based on Monte Carlo simulation could be developed inhouse by using MS Office Package software. Its production might even include only personal cost for employees involved in the development, as MS Excel licences are already used in the organisation.

Involve project teams in risk management more

Based on the answers provided by project managers, 78% of project managers do not organise any risk review sessions with their project teams regularly. Best practices provided both by the professional literature and UPM methodology promote the importance of engagement of project teams in risk identification and risk monitoring and controlling. Project managers in Organisation XYZ use WBS table in order to categorise risks based on

the work activity involved in the project. This table also maps who is the owner of the process which brings the opportunity to involve that person in the whole process and get his/her insights on the problematics from the position of subject matter expert. This expert opinion could lead to the augmentation of the quality of risk identification, its assessment and its consequent controlling.

Improve collaboration with sales and presales teams

Analysis of the data gathered from Organisation XYZ’s managers already revealed that project managers’ weakest point in risk management practice is the ability to initiate the whole risk management process (average score for this activity among project managers was quantized as 6.26 points out of 10 possible). Figure 26 represents a deep-dive insight on the risk management initiation activity showing that project managers perform lowest in case of gathering information about existing risks which occurred before the project kick-off.

Figure 26: Average scores in each section of Risk management initiation activity

	Risk management initiation			
	I am able to properly collect information about existing risks which occurred during presales/sales stage of the project	I am able to review, and tailor risk management procedures used in the project	I am able to select the most suitable risk management tools	I am able to identify and document potential risks which might occur
PM 1	6	5	5	7
PM 2	8	7	6	8
PM 3	7	8	7	7
PM 4	4	6	6	8
PM 5	5	9	9	9
PM 6	1	8	3	9
PM 7	7	6	6	5
PM 8	5	5	3	6
PM 9	9	9	9	9
Average	5.78	7.00	6.00	7.56

Source: own research

The average score of 5.78 represents the lowest value among all self-evaluated risk management activities and signals that support from the side of specific stakeholders might be insufficient. The identification and high-level assessment are dependent on the information gathered from various stakeholders who will not be involved in the project team working on the project delivery. For this purpose, stakeholders from the Organisation XYZ who were involved in the presales/sales process should be engaged more as they possess in-depth knowledge about the client and know the full story of the project either from the presales or sales negotiation with the client. Thus, the author recommends the organisation to conduct preliminary risk assessment sessions with the peculiar sales manager, or account manager who manages the client account. In addition to the initial session with the client sponsor who helps with the identification of initial risks, the outlook from the other side represented by account/sales manager could augment this process.

6 Conclusion

This diploma thesis aimed to provide a structure evaluation of risk management practices executed in practice by project managers of the chosen organisation and to provide suitable recommendations, which could be used by the management to improve the current process.

The theoretical part of this diploma thesis was based on the review of contemporary professional and academic literature and focusing on the area of project risk management, its methods and tools used in the organisational practice. The literature started with a brief introduction to the phenomenon of project management, which is taking patronage over risk management because of its interconnectivity with other project management activities. These activities are change management, issue management, knowledge management and many more. As a primary methodology of focus, forming the base of the theoretical part, the author chose PMBOK created by the Project Management Institute. As a result of the literature research, the author set up a solid base for the following analyses of risk management practices in the chosen organisation.

Practical part of the paper was based on the analysis of the organisation's risk management guidelines which must be followed by all project managers. After their comparison to industry best practices, it could be argued that the internal methodology includes even more structured approach towards risk management than PMBOK. In addition, project managers, who are primary risk management practitioners in the organisation, were surveyed, in order to get a unique empirical data set. Gathered data served as a support to the risk management guidelines analysis, as they revealed project managers' opinion about organisational risk management practices and mapped their own practices executed in practice. Project managers stressed the importance of suitable risk management guidelines, and rated guidelines adopted by the organisation very positively. However, the rating given to the current state of the implementation of risk management practices was rather negative.

The author tried to prove the existence of the relationship between project management experience and risk management knowledge score stemming from project managers evaluation. After conducting the statistical test of this hypotheses, the author found statistical insignificance of the relationship between these two variables. Thus, the organisation cannot just rely on increasing maturity of project managers and consequential experience gain in case of risk management. Thus, management of the organisation has to implement specific measures which would help with the augmentation of the current state of risk management processes practised by project managers. To support this augmentation, the author tried to propose a feasible recommendation to the organisation.

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8 Appendix

Appendix 1: Questionnaire survey of project managers from Organisation XYZ101

Appendix 2: Results of the questionnaire survey.....111

Appendix 1: Questionnaire survey of project managers from Organisation XYZ

Section 1

...

General information about the respondent

Please answer the following questions about yourself and your project/risk management experience

1. Your age *

- 18-25
- 26-35
- 36-45
- 46-55
- 56-65
- >65
- Prefer not to say

2. How many years of project management experience do you have from organisation XYZ? *

- 1-2
- 3-4
- 5-10
- >10
- Prefer not to say

3. How many years of project management experience do you have, considering your whole career? *

- 1-2
- 3-4
- 5-10
- >10
- Prefer not to say

Risk management practices as a part of project management in organisation XYZ

This sections aims to map the overall project risk management practices and used methods in organisation XYZ

4. Contemporary project management practice include two main „streams“ of project management: agile and traditional (e.g. Waterfall model). Which approach is being primarily used in organisation XYZ? *

- Agile
- Traditional

5. Do you think that the fusion of agile and traditional methodology into a "hybrid" could lead to better and more effective governance? *

Example of hybrid can be, for example, using Waterfall approach during business analysis and agile methodology during development.

- Yes
- No

6. Do you think that risk management methodology proposed by organisation XYZ's Unified Project Management (UPM) provides comprehensive framework covering the whole area of project risk managment? *

- Yes
- No

7. If you answered NO to questions number 6, could you please mention its shortcomings?

8. Does organisation XYZ (either local business unit or the group) encourage project managers to familiarize themselves with the UPM methodology? *

- Yes
- No

9. If you answered YES to questions number 9, please justify your answer

10. Does organisation XYZ have any control mechanism observing usage of UPM methodology among project managers? *

Yes

No

11. If you answered YES to questions number 10, could you please briefly describe this mechanism?

12. How would you rate the current state of project risk management in organisation XYZ? *

Please rate the current state of project risk management on the scale from 0 to 10

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Poor

Superior

Project managers' approach to project risk management practices in their day-to-day work

Questions presented in the section 3 aim to reveal the overall appetite of project managers towards project risk management.

13. Have you passed any risk management trainings provided by organisation XYZ? *

- Yes
- No

14. If you answered YES to question number 13, do you think these trainings have prepared you to be a good project risk manager?

By good project risk manager it is meant knowing how to conduct associated planning, knowing which methods to use, being able to track risks over the whole project life cycle etc.

- Yes
- No

15. Do you have any project management certification or professional exam besides the ones from organisation XYZ which features project risk management? *

- Yes
- No

16. If you answered YES to question number 15, please specify the professional certification or exam you have passed.

17. Do you think that risk management is an integral part of project management practice? Please rate its importance to you on the scale from 0 to 10. *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Not important at all

Very important

18. How much time do you dedicate to project risk management procedures per week? *

- Less than an hour per week
- 1 - 5 hours per week
- 6 - 10 hours per week
- More than 10 hours

19. Do you always conduct planning of risk management processes/procedures before starting new project? *

- Yes
- No

20. Does your position towards project risk management depend on a project's size? *

- Yes
- No

21. Does your position towards project risk management depend on a project's complexity? *

- Yes
- No

22. Do you use any quantitative method, in order to assess potential risks a project might face? *

- Yes
- No

23. If you answered YES to question number 22, please specify the quantitative method

24. Do you organise risk review sessions with your project teams on a regular basis? *

- Yes
- No

25. If you answered YES to question 26, can you please describe frequency of these reviews?

26. Do you use templates of documents used for tracking and identification of risks provided by organisation XYZ? *

- Yes
- No
- I have my own templates

Risk management self assessment form

I would like to ask you for filling self-assessment form about the knowledge of Risk Management stream from organisation XYZ's Unified Project Management method. Assessment will be done by answering 10 questions split between 4 categories:

- 1) Risk management initiation
- 2) Identification and risks assessment
- 3) Managing risks
- 4) Completing risk management

Each question will be rated on the scale from 0 to 10, when 0 corresponds with low level knowledge and 10 with proficiency in the field.

1) Risk management initiation

Please rate your knowledge on the scale of 0 - 10, where 0=lack of knowledge and 10=proficiency

27. I am able to properly collect information about existing risks which occurred during presales/sales stage of the project *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

Proficiency

28. I am able to review, and tailor risk management procedures used in the project *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

Proficiency

29. I am able to select the most suitable risk management tools *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

Proficiency

2) Identification and risks assessment

Please rate your knowledge on the scale of 0 - 10, where 0=low knowledge and 10=proficiency

30. I am able to identify and document potential risks which might occur *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

Proficiency

31. I am able to describe and analyse potential risks *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

Proficiency

32. I am able to develop risk control plan *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

Proficiency

3) Managing risks

Please rate your knowledge on the scale of 1 - 10, where 0=low knowledge and 10=proficiency

33. I am able to follow identified risks, in order to track the risk mitigation, its contingency and triggers *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

Proficiency

34. I am able to produce a good quality risk status report mapping the most critical risks and their key parameters (i.e. likelihood and impact) *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

Proficiency

4) Completing risk management

Please rate your knowledge on the scale of 0 - 10, where 0=low knowledge and 10=proficiency

35. I am able to create outstanding risks handover for appropriate stakeholders (list of still persisting risks after the project completion) *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

Proficiency

36. I am able to produce risk management summary for the purpose of reusing in future projects *

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

Lack of knowledge

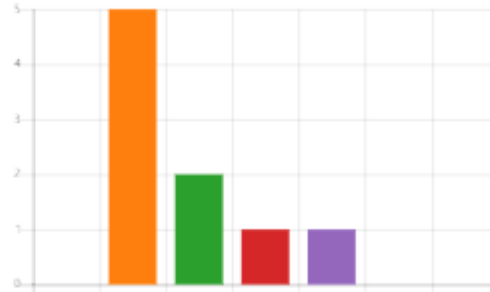
Proficiency

Appendix 2: Results of the questionnaire survey

1. Your age

[More Details](#)

18-25	0
26-35	5
36-45	2
46-55	1
56-65	1
>65	0
Prefer not to say	0



2. How many years of project management experience do you have from organisation XYZ?

[More Details](#)

1-2	4
3-4	1
5-10	4
>10	0
Prefer not to say	0



3. How many years of project management experience do you have, considering your whole career?

[More Details](#)

1-2	1
3-4	1
5-10	6
>10	1
Prefer not to say	0



4. Contemporary project management practice include two main „streams“ of project management: agile and traditional (e.g. Waterfall model). Which approach is being primarily used in organisation XYZ?

[More Details](#)

Agile	1
Traditional	8



5. Do you think that the fusion of agile and traditional methodology into a "hybrid" could lead to better and more effective governance?

[More Details](#)

Yes	8
No	1



6. Do you think that risk management methodology proposed by organisation XYZ's Unified Project Management (UPM) provides comprehensive framework covering the whole area of project risk management?

[More Details](#)

Yes	9
No	0



7. If you answered NO to questions number 6, could you please mention its shortcomings?

[More Details](#)

1
Responses

Latest Responses

8. Does organisation XYZ (either local business unit or the group) encourage project managers to familiarize themselves with the UPM methodology?

[More Details](#)

Yes	7
No	2



9. If you answered YES to questions number 9, please justify your answer

[More Details](#)

4
Responses

Latest Responses

10. Does organisation XYZ have any control mechanism observing usage of UPM methodology among project managers?

[More Details](#)

Yes	4
No	5



11. If you answered YES to questions number 10, could you please briefly describe this mechanism?

[More Details](#)

4
Responses

Latest Responses
"Monthly review should be mandatory event that covers UPM method..."

12. How would you rate the current state of project risk management in organisation XYZ?

[More Details](#)

Promoters	0
Passives	4
Detractors	5



13. Have you passed any risk management trainings provided by organisation XYZ?

[More Details](#)

Yes	6
No	3



14. If you answered YES to question number 13, do you think these trainings have prepared you to be a good project risk manager?

[More Details](#)

Yes	2
No	4



15. Do you have any project management certification or professional exam besides the ones from organisation XYZ which features project risk management?

[More Details](#)

Yes	5
No	4



16. If you answered YES to question number 15, please specify the professional certification or exam you have passed.

[More Details](#)

4
Responses

Latest Responses
"PRINCE2 Foundation"

17. Do you think that risk management is an integral part of project management practice? Please rate its importance to you on the scale from 0 to 10.

[More Details](#)

Promoters	7
Passives	2
Detractors	0



18. How much time do you dedicate to project risk management procedures per week?

[More Details](#)

Less than an hour per week	3
1 - 5 hours per week	6
6 - 10 hours per week	0
More than 10 hours	0



19. Do you always conduct planning of risk management processes/procedures before starting new project?

[More Details](#)

Yes	6
No	3



20. Does your position towards project risk management depend on a project's size?

[More Details](#)



21. Does your position towards project risk management depend on a project's complexity?

[More Details](#)



22. Do you use any quantitative method, in order to assess potential risks a project might face?

[More Details](#)



23. If you answered YES to question number 22, please specify the quantitative method

[More Details](#)

1
Responses

Latest Responses

24. Do you organise risk review sessions with your project teams on a regular basis?

[More Details](#)



25. If you answered YES to question 26, can you please describe frequency of these reviews?

[More Details](#)

2
Responses

Latest Responses

26. Do you use templates of documents used for tracking and identification of risks provided by organisation XYZ?

[More Details](#)

Yes	8
No	0
I have my own templates	1



27. I am able to properly collect information about existing risks which occurred during presales/sales stage of the project

[More Details](#)

Promoters	1
Passives	3
Detractors	5



28. I am able to review, and tailor risk management procedures used in the project

[More Details](#)

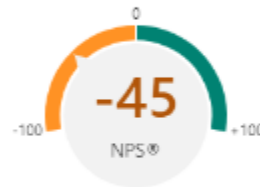
Promoters	2
Passives	3
Detractors	4



29. I am able to select the most suitable risk management tools

[More Details](#)

Promoters	2
Passives	1
Detractors	6



30. I am able to identify and document potential risks which might occur

[More Details](#)

Promoters	3
Passives	4
Detractors	2



31. I am able to describe and analyse potential risks

[More Details](#)

Promoters	2
Passives	5
Detractors	2



32. I am able to develop risk control plan

[More Details](#)

Promoters	3
Passives	4
Detractors	2



33. I am able to follow identified risks, in order to track the risk mitigation, its contingency and triggers

[More Details](#)

Promoters	3
Passives	5
Detractors	1



34. I am able to produce a good quality risk status report mapping the most critical risks and their key parameters (i.e. likelihood and impact)

[More Details](#)

Promoters	3
Passives	3
Detractors	3



35. I am able to create outstanding risks handover for appropriate stakeholders (list of still persisting risks after the project completion)

[More Details](#)

Promoters	3
Passives	3
Detractors	3



36. I am able to produce risk management summary for the purpose of reusing in future projects

[More Details](#)

Promoters	3
Passives	1
Detractors	5



Appendix 3: Detailed comparison of PMBOK and UPM methodology for risk management

Simplified PMBOK methodology (Kerzner, 2017)	UPM methodology adopted by Organisation XYZ
<ol style="list-style-type: none"> 1) Risk management planning 2) Risk identification 3) Risk analysis 4) Risk response planning 5) Monitoring and controlling risks 	<ol style="list-style-type: none"> 1) Initiate risk management <ol style="list-style-type: none"> a. Collect existing risk information b. Review and tailor risk management procedures c. Select risk management tools 2) Identify and assess risks <ol style="list-style-type: none"> a. Identify and document risks b. Analyse risks c. Develop risk control plan 3) Manage risk <ol style="list-style-type: none"> a. Tracking risks b. Producing risk status report

	<p>4) Complete risk management</p> <ul style="list-style-type: none">a. Create a handover of outstanding risksb. Produce risk management summary
--	---