**Humanities and Social Sciences** **2024**
**Research Journal 31, No. 4 (2024), pp 141-146** **October-December**

Received: June 2023
Accepted: December 2024
DOI: 10.7862/rz.2024.hss.48

**Agnieszka JĘDRUSIK**[1]

# COMPARISON OF RISK MANAGEMENT IN THE AVIATION AND AUTOMOTIVE INDUSTRIES

The purpose of this article is to present the risk management process in the project management of two industries: aviation and automotive. The analysis was based on a comparison of the two approaches based on the risk matrix used. Risk management differs between industries, and it is up to the organization to choose the monitoring and methodology adapted to the specific sector. Risk management is an important aspect of the entire project life cycle and must be monitored throughout the project life cycle to protect not only the budget but all areas of the so-called "golden triangle." Of great importance is the organization's awareness that risk management is everyone's responsibility, not just the project manager's.

**Keywords:** risk, risk management, risk matrix.

## 1. INTRODUCTION AND LITERATURE REVIEW

Project risk management seeks to identify all foreseeable risks, assess the chance of their occurrence, as well as how severe their subsequent effects may be.

Risks can arise at any stage of a project. Sometimes it is related to specific tasks, while at other times it has a source outside the project and can surface without warning. In general, risks that occur in the later phases of a project can cost more time and money than risks that occur in the initial phases. This is because the sum of costs and the value of work-in-progress at risk of loss or damage increase over time (Lock, 2013).

Risk taking in projects is inevitable as all projects lead to change, and change is accompanied by uncertainty and therefore risk (Trocki, 2012; Drączkowska, 2020)

Risk management should therefore be systemic, rather than haphazard, as it is in some projects. It is about proactively identifying, assessing and controlling those risks that can affect the achievement of project objectives. A cost-effective risk management procedure should be established and maintained in the project.

The essence of risk arises from the fact that decisions are made about the future, making decisions under such conditions of risk is nothing more than making decisions without complete information. In all types of ventures there is a possibility of events that will entail consequences, which are either opportunities for positive benefits or threats to the success of the venture. It is accepted that risk concerns not only the negative but also the positive aspects of an action (Trocki, 2012; Kerzner, 2001).

[1] Agnieszka Jędrusik, Rzeszow University of Technology, Poland; e-mail: jedrusik@prz.edu.pl. ORCID: 0000-0002-4282-699X.

Risk management is an ongoing activity that is carried out throughout the life of a project. Without an ongoing, effective risk management procedure, it cannot be ensured that the project will be able to fulfil its objectives and that it is therefore worth continuing. Effective risk management is therefore a requirement of the principle of maintaining continuous business case (Kerzner 2001; Malec, 2009).

Risk management protects and adds value to an organisation because it contributes to the achievement of its objectives by: providing a systemic framework, through which the organization will be run in a consistent and controlled manner, streamlines processes in the organization, allows more efficient use of the resources at hand, protects and builds the image of the company and improves the efficiency of operations (Marcinek, 2000; Kisielnicki, 2017).

### 2. RISK ASSESSMENT AND ANALYSIS

Once the risk factors have been identified and a list of them created, the likelihood of their occurrence and the effects they may have can be assessed. In the process, the least likely factors among those suggested during brainstorming are weeded out, while the events most likely to occur or that would have the greatest impact on the project are brought to the fore. Such analysis requires consideration of the possible causes and effects of each event posing a risk to the project.

Among risk assessment, we can distinguish between qualitative and quantitative risk analysis.

Qualitative risk analysis involves considering all risk factors in a descriptive way to imagine their various characteristics and their physical impact on the project. The main methods here are fault tree analysis and the Ishikawa diagram.

Quantitative analysis allows you to determine the performance of the project, taking into account the identified opportunities and risks. In addition, it involves one step more than quantitative analysis, aiming to quantify the outcome of a risky event or to assign numbers to risk factors corresponding to their priority from the point of view of preventive action or mitigation of undesirable consequences. In this case, a commonly used method is the analysis of types, effects and criticality of errors-FMECA (Lock, 2013).

## 3. PROJECT RISK MANAGEMENT STRATEGY

Once all known risk factors have been identified, evaluated and ranked in order of importance, it's time to think, next.

Risk response planning involves developing options for activities and actions that can be taken to take advantage of emerging opportunities, minimize or avoid risks. In this process, a risk owner is appointed, i.e. a person responsible for carrying out the tasks related to the adopted response to a given risk.

Depending on the assumptions made and the specifics of the project or its risks, the project manager may address risks in different ways.

Relevant techniques and strategies are described below:

- Transfer – is the transfer of responsibility or consequences associated with a given risk to another group of stakeholders; risk transfer rarely leads to risk elimination, but rather forces others to mitigate, accept or avoid it; risks can be transferred to contractors, suppliers, customers or insurers.

- Avoidance – involves changing the project plan to eliminate the risk or related conditions or to protect the project objectives from the possible consequences of the risk.
- Passive acceptance – consists of accepting the risk without taking any action other than documenting it.
- Active acceptance – consists of creating a retreat plan to be implemented when the risk event occurs. The turnaround plan includes detailed instructions on how to proceed and how to make a budget provision for the project.
- Reducing – involves selecting solutions with less risk than others. It is accepted because it involves potentially less adverse conditions. This strategy involves reducing the probability and/or consequences of an adverse event to an acceptable level. Taking timely action to reduce the probability or consequences of risks is preferable to fixing them (Kerzner, 2001; Prince2tm, 2009).

Risk in a project can be both an opportunity and a threat as shown in the table below:

Table 1. Risk Management Strategies

| | | |
|---|---|---|
| Risk as | Chance | Avoidance<br>Minimalization<br><br>Active acceptance<br>Passive acceptance |
| | Danger | Utilization<br>Strengthening<br>Sharing up<br>Acceptance |

Source: prepared by author.

As a result of conducting the risk response planning process, the project team updates and expands the risk register that is originally created in the risk identification process. The risk register (risk matrix) should include the following information a description of the risks with their characteristics, effects on the project, a list of owners of each risk, adopted risk response strategies, budget, schedule, and recovery and contingency plans.

## 4. RISK MANAGEMENT IN THE AVIATION INDUSTRY

Risk management in aviation is a necessary procedure in the matter of all aviation parts. It is the process of taking action and directing in such a way that the risk of a given hazard is minimized to an acceptable level.

This is primarily related to the existence of so-called “critical parts”, which are responsible for the safety of travelers.

As risk management in aviation is of particular importance, in addition to the typical risk matrix for each type of project, more or less extensive, a Risk Management Plan is created.

This plan is related to the organization's risk management procedures.

This plan consists of the following elements: risk management methods and tools, a description of the roles and responsibilities of those responsible for risk management, a budget and a risk management schedule. Each plan selects a risk management method (qualitative or quantitative) and establishes the form of reporting and monitoring of the various elements.

Below is the actual risk management matrix that is used in one of the companies in the Aviation Valley.

Table 2. Example of risk register

| Risk ID number | Entry Date | Risk descriptoion | Probability of occurrence (L) [%] | Effect (E) [EUR] | Difficult to detect [1-3] | Value V=L*E [EUR] | Preventive action | Respon-sible person |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Source: prepared by author.

This matrix applied to all projects in the organization. It is a "living" document, reviewed at weekly meetings and reported monthly to the company's top management.

Each matrix includes a risk identification number, which allows monitoring the occurrence of risks and not repeating risks already listed.

In addition, the matrix includes the following information: the date of introduction, allowing to track when the risk occurred, a broad description of the risk in question along with the reason for its occurrence, the probability of its occurrence given as a percentage.

This probability is expressed on the basis of a quantitative analysis. The effect of the risk is derived from the valuation of the risk in question in relation to the project budget at hand.

The difficulty of detection is defined here on a 3-grade scale, where 1 – means a very low chance of detection and 3 – means a high chance of detection.

Some projects use a green, yellow and red colour scale for this point.

The value of the risk is estimated as the product of the probability and the effect of its occurrence.

In addition, there is a column for preventive action, this being the planned strategy.

The last column is information about the responsible person (risk owner), who reports the status of the risk in question and applies strategies to minimize or avoid the risk.

This document varies in size over the course of the project depending on the complexity of the project, the project challenges and the involvement of the project team.

Risk Rejstr is an excellent tool not only for reporting, as it is an appendix to the action plan, as well as LL for newly implemented projects.

## 5. RISK MANAGEMENT IN THE AUTOMOTIVE INDUSTRY

Risk management for the automotive industry looks completely different than for aviation. In this case, risks are assessed in quite different categories, although the quantitative method still prevails here.

In the case of company X, there is no standard matrix for risk management. There is a certain template created, which is customized for each project.

One of the matrices used for the passcar project is shown below.

Table 3. Matrices for passcar project

| Risk ID number | Cate-gory | Risk description | Proba-bility of occurrence (1-3-5) | Severity (S) (1-3-5) | Risk rank P*S | Risk response | Analysis/ LL | Respon-sible role | Com-ments |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Source: prepared by author.

A typical matrix consists of 10 columns, in which the risk number is determined, consistent with the action plan reviewed with management. Column two contains information on the risk category. For the project, risks (technological, construction, social, economic, legal or environmental) can be selected from a drop-down list. Column three is the name of the risk along with its description. The fourth and fifth columns allow you to calculate the cost of risk for a given category.

The product of the estimated probability value expressed numerically from 1–3, where 1 means low probability, 3 means medium probability, 5 high probability. For the incidence effect, the scale is identical.

The risk in this case is the product of the probability and the effect of occurrence.

In the case of a value greater than 15, the risk is marked in red, which indicates its high importance for the project. The project team, in the case of risks marked yellow<15, only monitors the status of the risk so that it does not increase in value and become red. When the risk takes values >15 it is necessary to take immediate action that will not disrupt the "golden triangle of the project".

The seventh column refers to the planned strategy for a given risk. As in the case of the aviation industry, one can choose here to transfer, avoid, minimize or accept a given risk in active (contingency plan) or passive terms.

The eighth column is an in-depth analysis of a given risk using 8D reports or brainstorming by the project team.

This is also the place to enter lessons learned from previous projects if the team has any.

The last column is also a place for commenaters, tips, which will help in solving this risk.

## 6. CONCLUSION

Based on the risk matrix analyzed for the aerospace and automotive industries, it is safe to say that the approach in both cases is very similar and is based on the IPMA methodology in the context of project risk management.

Of course, the way of risk management is slightly different in these two industries, although this is due to the specifics of the product and the different approach to the topic of standards and procedures.

Each organization develops a risk management approach tailored to the needs of the product and process. Such refinement depends mainly on the complexity of the product

and the duration of the overall project. Risk management is an ongoing process and affects all areas in a project.

The more thorough the risk analysis at each stage of the project, the better the management and monitoring of all components throughout the project.

Nevertheless, even the best risk management system in an organization must be constantly monitored and updated so that all elements of risk are supervised. Such a task is mainly assigned to the project manager.

However, the monitoring and management of risks belongs to the entire team, so that ultimately at the end of the project duration, deliver the product in accordance with the stated objectives and the golden triangle principle from the project initiation phase.

## REFERENCES

Drączkowska, E. (2020). *Wybrane aspekty zarządzania procesami, projektami i ryzykiem w przedsiębiorstwie.* Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

Kerzner, H. (2001). *Project Management: A Systems Approach to Planning, Scheduling and Controlling*. USA: John Wiley &Sons, Hoboken.

Kisielnicki, J. (2017). *Zarządzanie projektami badawczo-rozwojowymi.* Warszawa: Wydawnictwo Nieoczywiste.

Lock, D. (2013). *Podstawy zarządzania projektami.* Warszawa: Polskie Wydawnictwo Ekonomiczne.

Malec, P. (2009). *Zarządzanie ryzykiem projektu* [w:] Trocki, M., Sońta-Drączkowska, E., red., *Strategiczne zarządzanie projektami*. Warszawa: Bizarre.

Marcinek, K. (2000). *Ryzyko projektów inwestycyjnych.* Katowice: Wydawnictwo Uczelniane AE w Katowicach.

Pritchard, C.L. (2000). *Zarządzanie ryzykiem w projektach. Teoria i praktyka.* Warszawa: IG-Press.

Prince2tm (2009). *Skuteczne zarządzanie projektami.*

Stowarzyszenie Project Management Polska (2020). *Zarządzanie projektami Podręcznik.*

Trocki, M. (2012). *Nowoczesne zarządzanie projektami.* Warszawa: PWE.

Wyrozębski, P., Jachniewicz, M., Metelski, W. (2012). *Wiedza, dojrzałość, ryzyko w zarządzaniu projektami.* Warszawa: Oficyna Wydawnicza, SGH w Warszawie.