



## Master Thesis

### Risk Management in Automotive Industry

*Study programme:* N0413A050030 International Management

*Author:* **Bc. Vojtěch Souček**

*Thesis Supervisors:* Ing. Jan Öhm, Ph.D.

Department of Economic Statistics

Liberec 2024



## Master Thesis Assignment Form

### Risk Management in Automotive Industry

*Name and surname:* **Bc. Vojtěch Souček**  
*Identification number:* E22000470  
*Study programme:* N0413A050030 International Management  
*Assigning department:* Department of Economic Statistics  
*Academic year:* 2023/2024

#### **Rules for Elaboration:**

1. Determination of work objectives.
2. Theoretical basis of risks.
3. Theoretical basis of risk analysis.
4. Analysis of risks management of the company.
5. Formulation and evaluation of conclusions.

*Scope of Graphic Work:*

*Scope of Report:* minimum 65 pages

*Thesis Form:* printed/electronic

*Thesis Language:* English

**List of Specialised Literature:**

- FOTR, Jiří and Jiří HNILICA, 2014. *Aplikovaná analýza rizika ve finančním managementu a investičním rozhodování*. 2. vyd. Praha: Grada Publishing. ISBN 978-80-247-5104-7.
- HOPKIN, Paul, 2018. *Fundamentals of Risk Management: Understanding, Evaluating and Implementing Effective Risk Management*. 5<sup>th</sup> Edition. London: Kogan Page. ISBN 978-0-7494-8307-4.
- PANJEHFOULADGAREN, Hamidreza and Frederick STANLEY, 2020. *Reverse Logistics Risk Management: Identification, Clustering, and Risk Mitigation Strategies*. online. London: Emerald Group Publishing Limited. Available from: <https://www.proquest.com/docview/2499028025/4121F364A7B4991PQ/1?accountid=17116>.
- REJDA, George E., 2021. *Principles of Risk Management and Insurance, Global Edition*. 14<sup>th</sup> Edition. Boston: Pearson Education Limited. ISBN 978-1292349749.
- SMEJKAL, Vladimír and Karel RAIS, 2013. *Řízení rizik ve firmách a jiných organizacích*. 4. vydání. Praha: Grada Publishing. ISBN 978-80-247-4644-9.

*Thesis Supervisors:* Ing. Jan Öhm, Ph.D.

Department of Economic Statistics

*Date of Thesis Assignment:* November 1, 2023

*Date of Thesis Submission:* August 31, 2025

L.S.

doc. Ing. Aleš Kocourek, Ph.D.

Dean

doc. Ing. Kateřina Maršíková, Ph.D.

study programme guarantor

Liberec November 1, 2023

# Declaration

I hereby certify, I, myself, have written my master thesis as an original and primary work using the literature listed below and consulting it with my thesis supervisor and my thesis counsellor.

I acknowledge that my master thesis is fully governed by Act No. 121/2000 Coll., the Copyright Act, in particular Article 60 – School Work.

I acknowledge that the Technical University of Liberec does not infringe my copyrights by using my master thesis for internal purposes of the Technical University of Liberec.

I am aware of my obligation to inform the Technical University of Liberec on having used or granted license to use the results of my master thesis; in such a case the Technical University of Liberec may require reimbursement of the costs incurred for creating the result up to their actual amount.

At the same time, I honestly declare that the text of the printed version of my master thesis is identical with the text of the electronic version uploaded into the IS/STAG.

I acknowledge that the Technical University of Liberec will make my master thesis public in accordance with paragraph 47b of Act No. 111/1998 Coll., on Higher Education Institutions and on Amendment to Other Acts (the Higher Education Act), as amended.

I am aware of the consequences which may under the Higher Education Act result from a breach of this declaration.

April 30, 2024

Bc. Vojtěch Souček



# Řízení rizik v automobilovém průmyslu

## Anotace

Tato diplomová práce zkoumá řízení rizik v kontextu mezinárodního podnikání, konkrétně se zaměřením na přední společnost v automobilovém průmyslu. Cílem práce je identifikace klíčových rizik a jejich následného ohodnocení spolu s navržením možné strategie snížení pro nejzávažnější rizika. Pro lepší pochopení problematiky jsou v teoretické části definovány pojmy jako je riziko, řízení rizik nebo proces řízení rizik spolu s v něm využívanými nástroji. Praktická část se věnuje analýze prostředí pomocí PESTLE a SWOT analýzy a také identifikaci rizik, kterým společnost XY čelí. Aby se ukázala závažnost identifikovaných rizik jsou v závěru za pomoci rozhovoru s expertem číselně ohodnocena.

## Klíčová slova

Automobilový průmysl, Identifikace rizik, Matice rizik, PESTLE analýza, Řízení rizik, Riziko, SWOT analýza

# **Risk Management in Automotive Industry**

## **Annotation**

This thesis examines risk management in the context of international business, specifically focusing on a leading company in the automotive industry. The aim of the thesis is to identify the key risks and subsequently evaluate them, along with proposing a possible mitigation strategy for the most serious risks. For a better understanding of the issue, terms such as risk, risk management or risk management process along with the tools used in it are defined in the theoretical part. The practical part is focused on the analysis of the environment by conducting a PESTLE and SWOT analysis and also identifying the risks faced by company XY. In order to show the severity of the identified risks, they are numerically rated at the end with the help of an interview with an expert.

## **Key Words**

Automotive Industry, PESTLE analysis, Risk Identification, Risk Management, Risk Matrix, Risks, SWOT analysis

# Content

<b>List of Figures</b> .....	<b>11</b>
<b>List of Tables</b> .....	<b>12</b>
<b>List of Abbreviations, Signs and Symbols</b> .....	<b>13</b>
<b>Introduction</b> .....	<b>14</b>
<b>1 Risk</b> .....	<b>16</b>
1.1 Classification of risk.....	17
1.2 Importance of risks .....	21
<b>2 Risk Management</b> .....	<b>22</b>
2.1 Origins of Risk Management .....	24
2.2 Benefits of Risk management.....	25
2.3 Future for Risk Management .....	25
2.4 Risk Management Process.....	26
2.4.1 Risk Identification.....	26
2.4.2 Risks Assessment .....	27
2.4.3 Developing strategies for risk mitigation .....	27
2.4.4 Monitoring and control of the implemented strategies.....	28
2.5 Tools used in Risk Management process .....	29
2.5.1 Brainstorming.....	29
2.5.2 Delhi technique .....	30
2.5.3 Checklist analysis .....	31
2.5.4 PESTLE analysis.....	32
2.5.5 SWOT analysis .....	34
2.5.6 Expert interview .....	35
2.5.7 Qualitative and Quantitative analysis .....	36
<b>3 Introduction of the company and its environment</b> .....	<b>40</b>
3.1 Risk Management of the selected company .....	40
3.2 Overview of the Automotive Industry.....	41
3.3 PESTLE analysis of the EU .....	46
3.3.1 Political Factors.....	46
3.3.2 Economic Factors .....	47
3.3.3 Social and cultural factors.....	48
3.3.4 Technological factors.....	49

3.3.5 Legal Factors .....	50
3.3.6 Environmental Factors .....	51
3.4 SWOT analysis of the selected company .....	51
<b>4 Risk Identification of the selected company .....</b>	<b>55</b>
4.1 Operational risks.....	55
4.2 Financial risks .....	58
4.3 Legal and regulatory risks .....	60
4.4 Market risks .....	63
4.5 Risks associated with human factor .....	65
4.6 Environmental risks.....	67
<b>5 Risk assessment and mitigation strategies .....</b>	<b>69</b>
<b>Conclusion .....</b>	<b>77</b>
<b>References .....</b>	<b>80</b>

## List of Figures

Figure 1 - Risk Matrix .....	37
------------------------------	----

## List of Tables

Table 1 - SWOT analysis .....	35
Table 2 - SWOT analysis of company XY .....	52
Table 3 - List of Operational risks .....	70
Table 4 - Risk matrix of Operational risks .....	70
Table 5 - List of Financial risks .....	71
Table 6 - Risk matrix of Financial risks .....	71
Table 7 - List of Legal and regulatory risks .....	72
Table 8 - Risk matrix of Legal and regulatory risks .....	72
Table 9 - List of Market risks .....	73
Table 10 - Risk matrix of Market risks .....	74
Table 11 - List of Risks associated with human factor .....	74
Table 12 - Risks matrix of Risks associated with human factor .....	75
Table 13 - List of Environmental risks .....	76
Table 14 - Risk matrix of Environmental risks .....	76

## **List of Abbreviations, Signs and Symbols**

**R&D** – Research and Development

**EV** – Electric Vehicles

**USD** – United States Dollar

**GDP** – Gross Domestic Product

**EBIT** – Earnings Before Interest and Taxes

**PHEV** – Plug-in Hybrid Electric Vehicle

**MaaS** – Mobility as a Service

**EU** – European Union

**GWP** – Global Warming Potential

## Introduction

In today's ever-changing and uncertain business environment, risk management has become a key element of any organisation's strategic planning. The ability to effectively identify, assess and mitigate potential risks is essential to ensure the long-term sustainability and prosperity of companies. The meaning of risk has been long permeating the structure of everyday decisions and complex corporate strategies. It has evolved from a historical sea term to a crucial element of modern organisational and economic activities. The term 'risico', which originated in 17th century in Italy, was used in maritime trade to describe the dangers associated with sea voyages and to describe the potential for loss. Subsequently, the term has expanded and now includes various uncertainties faced by modern businesses. Today, risk is understood not only as the possibility of financial loss, but as a multifaceted concept that affects all areas of business activity and highlights the always-present nature of uncertainty in all human activities. (Smejkal and Rais, 2011)

The evolution of risk management as a discipline reflects its growing importance in navigating the complexities of modern markets and technology. Originally concerned with the simple prevention of hazards, risk management has evolved into a sophisticated framework that seeks not only to mitigate potential threats but also to exploit uncertainty as a strategic opportunity. This change is particularly evident in the development of enterprise risk management frameworks that take a holistic approach to risk management across the organisation. (Harvey, 2012)

This thesis focuses on a comprehensive risk analysis of a selected company operating in the automotive industry, which is anonymously referred to as Company XY throughout the thesis due to management requirements. **The main objective of the thesis is to identify the key risks associated with the operations of this company and then to evaluate the most serious risks, for which a set of recommendations is proposed to potentially reduce the impact or probability of occurrence of these risks.** To achieve the objective, the thesis is divided into two parts - theoretical and practical. The theoretical part defines risk and its classification and risk management along with the risk management process and the tools used in it. The practical part of the thesis includes an introduction of the company and the



environment in which it operates. Firstly, the automotive industry and its future trends are introduced, followed by a PESTLE analysis of the market of the European Union countries, where all the obtained knowledge are summarized in a SWOT analysis, which was consulted with an expert from the company. The second part of the practical part is the identification of specific risks, which is conducted by brainstorming with the manager of the company. The risks are divided into six main groups in which specific threats are described in more detail. Using expert interviews with the company manager each risk is assigned a score for potential impact and probability of occurrence on a scale of 1-5, from very low to very high. The thesis concludes with an assessment of the most serious risks and a suggestion of possible recommendations to mitigate the risks.

The theoretical part is based on the professional literature, journals, articles, and research mainly from internet sources. The practical part is based on verified Internet sources and databases related to the topic. The identification of risks is based on the knowledge of the company manager and internal documents. In order to efficiently process large datasets and better understand the addressed problems, artificial intelligence, specifically ChatGPT, was used. However, this tool was used only as a complementary tool and the potential limitations and distortions of this technology were considered.

# 1 Risk

Risk is a historical term from 17th century when it was firstly used in the context of shipping. The term originates from Italy, where *risico* meant a pitfall that shops had to avoid during voyages. Subsequently, the term risk was expressed as exposure to any adverse circumstances. In encyclopaedias from past centuries, risk is explained as courage or danger and the verb to risk means to dare something new. Only in the following years is the risk taken as a possible loss. Today, risk is better known as the danger of damage, loss or destruction and is an important attribute in most human activities, especially in business. Example of business activities whose outcome is not certain in advance and are therefore subject to risk include for example, entering a new market, mergers or acquisitions, company restructuring, research and development of new product or the introduction of new modern technology. The quality of their preparation and the quality of their implementation determine how these new activities will turn out. The quality of preparation affects success and failure because the shortcomings in the preparation leading to the choice of an inappropriate variant cannot usually be eliminated, but they can be mitigated during their implementation. As for the quality of implementation, if it is low, it can significantly threaten the success of the project and its future development. When achieving the required level of quality, both during preparation and during implementation, however, due to the existence of risk and uncertainty, results may be achieved that do not reach the targeted values.

When preparing a project, in addition to the quality of project preparation and the quality of project implementation, all risks that can endanger the project should be also considered. Therefore, before introducing each project, the risks and uncertainties that may affect the results should be identified and their significance assessed. Furthermore, the impacts of the identified risks on the future outcome of the project should be evaluated. And the last necessary step is to consider possible measures and try to eliminate or at least reduce the risk. (Smejkal and Rais, 2011)

To fully define the term, it is important to distinguish risk from uncertainty, even though some sources state that they are the same. Risk is associated with an activity or project that has uncertain outcomes and these outcomes affect the financial

position of the entity. Thus, failure of a given project may lead to cash flow problems and economic losses which, in the worst case, may threaten the existence of the enterprise. Those responsible for the losses incurred are the managers in charge of these projects, who may be hit with financial penalties or loss of position. Otherwise, if the project is successful, they are the ones who benefit the most.

Uncertainty arises due to the inability to accurately predict risks and their future evolution, which can affect the results and achievement of project objectives. This uncertainty is associated with factors such as fluctuations in exchange rates, demand, energy, and material prices, selling prices and others. Uncertainty about the future values of these risk factors then translates into uncertainty about the results of the business activities or projects undertaken, which is the basis of their risk nature. The limited reliability in estimating future values of risk factors has an adverse effect on several aspects, in particular: Limited access to information and lack of understanding of the processes that generate risk and uncertainty factors, use of inappropriate information sources and unreliable data and incorrect methods for estimating the future evolution of these risk and uncertainty factors. This information demonstrates that there is a possibility to reduce uncertainty in estimating the evolution of risk and uncertainty factors. This can be achieved through a deeper understanding of the processes that generate these factors, as well as improving the availability of information, including the use of validated and more reliable data sources. However, it should be emphasised that the complete elimination of uncertainty is not possible due to the random nature of the processes behind the generation of risk factors. (Fotr and Hnilica, 2014)

## **1.1 Classification of risk**

There are many ways to classify risks, one of the basic divisions is to business and pure risks, systematic and unsystematic, internal, and external, controllable, and uncontrollable, primary a secondary and risks in the phase of project preparation, implementation, and operation. A more detailed classification of risks considers their content and is divided into technical-technological, production, economic, market,

financial, credit, legislative, political, environmental, informational, and human factor risks.

Another classification of risks can be the division into strategic and operational risks, where the category of strategic risks involves the discovery of new technologies or rapid changes in the market or customer preferences. Operational risks are associated with individual operations and processes. (Fotr and Hnilica, 2014)

### **Business and Pure Risk**

Business risks can be divided into those with potentially positive and negative impacts. The positive aspect occurs when deviations in results lead to better-than-expected profits. On the other hand, pure risk is associated exclusively with negative consequences, i.e. the possibility of situations that are worse than originally intended. This includes threats to property, health, or eventual human lives. Pure risks are typically associated with potential losses or damages caused by natural disasters (such as floods, fires, earthquakes), failure of technical systems (such as equipment breakdown), or human actions (theft, embezzlement, strikes, etc.).

### **Systematic and Unsystematic risk**

Systematic risk is a type of risk that is caused by factors affecting the whole market or economy and can therefore affect all entities in the economy or different business sectors. Examples of factors leading to systematic risk include changes in financial and fiscal policy or overall market changes such as economic cycles or fluctuations in the prices of basic materials and energy. This risk, often referred to as market risk, cannot be eliminated through diversification as it affects a wide range of economic units and is therefore referred to as non-diversifiable. In contrast, non-systematic risk is specific to individual enterprises or their specific activities. This may include factors such as the loss of key personnel or accidents to production facilities. While systematic risks relate to the whole economy and are therefore macroeconomic, unsystematic risks are considered microeconomic because they affect specific firms or sectors.

## **Internal and External Risk**

Internal risks are related to factors that are located directly within the enterprise. These include, for example, risks associated with research and development of new products and technologies, technical or technological challenges, or the possibility of employee failure. External risks, on the other hand, are associated with the environment in which the firm operates and arise from external, outside factors. These factors can be further divided into macroeconomic factors, which include social, economic, technological, and environmental aspects of the wider macroenvironment, and microeconomic factors, such as relationships with customers, competitors, and suppliers.

## **Controllable and Uncontrollable Risks**

Risks considered to be controllable can be eliminated or at least minimised through preventive measures aimed at reducing the likelihood or impact of potentially adverse outcomes, such as investment in new equipment or staff skills, which can effectively reduce the risks associated with R&D. In contrast, uncontrollable risks, where the cause cannot be controlled, such as negative changes in exchange rates or environmental disasters, require measures to limit their negative impact, for example through insurance. Internal risks are typically classified as controllable risks, while external risks are more likely to be considered as uncontrollable.

## **Primary and Secondary Risks**

These risks are interdependent, as the secondary risk will arise as a result of the implementation of strategies aimed at minimising the primary risk, which can originate from a wide range of factors. An illustrative example of secondary risk is the potential conflict arising from differences in corporate cultures when setting up a joint venture with an international partner, which may lead to its failure. In this case, the intention of the joint venture was a strategy to mitigate the primary risk, such as the risk associated with entering a foreign market.

## **Risks in the phase of project Preparation, Implementation and Operation**

Risks during the project preparation and implementation period include a wide range of potential threats that can negatively affect the project's schedule, budget limits and overall quality. These risks may include defects in project design, failure of subcontractors responsible for construction or engineering components, or negative currency fluctuations affecting the cost of imported technology. Alternatively, the risks associated with the operational phase of a project include factors that may affect its economic efficiency and performance, including increases in the cost of energy, materials, and other resources, decreases in market demand, or the inability to achieve planned capacity due to process problems.

There is also an important classification by subject matter into - **Technical/technological risks** that arise from the integration of scientific and technological progress, which can lead to the failure of innovation or to the moral obsolescence of technology. **Production risks**, which are linked to resource constraints and can lead to cost increases and disruptions in production processes. **Economic risks** reflect the potential for budget overruns due to rising prices of basic inputs, while **market risks** relate to product marketability and price pressures, mainly due to competition, and are among the most significant risks due to the impact on economic performance. **Financial risks** relate to how the company is financed and its ability to repay its obligations, while **credit risks** arise from the inability of customers and clients to meet financial commitments. **Legislative risks** result from changes in policies and legislation, for example changes in laws affecting the subject matter of the business, while **political risks** represent the threat from political instability such as strikes, national unrest or war. **Environmental risks** include costs associated with environmental protection and **information risks** relate to the lack of protection and subsequent misuse of the firm's information systems. Finally, the **risks associated with the human factor** consider the importance of the competence and behaviour of key personnel and management to the success of the firm. (Fotr and Hnilica, 2014)

## **1.2 Importance of risks**

After the financial crisis in 2008, all organisations started to focus more on understanding and reducing risk. This was due to the realisation that risks can also bring benefits and the fact that nowadays it is unacceptable for an organisation not to be prepared for unexpected events that would lead to financial losses, damage to their reputation or loss of market presence. Stakeholders are also an important aspect, as they expect the organisation to reduce risks that could, for example, delay a project or affect their operations.

The main benefits are then divided into three areas of improvement. The first is operational improvements, which come from identifying potential failures early and taking action to reduce the likelihood of their occurrence or the damage caused by them. This will make operations smoother and cheaper. The second benefit is the improvement in process efficiency, as the best option can be chosen by assessing the risks of different processes and process changes can be made more reliably and efficiently. And the last benefit is the improvement of strategic operations and its decisions, as all possible strategies and their risks will be analysed in detail and thus better decisions can be made leading to better company results and the achievement of the set objectives. (Hopkin, 2010)

## 2 Risk Management

Risk management is an important part of any organisation and is a process aimed at identifying, classifying and evaluating potential risks that can lead to losses (Panjehfouladgaran and Frederick, 2020). As mentioned in Chapter 1, risk can have multiple meanings to different people, so it is common for risk managers to use the term loss exposure. This term specifies a situation in which a loss may occur, such as damage to production machinery by a natural disaster, lawsuits resulting from defective products, or theft of an organization's assets due to security failures. Traditional risk managers focus only on "pure" loss exposures, which are risks that represent only a loss to the firm, not a potential gain. However, modern risk managers also consider "speculative" loss exposures, which are risks that can result in both loss and gain.

Traditional risk management, as mentioned, addresses the potential losses that an organization may face, and its objectives are divided into two types - Pre-loss objectives and Post-loss objectives.

Pre-loss objectives focus on ensuring economic efficiency in preparing for losses, which means conducting an analysis and selecting the most cost-effective way to deal with potential losses. Examples of these methods include costs of safety programs or insurance. Another pre-loss goal is to reduce the anxiety of key personnel and managers who are dealing with a variety of concerns that can cause significant worry. An example would be dealing with a large-scale lawsuit over defective products. The final goal is to meet legal obligations that mandate safety regulations, accurate product labelling, or proper disposal of hazardous materials to protect employees, consumers, and the environment.

Post-loss objectives, on the other hand, focus on the resilience of the organisation and its post-loss responsibilities. The main objective is to survive and ensure a rapid recovery of the company's operations. Rapid recovery of operations is extremely important for essential services such as banks or bakeries, as it is crucial to keep up with other firms on the market to maintain a competitive advantage. Another objective after a loss is stability of earnings, which is to maintain financial performance despite



the problems that have arisen after a loss. An important objective is the continued growth of the company, which includes developing new products, exploring new markets, and possibly merging or acquiring with other companies. A final important objective is social responsibility, which emphasises the need to minimise the impact of losses on the employees, suppliers, and the company as a whole. A significant loss can lead to long-term closure of the business and this can even have a liquidation impact for the company.

On the other hand, modern risk managers set a trend in the 1990s to take speculative financial risks into consideration. Then, some businesses extended their risk management function to all risks related to the organization.

Speculative financial risks, include commodity price risk, interest price risk and currency exchange rate risk. The first mentioned risk is the risk of losing money when a certain commodity changes its price. This risk is closely related to many producers and users. An example is agricultural operations, where the price of a commodity depends on the success of the harvest and the demand for it. However, there may also be positive effects for the firm, where the price of the commodity rises and can be sold at a higher price. The second risk is Interest Rate Risk to which financial institutions are very susceptible and it is a loss caused by changes in interest rates. And the third risk, Currency exchange rate risk is seen as the possible loss or gain when one nation's currency is converted into another nation's currency.

After successfully handling financial risk management, some companies introduce another industry to handle pure, speculative, strategic and operational risks, called Enterprise risk management. Overall risk exposure can be reduced by combining these different risks into one comprehensive approach, which can balance one risk against another. This strategy works well when the risks included in the program move in opposite directions and the overall risk to the company can be significantly reduced. This method uses the idea that not all risks occur at the same time or affect the company in the same way, so risk management can use a smarter and more balanced strategy. (Rejda, 2008)

## 2.1 Origins of Risk Management

Risk management began to emerge and explore its early stage of development during the Renaissance, the foundations for it were laid by scientists Blaise Pascal and Pierre de Fermat in 1654 with their theory of probability. At first, they applied this theory to gambling, however, the work was used as a framework for understanding risk, uncertainty, and decision-making. Over the centuries, a large number of other mathematicians and scientists contributed to the field, such as Girolamo Cardano, who worked on calculating probabilities on dice games, or Abraham de Moivre, who developed the concept of the normal distribution and standard deviation. Modern risk management began to evolve later significantly in the 20<sup>th</sup> century. The first references of the development are from 1955. (Przetacznik, 2022)

Modern risk management as applied to businesses began to develop later, with the first risk management concepts taking shape after 1955 and the first risk reduction strategies starting to emerge in the 1970s. This was preceded by the events of the Second World War, when, after the end of the war, large companies began to adopt self-insurance strategies to manage all possible risks. Self-insurance is defined as setting aside funds to cover the potential negative impact of various accidents or market downturns. Firms most often applied this option when dealing with the impact of natural disasters. In addition to self-insurance, firms increasingly implemented self-protection measures to reduce the probability of losses before they occurred.

In the 1980s, a development in the United States was caused by an insurance crisis in which insurance rates escalated and risks were inadequately covered. All of this led to new alternatives to eliminate risk, such as spreading risk over time rather than between entities.

In the financial sector, a revolution in risk management took place in the 1970s, when firms gave greater priority to financial risk management functions because of fluctuations in interest rates, exchange rates or commodity prices. To protect against these risks, firms relied on their reserves. For greater flexibility and to reduce the costs of these traditional methods, derivatives were increasingly used. Derivatives are financial contracts that serve as a protective measure against specific risks. All

this has helped to generalise the definition of risk management. It is now seen as including financial decisions evaluated by their impact on the value of a firm or investment portfolio, not just their ability to mitigate specific risks. (Dionne, 2013)

## **2.2 Benefits of Risk management**

Generally, risk management requires a lot of resources and careful and complete analysis but brings significant benefits for businesses and organizations. The key benefits include facilitating the achievement of pre-loss and post-loss objectives and the overall reduction of costs associated with risks (loss prevention expenses, fees for external consulting, insurance losses, etc.), which can increase profit of the company. By reducing the financial impact from unavoidable losses, companies can implement comprehensive risk management strategies that address both pure and speculative loss exposures. Among other things, risk management is also beneficial for the society, as it reduces direct and indirect losses and thereby reduce unpleasant circumstances. (Rejda, 2008)

## **2.3 Future for Risk Management**

The future of risk management is set to experience significant changes that will transform the way risks are managed and perceived across organisations. Business units will take direct responsibility for the risks associated with their activities, ensuring deeper integration of risk awareness.

The risk management function will shift towards a more focused oversight and challenge role, gradually moving away from its traditional scope. The increasing use of digital tools that can cognitively search for new risks and emerging threats from internal and external sources will play an essential role. Increased automation will revolutionise risk management by restructuring and optimising processes. Due to process improvements and robotics, operational risks will be reduced, and monitoring and automated risk classification systems will lead to a higher quality of risk management. Due to these changes, in particular digitalisation, companies are at a critical point in risk management.

In the coming years, they must decide whether to continue with their traditional methods or completely change the way they manage risk. If they properly embrace new technological tools such as artificial intelligence or process automation, they will be able to reduce costs and more effectively hedge against potential risks, but some organisations have already taken small steps in this digitalisation, but their incorrect configuration has led to rather chaotic and inefficient risk management. (Hida and Leake, 2017)

## **2.4 Risk Management Process**

Until recently, risks were often managed by mid-level executives or were outsourced by insurance brokers. However, as risks grew in complexity and began to have greater impact, various risk management organisations began to develop more integrated and effective risk management systems. Today risk management involves identifying and actively managing various corporate risks, including strategic, financial, operational and hazard risks. From which a systematic process called Enterprise Risk Management (ERM) has evolved, which consists of several steps namely Risk Identification, Risk Evaluation and Assessment, Development of Risk Management Strategy and its subsequent implementation and monitoring and controlling of the results. All these steps are described below. (Harvey, 2012)

### **2.4.1 Risk Identification**

The first critical step is to identify all the potential risks the company may be facing. Many companies are already failing in this step because they focus only on hazard and operational risk and forget about financial and strategic risk. Incorrect or no identification and misunderstanding of the interconnectivity of risks can lead to a decrease in a company's value. There is no universal method to identify all risks; for more comprehensive identification, external experts can be hired to help internal teams. They should consider, among other things, foreign currency transactions, secured loans, employee competencies, ongoing legal issues, or the overall financial market outlook as possible risk locations. (Srinivas, 2019)

The primary objective of risk identification is to establish a comprehensive list of all potential problems that could negatively affect the progress of the project to apply various mitigation strategies to them. It is also important that all stakeholders are informed of unexpected problems and are at least partially prepared for them. Selecting and applying a strategy that is most comfortable to the project team and is most effective is essential to establishing a risk list, as precise risk identification is key to successful risk management. (Harvey, 2012)

#### **2.4.2 Risks Assessment**

The second step in the risk management process is risk assessment, where it is crucial for each identified risk from the previous step to evaluate the probability of occurrence and how significant its impact may be. Firms should conduct this risk assessment annually and also as soon as there are any major changes in their operating strategies. An important part of the risk assessment is the participation of the entire team and executive management in discussions that should help to assess and prioritise risks. Once the risk assessment is complete, a risk profile can be established that outlines the various types of risks expected to support future risk management activities and processes. (Harvey, 2012)

#### **2.4.3 Developing strategies for risk mitigation**

The main objective of risk management is to enable the company to exploit as many opportunities as possible without compromising its value. To achieve this goal, it is essential to design strategies and tactics for a strong risk management framework. Four basic strategies can significantly help an organization minimize risk exposure and associated costs:

**Risk Acceptance** – Businesses often choose to retain risks that occur frequently but have minor consequences. They may self-insure these risks or choose insurance with high deductibles, carrying a significant portion of the loss before the insurance begins. The decision to retain risk involves an assessment of the company's financial strength to absorb losses. Although it may appear cost-effective, retaining an

excessive amount of risk could potentially reduce investment opportunities and affect the company's overall financial position, specifically with regards to credit contracts or credit ratings.

**Risk mitigation or reduction** – This strategy, known variously as loss prevention, is an effective way to manage common, less severe risks. By accepting that some risks are inherent, actions are taken to reduce the likelihood of future adverse events. This includes regular training of employees and contractors to improve safety and reduce accidents, implementing mandatory safety policies, and adopting IT security measures. The goal is to continuously look for methods to reduce risk exposure.

**Risk avoidance** – Risks with high frequency and severity should be prevented whenever it is possible. This may include redesigning the operations to reduce the danger or abandoning high-risk projects or areas. While avoiding risk can result in missed opportunities, it is a smart decision that is designed to protect the company's strategic objectives.

**Risk transfer** – This strategy is best for risks with low occurrence but high severity. It involves transferring risks, which were not allocated for the mitigation by other proper strategies, to third parties through outsourcing risky project or at least part of it or contractual agreements with typical example of insurance policies, which might be seen as the most cost-effective way to transfer risk, but as companies grow and their operations become more complex, they often find that a combination of these strategies adapted to their specific risk profile will provide the best protection. The challenge is to create a dynamic risk management process that optimizes opportunities while effectively managing costs. (Harvey, 2012)

#### **2.4.4 Monitoring and control of the implemented strategies**

The last step of risk management process is monitoring and control, which also includes the implementation of an already approved and well-consulted risk mitigation strategy. These are then important to be continuously monitored and controlled, which is considered as one of the most important steps of the risk management process itself. Control and monitoring are usually the responsibility of

the risk manager and his team. In the case of any changes in operations or in the implemented strategic plan, it is essential to immediately inform the board and executive managers for a possible re-evaluation and re-assessment of the risk. The monitoring process should also include both internal and external auditors to provide the board and executive managers with objective and systematic review of the risk management framework. (Harvey, 2012)

## **2.5 Tools used in Risk Management process**

There are many tools and techniques that are used in stages of Risk Management process, mainly for the first two steps of risk identification and risk assessment. The best known and most used are, for example, Brainstorming, Delhi technique, Checklist analysis, PESTLE analysis, SWOT analysis or Expert interview, which are primarily used for the identification. For the assessment, qualitative and quantitative tools are used. (Pritchard, 2015)

### **2.5.1 Brainstorming**

Brainstorming is a popular technique for gathering information. It is a collective tool to which employees and managers can contribute, as well as other stakeholders such as customers or vendors. Although it is not the most effective method, its familiarity and simplicity often make it a preferred choice for, for example, risk identification in companies, as it also involves predicting future problems, making it a very useful method because everyone is aware of how they can contribute and is able to share opinions and insights from their immediate perspective. Beyond identification, brainstorming is also useful to find ways to measure or assess these risks and also to suggest possible strategies to reduce them.

Brainstorming is about the collective sharing of ideas that can inspire other participants leading to a rich flow of information. In more detail it is a session led by a facilitator where everyone can openly give their opinion without any judgement by others, therefore very interesting and beneficial ideas can emerge. The aim is to generate as many possible ideas as possible, which can then be further developed.

Specifically in risk management, the organizer of the brainstorming session can bring in the question "What risks does a project face?" where the other participants then share all their opinions, which are documented and then further discussed. This leads to a comprehensive identification of risks and, thanks to the broad perspective of all participants, can reveal those that are often overlooked and neglected.

For a successful brainstorming session, it is necessary to first establish and explain the rules well, then expand on the ideas of the participants, making sure that no one is overlooked and that all ideas are given their space. It is important to stick to the topic, so that unwanted debates on topics that are not the subject of the brainstorming session do not arise. Once all the information has been gathered, it is then important to review it for possible development of the best ones. At the end, sharing of the results with participants is important, showing them how their contributions will be used. (Pritchard, 2015)

Brainstorming can be done in person or online and tools such as mind maps, whiteboards or sticky notes are used for more accurate results. Furthermore, brainstorming can be used as a support for a proactive risk management culture, where individuals feel safe and free to directly express their observations or any weaknesses. (Woodward, 2024)

### **2.5.2 Delhi technique**

The Delphi method is an evolutionary and structured technique designed to gather and specify expert knowledge through several expert discussion sessions aimed at reaching agreement on specific topics or issues without the need for their physical presence. This method is particularly advantageous when the direct involvement of experts is limited by their availability, geographical dispersion or potential conflict arising from direct interactions. It overcomes these challenges by offering a way for experts to share their ideas at their own pace and from any location, making it easier to integrate them within the context of their busy lives and different locations.

At first, the process begins with the creation of a clearly defined questionnaire aimed at obtaining detailed subject-relevant knowledge and perspective. This questionnaire



is then distributed to a carefully selected group of experts who have relevant knowledge or interest in the topic. These experts are selected not only for their professional expertise but also for their ability to contribute different perspectives, thus enhancing the collective view.

After receiving initial answers, information is gathered and summarized, and further identification of shared themes, disagreements, and areas requiring further clarification is made. This synthesis is shared with participants and encourages them to reflect on the collective feedback and provide additional insights or revisions in the subsequent sessions. This cycle of feedback and refinement continues until potential solutions emerge or the incremental knowledge gained from subsequent rounds is reduced, signalling the completion of the Delphi process. The result is then a complex collection of expertise that can be used to provide further strategies for, for example, mitigating the given risks. (Pritchard, 2015)

### **2.5.3 Checklist analysis**

Checklists are a very simple tool used mainly to identify risks, using the experience of past projects and the knowledge of experienced project managers. In addition to identification, risks can also be assessed, specifically through these checklists, which include questions and statements derived from the experience gained, reflecting previous challenges.

The checklists are applicable in all possible projects, especially in environments where such checklists are already in place. If a project does not have a checklist, it can use the generic checklist developed by the Software Engineering Institute to help identify risks in different projects in specific areas. The use of checklists is most effective at the beginning of a project, but they can be reviewed during or at the end of a project to ensure a comprehensive risk assessment.

Only clearly documentable collective experience is needed to develop these checklists, as mentioned above. Subsequently, project teams discuss and review the risks to determine their relevance, answer the questions raised and discuss the guidance provided. These guidelines should be clearly communicated to all team

members. This serves primarily as an alert system in which categories or specific risks known from past projects are highlighted. More sophisticated, software-driven checklists can also offer helpful guidance to direct teams to best management practices for identified risks.

The results of using checklists can offer a broad understanding of potential project risks that minimizes the concerns that may arise during implementation. The insights gained should also form the basis for revising the original checklists and adding or removing items based on experience with the most recent project. The accuracy of these results is generally high and ensures a consistent risk assessment across projects. However, the utility and level of detail may vary depending on the complexity of the checklist and how it is used. Despite the accuracy of the results, it is not recommended to use only checklists to identify risks, as not all risks can be predicted through predefined checklists. (Pritchard, 2015)

#### **2.5.4 PESTLE analysis**

PESTLE analysis is an acronym where the initial letters stand for six key macroeconomic factors, and these are Political, Economic, Socio-cultural, Technological, Legal and Environmental factors. This analysis helps to identify the macroeconomic variables of a given market and new opportunities, that are crucial to the development of the business or identifying potential risks and threats that may threaten the operation of the business.

Although there are many benefits from PESTLE analysis, it is important to consider its limitations, which may give inaccurate results to the firm. This is because some results can quickly become outdated and need to be updated frequently, this is most often the case in fast-changing sectors such as technology. The overall analysis and market research process is time-consuming and costly, so managers have to be sure that it is worth conducting this analysis. Besides, the PESTLE analysis only aims to highlight critical aspects and therefore further in-depth analyses such as SWOT analysis or Porter's five competitive forces model are essential. As already mentioned, PESTLE is an acronym for six macroeconomic factors, each of them is described below. (Alanzi, 2018)

## **P – Political Factors**

Political factors include such things as government and monetary policies, laws and restrictions, levels of corruption and levels of conflict. It is important to consider these factors, particularly in regions with unstable governments, where a wide range of risks may arise that threaten the operation of the business or its projects.

## **E – Economic factors**

These include for example country's GDP, tax rates, consumer purchasing power, inflation, or economic growth. Although it is impossible to change these factors, it is essential to analyse and understand them and their potential variation in order to be able to make better strategic decisions.

## **S – Socio-cultural factors**

Other important factors for success in the market are a good understanding of the needs and buying preferences of different cultures and regions. This can be achieved for example by analysing demographic data, cultural traditions, or social trends.

## **T – Technological factors**

Companies need to keep up with developments and innovations in their sector to maintain a competitive advantage. To identify risks, it is therefore important to be aware of new technologies, changes in communication methods or new patents and products.

## **L – Legal factors**

Knowledge of different laws such as labour or trade laws in different countries is essential to avoid the pitfalls of the law, minimise risks and operate effectively within the legal framework.

## **E – Environmental factors**

Environmental factors include the constantly growing issues focusing on the environment and sustainable development. Thus, it is important for a company to consider the environmental impacts of its operations and avoid unwanted conflicts with authorities. (Alanzi, 2018)

### **2.5.5 SWOT analysis**

SWOT analysis is one of the most common and basic tools for strategic planning or risk identification and assessment. It aims to analyse all the critical aspects of an organization by examining its internal and external environment. The analysis involves the evaluation of four major features which are acronym to the word SWOT and are namely Strengths, Weaknesses, Opportunities and Threats. These features are then further subdivided according to their origin of action into internal and external, with strengths and weaknesses belonging to internal factors as they derive from the organisation itself and opportunities and threats belonging to external factors as they come from the environment in which the organisation operates. In more detail, strengths include attributes that provide an advantage over competitors, including a dominant market position, financial durability, potential research, human resource capability or technical competence. These strengths are important for the organisation's ability to survive in the market, to take advantage of opportunities and can reduce the impact of threats. In terms of weaknesses, these are gaps or areas where the organisation is falling behind its competitors. Weaknesses limit an organisation's performance and can also reduce competitiveness and disrupt established strategies. Opportunities are positive external conditions that the organisation can use to its advantage and to better achieve its objective. They can arise, for example, from changes in the socio-political environment or from new market trends that create new chances and opportunities for the organisation to grow and improve. Threats, on the other hand, are negative to opportunities and threaten the organisation's goal achievement and success. These include any changes in the external environment that disrupt the organisation's market position and its competitive position and viability. (Gürel, 2017)

This analysis is typically visualized as a four-quadrant matrix (Table 1), which helps to provide a structured summary in accordance with these four categories. The interpreted results are qualitative and therefore, for the most effective analysis, an individual with the greatest knowledge of the project or organization on which the SWOT analysis is being conducted is needed. In terms of its reliability, it may be somewhat unreliable due to the subjective assessments of the individuals interviewed. The general rule here is that the more reliable the participants, the more reliable the analysis and its results. (Pritchard, 2015)

*Table 1 - SWOT analysis*

	Positive	Negative
Internal origin	Strengths	Weaknesses
External origin	Opportunities	Threats

Source: Own processing based on Gürel, 2017

### **2.5.6 Expert interview**

Expert interviews are a very effective method for obtaining more detailed information in risk identification and also risk assessment. In risk management, it is an essential technique, as it allows to identify risk areas very well and apply qualitative findings from specialists to risk assessment. Due to the unique challenges that each project presents, relying only on historical data from similar projects is inadequate and it is therefore crucial to use the expertise of skilled professionals.

The expert interview process is relatively straightforward to implement. It all starts with identifying and selecting the right experts in the field of investigation. Incomplete or biased risk assessments can occur if the wrong expert is chosen. Next, the preparation of the interview itself is very important, both the interviewer and the interviewee should have a good understanding of the topics and objectives of the interview to ensure the smooth flow of the interview. The interview should begin with a validation of already known risks before addressing potential risks using the expert's knowledge. This can help develop the discussion and through a wide range

of topics come up with a greater number of risks, that might not have been initially obvious. The next and final step is risk evaluation, which is considered to be the most difficult aspect of the process. Experts evaluate what the potential impact of each risk is and how probable it is to occur.

The findings from the expert interview can serve multiple purposes, for example, laying the groundwork for a risk management framework or identifying specific risks and suggesting a potential mitigation strategy. The success and reliability of the results, however, depends heavily on the skills of both the interviewer and the interviewee and on the methodology chosen. While the process can be problematic, including poorly chosen experts or poor quality of information obtained, its benefits are unquestionable. (Pritchard, 2015)

### **2.5.7 Qualitative and Quantitative analysis**

Risk assessment tools are divided into two main types - qualitative and quantitative, each offering a unique approach to risk assessment and prioritization. These techniques provide a better understanding of the risks and also enable more informed decision-making to mitigate potential disadvantages or exploit potential advantages. (Volkan, 2021)

#### **Qualitative analysis**

Conducting a qualitative analysis after identifying risks in a company or project involves organizing and evaluating those risks based on the information gathered during the identification phase. (Pritchard, 2015)

This type of analysis is widely used across a variety of business risks in which the "Probability/Impact" and "Keep It Super Simple (KISS)" methods are widely used. The KISS method is designed more for smaller businesses and projects with a narrower focus, where risks are assessed on a basic scale from very low to very high. The Probability/Impact method is suitable for more complex projects and larger companies. It applies a two-dimensional technique that assesses risk according to the probability of the risk occurring and its potential impact. Probability and impact

are rated on a scale of, for example, 1 to 10 or 1 to 5, with the risk score being multiplication of the quantities of both variables. (Volkan, 2021)

		SEVERITY →		
		1	2	3
LIKELIHOOD ↓	1	LOW - 1 -	LOW - 2 -	MEDIUM - 3 -
	2	LOW - 2 -	MEDIUM - 4 -	HIGH - 6 -
	3	MEDIUM - 3 -	HIGH - 6 -	HIGH - 9 -

*Figure 1 - Risk Matrix*

Source: Marker, 2017

These scales for qualitative risk assessment are not universal and each enterprise can set its own number of scales or numerical range (Fotr and Hnilica, 2014). According to Figure 1, the business should mostly deal with high impact and high likelihood risks in the red zone and try to design an effective strategy to mitigate them. The risks from the orange area should also be addressed with high priority because they can be very dangerous for the company.

Qualitative risk analysis offers a deeper insight into relevant risk scenarios and provides detailed data for decision making. Despite the more objective perspective, risk essentially involves estimates or inferences. While qualitative analysis is often preferred for its simplicity and ease of use, some situations require the use of quantitative risk analysis, which can provide additional insights to the qualitative analysis which has already been performed. However, if the results from the qualitative analysis are sufficient, conducting a quantitative analysis for each risk could be unnecessary and unhelpful. (Volkan, 2021)

## **Quantitative analysis**

Quantitative risk analysis is usually used to evaluate higher priority and higher impact risks. The aim of quantitative analysis is to convert probability and impact, qualitative variables, into measurable variables to provide a more effective method for decision making and to help develop a realistic plan for cost reduction. Its use depends on the type of project, the risks involved and, most importantly, the availability of data, which is often a major limitation to successful evaluation, and which complicates the risk analysis process. This analysis is particularly suitable for more complex business projects where budgets must be controlled and where more detailed evaluations are required. Its advantages include direct cost projections, adaptability to different situations and sectors, and less chance of causing conflicts between project teams and management because it is based on hard facts. (Volkan, 2021)

Ideally, quantitative risk analysis uses comprehensive and detailed data summaries to gather information, along with insights from previous risk identifications and any existing statistical databases within the organization. If these data are still insufficient, they can be enhanced with some tools such as expert interviews or Monte Carlo simulation, which analyses cost and schedule risk projections of possible outcomes along with their probabilities, providing valuable insights into potential project risks. (Pritchard, 2015)

Statistical indicators such as variance, standard deviation or coefficient of variation are often used to assess risks, especially risks related to financial management. These indicators show how far or how close the values of a criterion (for example, project revenue) are to the average (expected) value. A higher variance and standard deviation indicate that the values of the criterion are more dispersed from the mean value, which indicates a higher risk. However, the variance and standard deviation may be inaccurate when comparing projects with higher and lower scales or larger and smaller companies. A larger project with less risk may have a higher variance than a smaller but riskier project. In such cases, the coefficient of variation, which represents the level of risk and is calculated as the ratio of the standard deviation to the mean value of the criterion, is used as an indicator of risk and thus allows for a better comparison of the riskiness of projects and firms regardless of their size. The



coefficient of variation thus provides an overview of the risk per unit of mean value. (Fotr and Hnilica, 2014)

Quantitative risk analysis therefore provides project managers with a clearer understanding of the overall level of project risk and enables the development of a prioritised list of risks that the company should aim to eliminate. (Pritchard, 2015)

### **3 Introduction of the company and its environment**

Company XY is a German corporate joint stock company founded in 1871 in Hannover, which manufactures components for the automotive industry and is one of the world's largest suppliers to this industry. The company operates in fifty-six countries worldwide and employs more than 190,000 people in 554 locations.

Company XY achieved revenue growth to EUR 41.4 billion in 2023, an increase of 5.1% compared to the previous year. This is due to strong demand and the company XY's market presence and operational efficiency. This growth provides an opportunity for further expansion, with plans to expand into the Asia Pacific and Americas region to take advantage of growth opportunities in the Tire sector. As a result of the positive year 2023, the company's High Net Indebtedness has been reduced by 10,3 % and currently amounts to 4 037,9 million EUR. The company has a diversified product portfolio in the Automotive, Tires and Technology segments, benefiting from its extensive global presence. Its success is also supported by a strong focus on research and development, ensuring innovation and technological advancement, which means that product development is more focused on digitalisation and sustainability. (Internal information)

#### **3.1 Risk Management of the selected company**

The Risk and Opportunity Management System is used across the company to provide a complete analysis and management of the business environment. At company XY, risk management is core to corporate strategy and is aligned with strategic objectives and is continuously improving. The goal is to support long-term value creation, which is continuously improved by analysing each department's unique risks and opportunities.

As a global company, XY faces a wide variety of risks that can potentially complicate business operations and threaten the company's survival. Therefore, risk management and internal control system are very important here, and are supervised by the Governance, Risk and Compliance Committee, which is led by the board

members responsible for integrity, legal, finance, controlling and IT. For risk management, there is a framework for identifying, assessing, reporting, and documenting risks, increasing awareness of potential and existing risks throughout the company. When a risk is detected, the issue is reported to the appropriate organisational level, which is also responsible for the risk. Further, the risk is extended to higher organisational levels, ensuring comprehensive reporting from the lowest to the highest corporate level. At the highest level, the most significant risks are identified and subsequently reported to the Executive Board and the Audit Committee of the Supervisory Board. A one-year period is used to assess the identified risks and a complex gross and net assessment method is used to help assess the effectiveness of risk mitigation measures. Mostly quantitative measures are used to assess risks, but in cases that examine potential adverse impacts on corporate objectives and reputational damage, qualitative methods are used. Among all risks, the most significant ones are selected according to the potential amount of damage and the probability of occurrence. In the case of the quantitative assessment, the impact on free cash flow and EBIT is considered. Risks with a financial impact exceeding EUR 100 million are further described in detail in the Risks and Opportunities Report.

The effectiveness of risk management is evaluated on the basis of the findings of regular internal reports and group-by-group assessments of these systems. When weaknesses or deviations are identified, all are reported to the appropriate persons for correction and any improvements that are initiated are followed up. In 2023, there were no indications that the risk control systems were deficient in any significant way, however, despite the high level of effectiveness, because of the difficult to predict and complexity, it is not possible to guarantee the complete identification of all potential risks to the company, so risk management should never be underestimated. (Internal information)

## **3.2 Overview of the Automotive Industry**

The automotive sector is a very important part of the global economy, contributing 3.65% to global GDP. It is strategically important especially in regions such as the America, Europe, and Asia, where it is key to countries such as the United States,

China, Japan, Germany, India, Korea, France, and the United Kingdom. In 2019, the automotive industry was responsible for nearly 10% of global trade. The strategic importance in Europe is supported by the fact that the automotive industry accounts for 7% of the EU's GDP. It is also significant in the supply of jobs, with almost fourteen million people employed in the industry. (Fabbe-Costes and Lechaptois, 2022)

Despite these important meanings and all its achievements, the sector is currently facing many challenges related to large-scale transformations. The main factors include the transition from internal combustion engines to electric powertrains, a step that has opened the opportunity for the creation of new competitors that can disrupt the traditional dynamics of the market and thereby gain large market shares, especially competitors from China, since China is the largest automotive market in the world. The fact that China is a major threat and competitor has already been proven in 2022, when it overtook Germany in the number of light vehicles exported by 400 000 units. This is also due to the poor macroeconomic situation in Europe, which is characterised by rising energy costs, inflation, and geopolitical tensions that threaten the functioning and future of the automotive industry in Europe. The future will depend on the ability to adapt quickly and effectively, which requires a collective effort from all stakeholders involved in the European automotive ecosystem. (Cornet et al., 2023)

Even though, the first two months of 2024 recorded a 22.3% increase in the number of cars produced, with 263,028 units produced compared to the previous year. Of this amount, 18,536 units were electric cars, equivalent to 7% of total car production. There were 13,286 battery BEVs and 5,250 plug-in hybrid PHEVs.

More than half of the units produced came from Škoda, the largest Czech car manufacturer, which produced 161,733 passenger vehicles in January and February, of which 8,605 were electric vehicles. Hyundai produced 58,800 vehicles in the Czech market, up 8.7% compared to the previous year, while Toyota produced 42,495 passenger cars.

Apart from passenger cars, the production of buses also performed well, with forty-five more buses produced in January and February than last year, which is a 7.1%

increase, and motorcycles, of which 152 units were produced, with a 39.4% increase compared to last year. (Jungwirth, 2024)

The global nature of the automotive industry makes it highly sensitive to a variety of external factors. Political factors, such as changes in tariffs and trade agreements, can have a significant impact on the cost of import and export of key commodities such as raw materials, components, and finished vehicles, as well as affecting transport logistics. Environmental factors such as floods and volcanic eruptions can also disrupt the flow of goods through the supply chain. In addition, changes in social and economic conditions may shift consumer demands and force the supply chain to adapt to preferences for more fuel-efficient vehicles or electric vehicles, thus challenging the established supply chain practices. (Jehan, 2021)

To counter these potential interruptions, automotive supply chain managers use advanced risk management strategies to identify and evaluate potential issues that could negatively impact the supply chain. By determining the potential impact and likelihood of these risks, they can be prioritised and addressed accordingly. Managers can develop risk mitigation plans with key suppliers to ensure the availability of critical vehicle parts, including arrangements for alternative suppliers, production options, backup logistics, and even relocation of operations to take advantage of more favourable economic conditions in other countries. In addition, performing complex market analyses enables a deeper understanding of consumer trends, which informs future supply chain design strategies and ensures resilience to external shocks. (Jehan, 2021)

### **Trends in Automotive Industry**

As mentioned above, today's automotive industry is going through a major transformation due to technological advances and changes in customer expectations. It is due to technological advances that the car is now seen as a connected intelligent mobility device that can be similar in functionality to a smartphone or a computer. Technological innovations such as artificial intelligence, additive manufacturing in the form of 3D printing and 5G internet connectivity are among the main reasons for this progress. These technologies can also improve

manufacturing processes, leading to a significant redefinition of the customer experience offered by the automotive sector.

In the last few years, the automotive sector has been undergoing major trends that are expected to continue to influence its direction. Some of these major trends expected for 2024 include the shift to electric vehicles, the development of autonomous driving technology, expanded vehicle connectivity, a focus on sustainability in the form of alternative fuels, the rise of mobility as a service (MaaS), and the integration of advanced safety features. (Andriiuk and Sokolova, 2023)

**Electric Vehicles (EVs)** – The transition to EV is one of the most significant trends in the automotive sector. This is mainly caused by environmental concerns and demand for zero-emission transportation options. The popularity of electric and hybrid cars is constantly growing, which is also supported by the progress in battery technology and the continuous expansion of charging infrastructure. Major car companies are increasingly focusing on electric cars and companies such as General Motors, Volvo and Aston Martin are even planning to stop producing vehicles with internal combustion engines completely in the near future. Projections for 2030 show that electric cars will account for 55% of all new car sales in Europe. (Andriiuk and Sokolova, 2023)

**Self-driving technology** – Car companies like Tesla, Ford or Volvo are increasingly focusing on the potential of self-driving technology as it offers further opportunities to differentiate themselves from competitors and enhance their business. Currently, the development of autonomous vehicles is at an early stage and only Level 3 (conditional automation) and some Level 4 (high automation) vehicles are being tested in selected areas. Although the full deployment of autonomous driving is still several years away, the dynamics of this technology are strong and development and testing can be expected to speed up in the coming years, leading to an increase in the number of autonomous vehicles on the road. (Andriiuk and Sokolova, 2023; Howarth, 2024)

**Mobility as a Service (MaaS) / Transportation Transformation** – This trend represents a significant shift in transportation and offers a simplified and

cost-effective alternative to traditional car ownership. MaaS involves a combination of public transport, taxi, and car leasing services to deliver a complex mobility solution. The MaaS market is expected to continue to grow, driven by advances in connectivity, an expanding range of transport options and changing consumer transport habits due to the comfort and efficiency of the MaaS platform. (EMR, 2023)

**Sustainability in the form of alternative fuels** – With the move towards electrification, alternative fuels are emerging as a complementary trend, offering a more environmentally friendly option for internal combustion engine cars. The main e-fuels include e-kerosene, e-methane, and e-methanol, which are produced by synthesizing CO<sub>2</sub> emissions with renewable, carbon-free electricity. Despite the discussions about the harmfulness and use of alternative fuels, the European Commission has allowed the sale of cars using these fuels after 2035, provided they have no impact on the climate. This may affect the potential growth of e-fuel production in the coming years. (Andriiuk and Sokolova, 2023)

**Advanced Safety Features** – Other trend in the automotive industry include safety features, which are constantly improving. Manufacturers are increasingly expected to build more sophisticated safety features into their vehicles, which will be driven by constant changes in legislation, mainly the General Safety Regulation (GSR) issued by the European Commission. These safety features include, for example, the integration of advanced driver assistance systems, which include lane departure warning or autonomous emergency braking. Other safety features include pedestrian and cyclist protection, which will be in the form of integrated cameras and sensors linked to emergency braking systems, or intelligent speed assistance, which will use GPS and data mapping to alert the driver to speeding and adjust the vehicle's speed if necessary. All these safety technologies are constantly improving systems and it is very likely that this trend will continue to expand in the future so car manufacturers will be forced to adjust to them. (Jungo, 2024)

### **3.3 PESTLE analysis of the EU**

To effectively identify risks, it is necessary to analyse the environment in which company XY operates. Due to the global character of the company, the business environment is very diverse and the markets in which it operates are worldwide. The most significant region for sales is Europe, with 48% of all sales generated there in 2023, with Germany being the most significant country (19%), 27% of sales generated in North America, 21% in Asia and the remaining 4% in other countries (Internal sources). Europe and mainly the European Union countries can thus be considered the most significant environment for XY's business and thus a PESTLE analysis will be performed on this region (EU). This includes political, economic, social, technological, legislative, and environmental factors that affect the business of company XY and the overall impact on the automotive industry. (Internal information)

#### **3.3.1 Political Factors**

The European Union is an international entity of 27 European countries that is dedicated to the management of common economic, social and security agendas. The EU was established by the Maastricht Treaty, which came into force in 1993, to promote integration in the political and economic spheres. This was supposed to be achieved by a common currency, the euro, with twenty of the 27 countries now forming the so-called eurozone (the euro is the official currency there). Another important factor contributing to political and economic integrity is the Schengen area - an area without internal border controls between Member States. There are currently twenty-nine countries in the Schengen area, 4 of them are not members of the European Union, and it allows the free movement of more than 400 million people. (European Union, 2024)

However, Europe and the European Union (EU) face many potential political challenges from 2022 that could significantly affect its stability and consistency. The European Union, with the aim of strengthening peace when it is founded, considers political stability as a fundamental pillar. Political tensions between some Member



States and external conflicts, in particular the Ukraine-Russia conflict that started in 2022, pose significant threats to stability. This conflict has had varying degrees of impact on individual Member States, with those neighbouring Ukraine feeling the most immediate effects and those further afield, such as Portugal and Spain, feeling less direct consequences. The emergence of political extremism and radical movements in Europe may also upset the political balance in Europe. Such movements may challenge established alliances, which could result in a Member State leaving the Community, which would mean the reintroduction of customs barriers and affect the integrity and functionality of the Union. (Oboolo, 2022)

### **3.3.2 Economic Factors**

With the free movement of goods, services, capital and people, the EU represents a single European market of more than 4 million square kilometres, home to almost 450 million people. The main objective is to remove barriers to doing business in member countries, and this was achieved by removing tariffs and minimising bureaucratic obstacles. In 2023, the European Union's GDP was \$17.818 trillion. GDP is projected to grow steadily and reach \$21.111 trillion in 2028. Between 2018 and 2022, there was more of a decline in GDP due to the coronavirus crisis and the start of the UkraineRussia conflict. The GDP per Capita in the European Union in 2023 was 41.11 thousand US dollars and in 2024 is so far 43.3 thousand US dollars. Purchasing power parity for GDP per capita was \$57 thousand in 2023. The inflation rate, which reached its peak in the last 20 years in 2022, with an average value of 9.3%, is now back to its target values, and reaches 3.6% in early 2024. (O'Neill, 2023; International Monetary Fund, 2024)

In terms of foreign trade, the European Union is one of the largest importers and exporters in the world. Exports amounted to USD 2.57 trillion in 2021, with goods exported to 210 countries. Imports were from 209 countries with a value of USD 2.5 trillion. The United States, the United Kingdom, China, and Switzerland are among the largest export partners. The largest export categories were - other medicines, petroleum oils, human and animal blood and automobiles. Regarding imports, goods are mostly imported from China, United States, United Kingdom, Switzerland, where

petroleum oils, transmission apparatus and natural gas are the most imported. (WITS, 2021)

The most widely used currency for international transactions is the dollar, therefore stability in the exchange rate between the dollar and the euro, which is the official currency in twenty countries of the European Union, is essential. The euro was at its strongest against the US dollar in 2008, when 1.57 USD could be exchanged for 1 euro. However, the Euro weakened over the following years, even falling below the dollar in October 2022, when exchange rates were 1 Euro for 0.97 USD. Since then, the Euro has strengthened with 1 Euro being exchanged for 1.08 USD in February 2024. (European Central Bank, 2024)

### **3.3.3 Social and cultural factors**

Europe has a rich and interconnected cultural heritage which continues to be developed by the European Union. Thanks to the Schengen area and the free movement of people, EU citizens are free to travel and reside in any Member State, which is increasing labour migration, especially among young people. This is also made possible by the EU's current cohesion policy, which places considerable emphasis on the research, innovation and information and communication technology sectors. (Rahman, 2021)

Nevertheless, the EU faces several social challenges. One problem is the ageing population, which is leading to changes in the demographic structure of society. The working age population is declining, and the number of older people is increasing, and these changes will have a major impact on health, the labour market, public finances, and pension systems. Another challenge is changes in consumer behaviour and economic distrust, which is experienced by an average of 61% of the population in Europe. As a result of the cost of living, many individuals are choosing to buy fewer things or to postpone purchases. This pessimism is influenced by the pandemic and economic and political instability. Furthermore, the structure of household expenditure is also changing, with a greater proportion of the budget being devoted to basic needs such as energy, transport, and food. Consumers are also shopping

more frequently at discount stores and looking for better value brands. (Eurostat, 2024; Bazzoni et al., 2022)

However, despite the changes in consumer behaviour, the car market was 13.9% more prosperous in 2023 than 2022. A total of 10.5 million units were sold. Petrol cars were the most dominant in the market with a 35.3% share. Hybrid-electric cars followed in second place with a 25.8% share. Battery electric cars were next with a market share of 18.5% and diesel cars were the last with a market share of 13.6%. In December 2023, however, sales were down 3.3% to a total of 867,052 units. The most significant decline was in Germany, down 23%. (Acea, 2024)

### **3.3.4 Technological factors**

The European Union is outstanding in the field of science and technology. Countries like Germany, France, Sweden, and Finland are among the most technologically advanced in the world. However, the EU is falling behind the US and China in technology and IT. Top technology companies such as Apple, Alibaba, Amazon, Alphabet and Microsoft are either from the US or China, and this shows the technological gap that the EU has against them. (Rahman, 2021)

This is also evidenced by gross domestic spending on science and research. In 2021, the EU spent 2.2% (USD 400 billion) of its GDP on science and research, China 2.4% (USD 620 billion) of its GDP and the US 3.5% (USD 709 billion) of its GDP. (OECD, 2024)

Lower R&D spending may bring significant challenges to the European car market in the form of emerging Chinese electric car brands targeting the European market. Currently, Chinese car supply does not threaten the market and is unlikely to immediately capture significant market share. Based on past experience, when Japanese and Korean car brands entered the European market, a significant increase in their market share only became apparent once local production bases were established. (Gattiker et al., 2023)

Other technological factors affecting the automotive industry, and thus company XY, include the overall transition from internal combustion engine cars to electric cars and autonomous driving, which has already been presented in section 3.2.1. The size of the automotive AI market exceeded USD 6 billion in 2022 and is expected to increase significantly over the coming years. With the increasing connectivity of vehicles and integration of digital technologies, the risk of cyber-attacks and threat to traffic and safety is increasing. Therefore, companies will need to increase vehicle security and mitigate these threats. This can be achieved through advances in 5G data networks and the increased efficiency and reliability of automated cloud environments. (GMI, 2022)

### **3.3.5 Legal Factors**

The European Union is a highly regulated and framed union. Because of that, there are several key aspects of the automotive legal environment that create unique challenges for companies in the sector. Cars and vans produce 19% of the EU's total CO2 emissions, which contribute to climate change. To reduce this, the EU has introduced Regulation (EU) 2019/613, which sets new CO2 emission standards for cars and vans. Since the introduction of the regulation, emissions have been reduced by 27% on new cars and 10% on new vans by 2022. However, in April 2023, the European Parliament updated the regulation to make the CO2 emission standards stricter, which is in line with the EU's goal of achieving climate neutrality by 2050. This update strengthened the emission reduction targets set for 2030 and set a 100% reduction target for cars and vans from 2035. (European Commission a, 2024)

Another regulation that automakers must comply with is the General Safety Regulation, which came into force in July 2022. Advanced driver assistance systems such as intelligent speed assist and event data recorders are now required in all vehicles, with additional requirements tailored to individual vehicle types. These rules apply immediately to all new vehicle types. (European Commission b, 2024)

Regarding foreign trade, customs duties and tariffs are applied. There is a common customs tariff in the Member States of the European Union, which aims to facilitate trade, ensure health and safety, and protect the EU's financial interests. These tariffs

have a significant impact on the automotive industry, where their application to automotive products imported into the EU can affect the structure of automotive companies and affect the price competitiveness of imported vehicles and parts. Cars produced outside the EU will be more expensive because of the 10% tariff, which could potentially reduce their market share in the EU. (International Trade Administration, 2024)

### **3.3.6 Environmental Factors**

The main environmental factors affecting the automotive industry include the already mentioned regulation on reducing emissions from cars and vans. In addition, the European Commission is dealing with the issues of noise and the use of fluorinated greenhouse gases in mobile air conditioning systems. Despite increasing traffic volumes, EU noise emission standards have remained unchanged since 1995. This has changed due to the high number of people affected by traffic noise, and in 2014 a new device was adopted that mandates a reduction of approximately 25% in vehicle noise. Electric cars are a good solution as they emit almost no noise. Regarding mobile air-conditioning systems, from 2017 all greenhouse gases exceeding a GWP of 150 are banned. (European Commission c, 2024)

## **3.4 SWOT analysis of the selected company**

Based on the information gathered, supported by consultations with a manager from the company, a SWOT analysis (Table 2) was established to highlight the strengths and weaknesses of the business as well as opportunities and threats.

Table 2 - SWOT analysis of company XY

Strengths	Weaknesses
Sales Growth	Decrease in Contract Manufacturing
Diverse Product Portfolio	Dependence on Automotive Sector
Strong Research and Development focus	High Net Indebtedness
Global Footprint	
Strong Workforce	
Opportunities	Threats
Emerging Markets	Global Political Instability
Digitalization	Competition
Technology and Innovation	Raw Material Price Volatility
	Exchange Rate Vulnerability

Source: own processing based on Internal information

Strengths include sales growth, which increased by 5.1% to €41.4 billion in 2023. These sales results demonstrate the company's strong position in the automotive and related sectors, which strengthens its competitiveness and resilience to global economic fluctuations. The second strength of the company is its diverse product portfolio, which includes the automotive, tyre and technology sectors and offers a wide range of products and services. This diversity enables the company to meet a wide range of customer needs and market segments, from automotive electronics and tyres to industrial materials and technology. In doing so, the company reduces the risk associated with market volatility and strengthens its market position. Another strength is the strong focus on research and development, which is a key strategy of XY, which continuously develops innovative products and technologies to meet

evolving demands from customers. R&D is particularly focused on digitalisation and sustainability, which is in line with future mobility trends. XY's significant global presence, spread across the world, provides the company with a diversified revenue stream and a broad customer base, which are among its other strengths. The high number of employees, which exceeds 190,000, is another strength. This strong workforce supports the company's ability to innovate, expand into new markets and improve operational efficiency.

Weaknesses include the company XY's strong dependence on the automotive industry, which demonstrates its strength in this area but also exposes it to industry-specific risks such as demand cyclicality, changes in regulations affecting vehicle production and features, or supply chain disruptions. By diversifying its portfolio, XY seeks to mitigate these risks. Another weakness is net debt, which has fallen by 10.3% since 2022 but still stands at EUR 4 037.9 million. This may limit the company's financial flexibility, making it more vulnerable to economic downturns and limiting its ability to invest in various opportunities. Another weakness is the decrease in Contract Manufacturing, which has fallen by 23% compared to last year. This decline may indicate issues such as reduced demand for contract manufacturing services, competitive pressures, or operational inefficiencies.

In terms of opportunities, the biggest opportunity is potential growth in emerging markets, particularly in regions such as Asia Pacific and the Americas. These markets are characterised by rapid urbanisation and growing car sales. XY can thus expand its production and sales footprint and tailor its product offering to the specific needs of these markets, thus taking full advantage of this opportunity. Another opportunity is digitalisation, which is linked to future trends in the automotive industry. Digitisation can thus help the company to improve its innovation, operational efficiency and bring new business models. A related opportunity is Technology and Innovation, which is currently seen as a significant competitive advantage due to the future of mobility in the form of electrification and autonomous vehicles.

Threats include global political instability that can affect company operations in the form of supply chain disruption, demand fluctuations in volatile regions and unpredictable regulatory changes. Another threat is the increasing competition,

especially from China, where a direct threat could only occur once competing manufacturing plants are established in Europe. XY is also vulnerable to changes in raw material prices, which affect production costs and margins, and is thus a relatively large threat. As well as exchange rate fluctuations, which due to its global presence can affect financial results.



## 4 Risk Identification of the selected company

The following chapter will identify possible potential risks threatening the company's operations. The identification of risks is based on brainstorming with an expert from the selected company, supported by research on the environment in which the company operates, PESTLE analysis, SWOT analysis and internal information. Potential risks are divided into operational, financial, market and competitive, legal, and regulatory, environmental risks and risks associated with human factor. All these groups are described in more detail with specific risks below. Subsequently, for the risks described, the potential impact on the company and the probability of occurrence are rated on a scale from 1 to 5, where 1 is the lowest impact and probability of occurrence and 5 is the highest impact and probability of occurrence. These ratings were confirmed by an expert interview with the manager of the company XY.

### 4.1 Operational risks

Operational or production risks are significant challenges that company XY faces frequently. Risks can range from problems related to production processes such as defects in production lines, poor quality of input materials or inefficiencies in production processes. But it also includes risks associated with suppliers and various logistical obstacles caused by, for example, a strike or a natural disaster. Furthermore, operational risks also include IT security problems and related cyberattacks that can endanger important company data and the continuity of business operations. Effective management of these risks is therefore critical to maintaining high levels of productivity and keeping pace with competitors.

**Machinery and equipment failures** – Machinery and equipment failure is a very common occurrence and therefore a risk that the company XY faces on an almost weekly basis. In company XY, failures can most often be caused, for example, by the long-term use of machines, which leads to their natural degradation and subsequent failure, as well as by the possible failure of software or hardware that controls production processes and can completely stop or disrupt production. Regarding the

impact of the risk on the company, any suspension of production due to machine failure may result in the inability to deliver products to customers and may result in financial losses for the company or various penalties for late delivery. In addition, the company must pay to repair the broken machine, which can be costly if special parts are required. Therefore, the rating of the impact on the company is 3 and the rating of the probability of occurrence is 4.

**Quality of input materials** – As the company is committed to the quality of its products, it is necessary for them to be supplied with input materials of superior quality. The quality of raw materials and components used in the manufacturing process directly affects the quality of the final product, its reliability and durability. Inadequate quality can be caused by a supplier not meeting quality standards or not having reliable quality control processes. The quality of input materials can also decline because of damage during transport or storage, or in an attempt to reduce costs by purchasing cheaper materials. As XY is a global company and takes input materials from a large number of suppliers around the world, it can often happen that the quality is not sufficient and therefore the probability of occurrence is rated as 3. The use of input materials of poor quality can lead to increased production defects, customer dissatisfaction and subsequent complaints or loss of trust as well as brand damage. The potential impact is rated as 2, again due to the global presence and the large number of satisfied customers.

**Dependence on key suppliers** – The risk of dependence on suppliers of key raw materials, components or technologies can pose a significant risk to production continuity, product quality and financial stability. In the area of specific components in particular, company XY is dependent on several critical suppliers. Although it generally seeks to diversify its supplier base, in some cases exclusive sourcing cannot be avoided. Therefore, the probability of occurrence is judged to be medium here and is therefore rated as 3. The potential impact is also rated as 3, as a loss of one of these key suppliers could mean a stoppage of production processes, delaying deliveries to customers and causing financial losses to the company.

**Logistical challenges** – Another major risk affecting the company's operations are logistical challenges, which include delivery delays, increased transportation and

logistics costs, difficulties in fulfilling customer orders or limited storage capacity. These challenges have a very negative impact on the company, where delays in deliveries or non-delivery of goods to customers can result in the loss of large amounts of financial resources and affect the continuity of the company. Frequently dealing with these issues also leads to increased transportation and storage costs, which can negatively change margins. Furthermore, the supply chain can also be disrupted, triggering a domino effect that affects other parts of the chain, causing major financial damage. Due to the globalisation of these supply chains and the increased reliance on complex logistics networks, the likelihood of these logistical challenges is high. That is also because of the current political instability, technological disruptions, climate change, possible natural disaster or the recent pandemic and is rated 4. The potential impact is also rated 4 due to the high impact on financial performance.

**Cyber-attacks** – Company operations, including business and manufacturing processes, products, and internal and external communications are heavily dependent on centralized and standardized IT systems and networks which are vulnerable to cybercrime. Attacks by hackers can lead to unauthorised access to sensitive information, while viruses can corrupt or control data and systems. In these cases, companies must increase the cost of dealing with the attacks and, in the worst cases, may be forced to pay ransoms to the attackers. Company XY has only experienced one cyberattack in recent years, which was detected in 2022, in which attackers copied several terabytes of data. However, at no time were the company's business operations affected and full control of all IT systems was maintained. In order to combat hacker attacks, the company duplicates data and continuously expands training against them, therefore the probability of occurrence and the potential impact are both low, at a value of 2.

**Software or network infrastructure failures** - Technology is essential to a company's daily business processes and although it can disrupt operations and information flows within the company, it is closely monitored by having robust security systems and procedures in place to manage these IT risks. These systems are the same as those in use to prevent cyber-attacks and include regular data backups and disaster recovery plans. They are designed to minimise the impact of any software or network

infrastructure failure. Because of this safeguarding, the regular updating of technology and procedures, as well as periodic testing of the systems' resistance to potential failure, the probability of occurrence and potential impact is at a low threat level and both indicators are rated 2.

## **4.2 Financial risks**

Financial risks pose a significant threat to any business, including XY. These risks include a wide range of potential financial losses resulting from fluctuations in exchange rates, changes in interest rates, non-payment of debt and lack of liquidity. Other risks include supplier insolvency, volatility in the price of input materials, decreases in the value of investments and the risk of inflation, which can significantly affect the company's costs and revenues. With market conditions constantly changing, the company must be vigilant and prepared to respond to new financial challenges to ensure the long-term sustainability of its financial health and growth.

**Exchange rate fluctuations** – Due to its global nature and therefore trading in different currencies, company XY is vulnerable to risks arising from exchange rate fluctuations. These changes in exchange rates can typically result in losses if the value of assets in the depreciating currency decreases or liabilities in the appreciating currency increase. In addition, the cost of raw materials in euros can fluctuate dramatically as a significant portion is purchased in foreign currencies, which can also affect the Company's financial results. However, company XY is aware of this risk and therefore uses financial instruments such as derivatives to provide protection against adverse movements in exchange rates. The potential impact of this risk is therefore assessed as 2. Due to the globalised business model and operating in a large number of foreign markets, the probability of occurrence is rated as medium or 3.

**Changes in interest rates** – While changes in interest rates may affect the cost of credit and the financing costs associated with the Company's debt, XY has strategies to manage this risk, including hedging and diversification of financing, to minimize the potential impact on its financial position. Therefore, the impact is rated as a low 2. Despite frequent interest rate reductions by central banks to control inflation and

influence economic growth, the likelihood of significant adverse changes impacting the company's operations or financial condition is very low. This may be partly due to the company's stable financial profile and its ability to anticipate and adapt to the financial environment. The probability of occurrence is assessed as 1.

**Insolvency of the supplier** - Supplier insolvency is a relatively significant risk that XY may face in times of political and economic instability. The impact on the company in this case would be very similar to the impact of the risk of losing key suppliers. It would therefore mean production disruptions and delayed delivery of goods to customers, causing financial losses. The potential impact is therefore assessed as medium with a rating of 3. However, this is not an abnormally frequent reason for loss of suppliers and the probability of occurrence in this case is low with a value of 2.

**Lack of liquidity** – Liquidity, the ability of a company to pay off its short-term obligations, is essential to maintaining normal operations. Lack of liquidity could lead Company XY into financial difficulties and, in extreme cases, insolvency. However, XY has a solid financial structure, manages its capital efficiently and accesses various sources of financing. The company maintains a favourable liquidity position, which allows it to respond easily to short-term financing needs without significantly impacting its operations. The stable financial health and the ability to generate sufficient cash flow from operations minimises the risk of liquidity shortages. The potential impact and the probability of occurrence are therefore assessed as 1.

**Volatility of raw material prices** – The rising cost of raw materials and electronic components can lead to significant increases in expenditure. As company XY is dependent on a wide range of materials, changes in these materials can cause instability in production costs and make financial planning difficult. For example, the Tyre and Technology sectors use petroleum-based materials and natural and synthetic rubber in their production, and the prices of these materials are often subject to significant fluctuations in world markets, greatly affecting the profitability of these sectors. The potential impact of this risk is therefore medium at 3. The highly interconnected markets and globalised supply chain can lead to frequent changes in the prices of these materials. Other factors affecting the likelihood of occurrence

include changes in supply and demand for materials or geopolitical events. The probability of occurrence in this case is also rated 3.

**Decline in the value of investments/shares** – In recent years, company XY has faced challenges related to frequent changes in its structure and strategy. These changes have led to a significant decline in the value of the company's shares, which have fallen nearly 75% from their all-time high. The continuing drastic decline in share value may have a negative impact on the company's market capitalisation, affecting its financial health and investor trust. Further decreases could affect the company's ability to raise capital in the markets, fund future projects and maintain stakeholder confidence. The situation could get worse due to the psychological impact on shareholders, which would lead to further selling of the shares. The potential impact of a decline in share value is high and is rated as 4. Because of volatile markets influenced by a wide range of economic, political, and social factors, some uncertainty is prevalent among investors and the probability of occurrence is at a medium level with a value of 3.

**Inflation risk** – When analysing the risk of inflation for company XY, it is necessary to consider its direct and indirect effects. Inflation can affect both the input costs of materials and services and lead to pressure on margins and overall profitability of the company, as well as limiting customer spending and the associated potential decline in demand for XY's products and services. However, in the first case, XY can transfer the increased costs to customers through price adjustments and mitigate the potential impact, which despite the possible mitigations is assessed as medium with a value of 3. And considering that the market has already recovered from the inflation crisis and, in particular, the inflation rate in Europe has stabilised, the probability of occurrence is rated 2.

### **4.3 Legal and regulatory risks**

Legal and regulatory risks are a significant challenge for company XY as a result of its operations in diverse legal and regulatory environments around the world. XY is engaged in the development, manufacture and sale of automotive components and

systems and therefore must constantly monitor and respond to new and changing legal and regulatory requirements. These requirements can cover a wide range of areas, including environmental regulations, product safety standards, intellectual property and trademark protection, international trade including tariffs and duties, as well as contractual relationships with suppliers and customers. In addition, geopolitical situations, such as war, may create additional uncertainties and complications that may affect the Company's business operations and financial results.

**Changes in legislation/Environmental regulation** – With the European Union's regulations to reduce emissions and achieve climate neutrality by 2050, companies in the automotive industry need to modify manufacturing processes and products to meet the new regulatory requirements. Company XY will therefore potentially have to invest in cleaner and more sustainable technologies to meet the standards of the new regulations. This also includes adjustments to transport and logistics chain, which can lead to higher costs. The new regulations may also affect market conditions such as less interest in environmentally sustainable cars and a decline in demand for new vehicles, which would cause significant losses and affect the company's financial health. The potential impact is therefore rated 4. The continuing evolution of the regulatory environment, particularly in the automotive and environmental sustainability areas, and given the increasing emphasis on environmental sustainability and emissions reduction, the probability of occurrence of further changes is medium with a value of 3.

**Product safety standards** – Failure to comply with safety standards can result in increased costs for recovery actions, product recalls, legal challenges, or potential damage to a company's reputation. XY has teams in various jurisdictions in order to review these safety regulations, where quality and compliance with the required regulations and standards are carefully monitored. This minimizes the risk and its potential impact and the probability of occurrence, where the values of both indicators are 2.

**Legal disputes and lawsuits** – Due to its widespread operations around the world, company XY is exposed to diverse legal systems and regulations, which increases

the risk of litigation. If lawsuits or litigation were to occur, the Company could be exposed to increased expenses in the form of lawyers' fees, potential fines, and compensation. However, XY has advanced systems such as auditing and monitoring of activities and employee training that reduce the chance of legal problems. In the past, XY has managed several significant legal disputes without a significant impact on its operations, but the potential impact for this risk is still at a medium level with a rating of 3, due to the dangerous possible effect on the financial position of the business. The probability of occurrence is rated one level lower, therefore at 2.

**Intellectual property and trademarks** – Company XY has robust systems and processes in to protect its intellectual property and trademarks. To minimize damage and unauthorized use of its innovations and trademarks, XY actively monitors the market to identify potential intellectual property violations and takes immediate action against them whenever they occur. The effectiveness of these preventive measures is proven by historical data showing a very low incidence of intellectual property litigation. The probability of occurrence as well as the potential impact are rated at the lowest level of 1.

**International trade** – Changes in international trade, specifically the introduction of new customs duties and tariffs, can increase production costs and change margins for any global firm, and consequently affect the firm's market competitiveness and profitability. Considering XY's global operations, changes in trade policy and the introduction of new tariffs would have significant consequences with the potential impact of this risk being rated at 3. The probability of occurrence is at a medium level with a value of 3 due to the instability and unpredictability of current international trade relations and policies, specifically geopolitical tensions and trade wars can change trade policy at any time, increasing the risk of new tariffs and duties.

**Inconsistency between contracts with customers and contracts with suppliers** - A mismatch between customer requirements and supplier capabilities or commitments can lead to supply chain problems such as delays, inability to meet product specifications or additional costs for contract modifications, where subsequent discrepancies can lead to fines, loss of customers or high-cost litigation. Despite regular reviews and updates of contracts to ensure compliance and minimise the risk



of inconsistencies cannot be completely eliminated due to the size and scale of operations. The probability of occurrence and potential impact of this risk is rated as 3.

#### **4.4 Market risks**

As a leading player in the automotive industry, company XY faces a number of market risks. One of the key factors are risks from the geopolitical situation and global economic instability. Other risks threatening the company's long-term stability and growth are changes in demand and the emergence of new competitors and the consequent price war. The final important market risk is the dependence on key customers, where the loss of one or more clients can impact the financial health of the business. These factors together create a complex environment full of challenges to which XY must respond in order to maintain its market position.

**Geopolitical risks** – Geopolitical tensions and potential conflicts could disrupt transport routes and logistics, cause raw material shortages, or increase energy and raw material costs, which would have a major impact on the company's operations. Also, access to potential key markets is limited, restricting the ability to sell products or obtain new business opportunities. Specifically, the Ukraine-Russia conflict has resulted in the suspension of all of XY's business operations with Russia, which has resulted in significant financial losses for XY. The potential impact is therefore at the maximum level and is rated 5. The current tense situation in Europe and the increasingly strained relations between Russia and NATO result in increasing chances of further international conflicts and the probability of occurrence is therefore rated as 3.

**Global economic instability** – XY's operations in many countries mean that it is naturally vulnerable to regional economic shocks such as currency crises, political instability, trade disputes or disruptions to raw material supplies. When there is a decline in economic activity, there is usually a drop in new vehicle sales, which has a direct impact on demand for automotive parts and related technologies. For XY, the automotive market represents 64 % of consolidated sales and is the most important

customer segment, so it must be able to react quickly to any changes in this segment to maintain its market position. A general economic decline would have a negative impact on the company's sales and profits and the potential impact is therefore rated as 3. The probability of occurrence is also rated as 3 considering geopolitical tensions, financial markets and other global uncertainties.

**Changes in demand** – As already mentioned under the risk of economic instability, the automotive market, i.e. the demand for cars, is extremely important for company XY. A drop in this market would be drastic for the company as it represents 64 % of all sales and a reduction in sales would have a major impact on the company's financial stability and investment capacity. Company XY would be forced to implement restructuring measures, including lay-offs and plant closures. In addition to the economic downturn, the decline in demand may be caused by rapid changes in technology and consumer preferences and increased environmental and safety regulations. The potential impact is rated at the highest value of 5 due to the significant negative effects. The probability of occurrence reflecting current economic problems and market conditions is rated as 4.

**New competitors** – An additional market risk is the entry of new competitors into the market, which could lead to customer defection from company XY. However, due to its global reach, XY has a stable market position with long-term customer relationships, high technological know-how and strategic partnerships. These competitive advantages make the entry of new competitors into the market a minimal risk with a potential impact of 1. The probability of occurrence is also rated 1 due to high barriers to entry in the market in the form of costly investments in technology, product development and production facilities. Therefore, new competitors are not expected to enter the market and threaten XY's market position.

**Existing competitors** – In contrast, existing competition poses a more significant threat to the company. The automotive industry is highly competitive and XY is threatened by several major global companies, which involves constant pressure for innovation and efficiency and therefore higher costs. Competition may result in price wars, which would force XY to lower prices in order to maintain market share. Such pressure would significantly affect the profitability of the company and the potential

impact is therefore rated as 4. However, XY is able to respond effectively to competitive pressure and thus reduce the probability of occurrence, which is at a medium level with a value of 3.

**Dependence on key customers** – For company XY, five largest customers are essential, representing approximately 34% of sales. The loss of one or more of these customers could cause significant financial losses. However, XY mitigates the risk by diversifying the customer base and having a broad product portfolio, to minimise the potential impact, which is rated 2. The probability is also rated as 2, since XY is a large and stable company and maintains strong and long-term relationships with their main customers, with which they enter long-term contracts on commercial terms for even greater security.

#### **4.5 Risks associated with human factor**

Other risks with potential exposures to the company XY are human resource related risks such as shortage of skilled workforce, high employee turnover, discrimination or bullying in the workplace, insufficient employee development, mistakes from employees and also losing some of the key employees.

**Shortage of skilled workforce** – As the company operates in a technology-intensive industry, a highly skilled workforce with specific skills in engineering, manufacturing and IT is required. A shortage of these workers could limit the ability to innovate and grow in technologically demanding areas and could also lead to delays in new product development and possible loss of market share. The potential impact is therefore rated as 3. However, XY is investing in training and development to minimise the risk, the only potential barrier for future years could be demographic changes in the form of an ageing workforce and a shortage of younger skilled workers. However, due to the global reach and diverse opportunities to attract new talent, the probability of occurrence is at level 2.

**High employee turnover and Loss of key employees** – The risk of a shortage of qualified staff is also associated with the risk of high employee turnover or the loss of key employees. Company XY tries to maintain a stable working environment with

competitive wages and employee benefits such as education and career development opportunities or flexible working conditions. In addition to this, the HR department still helps to identify and address potential causes of employee dissatisfaction, thus reducing the risk of high turnover. Which could affect the company by disrupting project teams, temporarily reducing productivity, and increasing the cost of recruiting and training new employees. For key employees, their departure would mean the loss of key skills and experience, and this would have even greater impacts on the business. Key employees are also more likely to leave, as they are subject to a higher workload and may leave the company for personal reasons or for a better offer from a competitor. The potential impact and probability of occurrence is rated 2 for Employee Turnover. For the Loss of Key Employees, the impact and likelihood are higher and both indicators are rated as 3.

**Lack of employee development** – In the dynamic technology industry, the need for quick and effective employee development is essential. If a company is unable to respond to market changes and innovation pressures, skills could become obsolete, and the competitiveness could be weakened. Lack of development challenges can also reduce employee motivation and commitment, which can lead to lower productivity and higher turnover. However, as mentioned in the previous risk, the company offers education and career development opportunities as one of its benefits, reducing the probability of occurrence and potential impact on value 2 for both indicators.

**Mistakes made by employees** – Another risk related to the human factors are mistakes made by employees. The complexity of processes and the need for quick decisions can often lead to mistakes that can cause disruptions in the company's production processes, damage to products or loss of data that can lead to financial losses. Company XY is striving to maintain a high level of quality in its products and services and therefore major mistakes made by employees could damage the company's reputation. However, with extensive quality management and internal control systems that help to identifying and correcting mistakes before they can affect the final products, the probability of occurrence is reduced, which has the same rating as the potential impact, which is 2.

**Discrimination and bullying in the workplace** – The final risk identified is the risk of discrimination and bullying in the workplace, where any occurrence could damage the company's reputation but also, in serious cases, its operations. However, these incidents are effectively managed and the damage to the company would not be significant. Furthermore, company XY has strictly defined and well communicated policies against discrimination and bullying, as well as regular training for employees on diversity and ethics in the workplace. This makes the probability of occurrence as well as the potential impact minimal and both are rated as 1.

## 4.6 Environmental risks

The last group of risks that may threaten the operation of company XY are environmental risks, which are becoming a greater threat. One of the main environmental risks are Regulation of emissions, which is already described under Legal and regulatory risks, specifically under Changes in legislation/Environmental regulation. In addition, other risks are Resource consumption, risks of pollution and waste management or some environmental disasters.

**Resource consumption** – As a manufacturer of tyres and other automotive components, company XY is heavily dependent on various raw materials that are highly consumed and have limited resources. Due to this, shortages could increase the cost of these raw materials. In extreme situations, a shortage of resources could completely stop production, and this would mean a significant reduction in profitability and further complications due to non-delivery of the products to customers. The potential impact is therefore rated as 4. In addition to the high impact, the probability of occurrence is also high, also rated as 4, due to increasing global demands for sustainability, growing concerns about climate change and resource constraints.

**Pollution and waste** – The intensive production processes of company XY generate significant amounts of waste and emissions. These operations pose a high risk of pollution, especially in areas with strict environmental regulations. Failure to comply with such regulations can lead to heavy financial penalties, litigation, and damage to

the company's image. Non-compliance may also lead to restrictions in production, which could affect the company's overall production capacity and its ability to fulfil customer orders. The risk can be mitigated by investing in cleaner technologies or through recycling, but this adds another significant cost for the company. The potential impact is assessed at a very high level with a score of 5. The probability of occurrence is also high for this risk and is rated 4, reflecting the ongoing concern about sustainability, the environmental impact of industrial production, including public pressure on firms to minimise their environmental impact.

**Environmental disasters** – The last identified environmental risk are disasters and their consequent impacts. Natural disasters such as earthquakes, floods, hurricanes, or tornadoes can cause significant damage to production facilities, loss of supplies and disruption in the supply chain, which again affects the financial results. The eventual recovery or repair from natural disasters can be very costly and additional investment may be required to secure and improve the resilience of buildings and infrastructure. The potential impact would therefore be high, with a rating of 4. Considering that the natural disasters are unpredictable and due to the spread of production facilities and offices around the world their occurrence varies, the probability of occurrence is rated as 3.

## 5 Risk assessment and mitigation strategies

In this chapter, the identified risks will be summarised in individual risk matrices according to the type of risk and then a mitigation strategy will be proposed for the most serious risks. The risks are firstly summarised in a comprehensive list in which each risk is assigned to a number for subsequent placement in the risk matrix clear graphical presentation.

Starting with operational risks (Table 3), according to the assessment and risk matrix, it is clear that the most serious risks are Logistic Challenges and Machinery and Equipment failures (Table 4). For the risk of Logistics Challenges, it is difficult to find a new strategy to reduce it, as the most effective strategy is to diversify suppliers and channels, which is already being pursued by company XY. Beyond that, the risk could be reduced by using robust shipment tracking devices to better predict and manage delays. Furthermore, new predictive analytics strategies could be employed to optimize inventory. And finally, it is also important to regularly train employees and prepare them for the possible emergence of certain logistical challenges.

To manage the risks associated with machinery and equipment failures, a possible strategy is to implement more frequent preventive inspections and maintenance of the machines. In addition, it would be appropriate to progressively modernise obsolete and frequently defective equipment. A further step could be to ensure that all operators and maintenance personnel have sufficient training and are well informed about the proper operation and maintenance of machinery. It is also important to develop effective procedures for the quick handling of breakdowns, including the availability of spare parts and technical support. By following these approaches and strategies, the risks of logistical challenges and breakdown of machinery and equipment can be effectively managed to minimize financial losses and production delays.

Table 3 - List of Operational risks

Operational Risks
Machinery and Equipment failures - 1
Quality of input materials - 2
Dependence on key suppliers - 3
Logistical challenges - 4
Cyber-attacks - 5
Software or Network infrastructure failures - 6

Source: Own processing

Table 4 - Risk matrix of Operational risks

		Probability of Occurrence				
		Very low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Potential Impact	Very low (1)					
	Low (2)		5, 6	2		
	Medium (3)			3	1	
	High (4)				4	
	Very High (5)					

Source: Own processing

For Financial risks (Table 5), the most serious is the risk of a Decline in the value of investments and shares faced by company XY (Table 6). To reduce this risk, it is necessary to implement strategies aimed at stabilising and improving the market perception of the company. Therefore, it would be helpful to reconsider and adapt corporate strategies to better reflect current market and economic conditions, which may include portfolio diversification, exploration of new markets and innovative technologies. In addition, risk could be mitigated by improving communication with investors and by increasing transparency, i.e. regular information on the financial situation, strategic decisions and potential risks and opportunities. Positive investor perceptions can also be strengthened by optimising operations, reducing costs, or increasing investment in research and development. Furthermore, XY can also benefit from more intensive marketing campaigns that can improve public perception of the company and its products, which would also be associated with increased



demand and better financial performance, and thus reduce the risk of a Decline in the value of investments and shares.

*Table 5 - List of Financial risks*

<b>Financial Risks</b>
Exchange rate fluctuations - <b>1</b>
Changes in interest rates - <b>2</b>
Insolvency of the supplier - <b>3</b>
Lack of liquidity - <b>4</b>
Volatility of raw material prices - <b>5</b>
Inflation risk - <b>6</b>
Decline in the value of investments/shares - <b>7</b>

Source: Own processing

*Table 6 - Risk matrix of Financial risks*

		<b>Probability of Occurrence</b>				
		Very low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
<b>Potential Impact</b>	Very low (1)	<b>4</b>				
	Low (2)	<b>2</b>		<b>1</b>		
	Medium (3)		<b>3,6</b>	<b>5</b>		
	High (4)			<b>7</b>		
	Very High (5)					

Source: Own processing

There is only one significant risk among the Legal and Regulatory risks (Table 7) and that are Changes in legislation and Environmental regulations (Table 8). To mitigate the risk to the greatest extent possible, company XY should closely monitor and track changes in legislation at the national and international level and establish a compliance program in line with current laws, including regular training of employees in this area. Another important mitigation strategy is to develop flexible business models that can adapt quickly to legislative changes and invest in innovation and research for products to not only meet regulatory requirements but also surpass them. Potential impact can also be mitigated by greater market diversification, where a company could specifically expand into markets that have less strict environmental

regulations. However, if these strategies are not effective, there is still the option of setting up a reserve to cover potential costs or considering insurance against regulatory risks to mitigate the problem.

Table 7 - List of Legal and regulatory risks

<b>Legal and regulatory risks</b>
Changes in legislation/Environmental regulation - <b>1</b>
Product safety standards - <b>2</b>
Legal disputes and lawsuits - <b>3</b>
Intellectual property and trademarks - <b>4</b>
International trade - <b>5</b>
Inconsistency between contracts with customers and suppliers- <b>6</b>

Source: Own processing

Table 8 - Risk matrix of Legal and regulatory risks

		Probability of Occurrence				
		Very low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Potential Impact	Very low (1)	<b>4</b>				
	Low (2)		<b>2</b>			
	Medium (3)		<b>3</b>	<b>5,6</b>		
	High (4)			<b>1</b>		
	Very High (5)					

Source: Own processing

It is obvious that market risks (Table 9) represent the riskiest group (Table 10), with 3 risks having a high probability and a high potential impact. These are the risks of a Demand Decline, a price war with existing competitors and risks related to the geopolitical situation. Of these three risks, the decline in demand is the riskiest. One of the strategies to mitigate this risk is to diversify products and markets so that the company's portfolio includes new and innovative technologies that match current and future trends. In addition, the risk could be mitigated through marketing and sales strategies to effectively communicate and highlight the value and uniqueness of the product. It would also be important to strengthen customer relations, which would enable the company to adapt the products to customer needs and market

requirements, which would increase demand. Strengthening the company's brand and image would also help to retain existing customers and attract new ones, which would help to mitigate risk.

The second biggest risk is geopolitical risk, which can also be mitigated through diversification, specifically of markets and sources of supply. By reducing dependence on one or more markets and suppliers, local political and economic instability can be effectively countered, and risk can be reduced. An effective strategy could also be to increase the flexibility of production operations, whereby company XY could move production bases to different regions as needed. However, this strategy would be very costly and complicated and may not be beneficial for the company. A simpler and less costly option might be to partner with local firms and governments to gain better market access and minimise the risk associated with political change.

A strategy to mitigate the last market risk, the risk of existing competition and price wars, could be product differentiation to exceed customer expectations and differentiate from competitors. As with the previous market risks, the strategy to mitigate the risk of existing competition would be brand and marketing enhancement and strategic partnerships and alliances. Competitiveness could be further enhanced by optimising costs and improving the efficiency of production processes, which would reduce the probability and impact of the risk.

*Table 9 - List of Market risks*

<b>Market risks</b>
Geopolitical risks - <b>1</b>
Global economic instability - <b>2</b>
Changes in demand - <b>3</b>
New competitors - <b>4</b>
Existing competitors - <b>5</b>
Dependence on key customers - <b>6</b>

Source: Own processing

Table 10 - Risk matrix of Market risks

		Probability of Occurrence				
		Very low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Potential Impact	Very low (1)	4				
	Low (2)		6			
	Medium (3)			2		
	High (4)			5		
	Very High (5)			1	3	

Source: Own processing

In terms of Risks associated with human factor (Table 11), there is no risk of this group significantly limiting the operation or profitability of the company (Table 12). Risks are at a low level due to advanced quality management and internal controls, robust procedures for employee training and development, or technology to help minimize human errors. If company XY decided to reduce the most serious risk in this group, which is the loss of one or more key employees, they could do it by offering competitive benefits such as attractive salary terms, bonuses, flexible working hours or home office. In addition to retain key employees, the company should provide development programmes for key employees to improve their individual skills. If, despite these aspects, the loss of a key employee was still a threat, the company could also mitigate the risk by developing internal talent and having processes in place that could quickly and efficiently bring in a replacement for that key employee, thereby mitigating the potential impact of this risk.

Table 11 - List of Risks associated with human factor

Risks associated with human factor
Shortage of skilled workforce - 1
High employee turnover - 2
Loss of key employees - 3
Lack of employee development - 4
Mistakes made by employees - 5
Discrimination and bullying in the workplace - 6

Source: Own processing

Table 12 - Risks matrix of Risks associated with human factor

		Probability of Occurrence				
		Very low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Potential Impact	Very low (1)	6				
	Low (2)		2,4,5			
	Medium (3)		1	3		
	High (4)					
	Very High (5)					

Source: Own processing

In the last group of environmental risks, all the identified risks (Table 13) belong to the category of significant, with high impact and high probability of occurrence (Table 14). Company XY should therefore address strategies to reduce the impact and likelihood of occurrence for Resource Consumption, Waste and Pollution risks as well as for Environmental Disaster risks. Specifically for Resource Consumption, the strategy could be about optimizing the use of materials, where possibilities for reducing the number of materials used and increasing recycling and reuse should be outlined. In addition, the development of more sustainable products that require fewer resources throughout their life cycle could be crucial. Also, employee education and involvement in resource use and recycling could help the company to effectively implement sustainability strategies across all levels of the organisation.

To reduce the risks from waste and pollution, which is the highest environmental risk, it is crucial for the company XY to adopt an integrated approach to waste and emissions management. This approach should include strategies to prevent waste by optimising production processes, for example by switching to less wasteful technologies. Furthermore, the risk could be reduced through increased recycling and reuse of materials, which would include recycling of water resources or possible recovery of waste heat. The final step should be to reduce emissions, i.e. invest in modern technologies and systems that reduce emissions of harmful substances into the air, water, and soil. Also, suppliers should be involved in environmental strategies in which they should follow similar standards and deliver materials and services with low environmental impact.

The final environmental risk, the risk of natural disasters, could be reduced by the company through the development and implementation of comprehensive emergency preparation plans, providing detailed procedures for employees to follow if required. To reduce the impact, it is also necessary to provide backup resources to maintain operations in the event of interruptions in power and other services. This could be achieved, for example, by installing back-up generators or water storage tanks. As a final, although very costly, strategy, investing in strengthening production and administrative buildings to withstand potential natural disasters could be a possibility. All this can reduce the risk.

*Table 13 – List of Environmental risks*

<b>Environmental risks</b>
Resource consumption - <b>1</b>
Pollution and waste - <b>2</b>
Environmental disasters - <b>3</b>

Source: Own processing

*Table 14 – Risk matrix of Environmental risks*

		<b>Probability of Occurrence</b>				
		Very low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
<b>Potential Impact</b>	Very low (1)					
	Low (2)					
	Medium (3)					
	High (4)			<b>3</b>	<b>1</b>	
	Very High (5)				<b>2</b>	

Source: Own processing

## Conclusion

The major objective of the thesis was to identify the key risks and subsequently evaluate them and propose a mitigation strategy for the most serious risks. To achieve the objective, a literature review was firstly conducted covering risks, their classification and importance, then risk management along with the risk management process and the tools used in it, which were also used in the later stage of the thesis in the practical part.

Initially, a selected company, referred to as company XY, which engages in the production of components for the automotive industry and is one of the largest suppliers of tyres and technology to this industry, was analysed. Next, the company's environment was examined, i.e. the automotive industry, which is important globally, as it accounts significant amount of the world's GDP. In Europe, accounting for almost half of XY's total sales, the automotive industry represents 7% of GDP and employs 14 million people. To better understand XY's operating environment, the key trends for the future development of the automotive industry were explored, mainly involving electric vehicles, which are predicted to be responsible for up to 55% of all new car sales in Europe in 2030. Other major trends include autonomous vehicles, sustainability, new safety features or the transformation of public transport.

For a more detailed overview and to obtain a more comprehensive basis from which risks may arise for company XY, a PESTLE analysis of the European Union countries as XY's leading sales markets was conducted. The findings revealed that despite the efforts to strengthen peace and integration in Europe by the European Union, the Eurozone and the Schengen area, Europe is currently facing political challenges and instabilities, especially due to the Ukraine-Russia conflict. Economic factors have shown that the countries of the European Union are among the countries with large GDP and high purchasing power parity, and that the European Union belongs to the largest importers and exporters in the world. Social and cultural factors revealed the interconnectedness between countries, but also the problem of an ageing population and a change in the consumption behaviour of the population, which may have a negative impact on the economic development of the EU. Regarding technological progress in the EU, despite relatively large investments in science and development,

the EU is still behind the US and China, which may be a problem for the future development of the automotive industry in Europe. Another problem may also be, for the automotive industry and therefore for Company XY, the emission regulations imposed on cars and vans and the overall achievement of climate neutrality by 2050. Subsequently, everything was summarised in a SWOT analysis, which was consulted with the manager of XY. These observations provided the background for the next part of the thesis, which focuses on identifying the risks faced by company XY.

Key risks threatening the company were identified by brainstorming with the manager. The risks were divided into 6 groups - Operational risks, Financial risks, Legal and regulatory risks, Market risks, Risks associated with human factor and Environmental risks, where in each group specific individual risks were described in detail. The risks were then rated using the expert interview method using two indicators, the potential impact on the company and the probability of occurrence of the risk, on a scale of 1 to 5 (from lowest to highest). The risks were then transferred into a risk matrix, which clearly showed which risks were the most significant and what could be the mitigation strategy. According to the expert interview, the most significant risks were - risks of Logistical challenges, Machinery, and equipment failure, Decline in the value of investments and shares, risk of Changes in legislation especially Environmental regulations, Geopolitical risk, risk of Change in demand and risk of Competition and price war. Of the Risks associated with human factor, there was no risk significantly affecting the company's operations and from the last group of environmental risks, all mentioned were highly rated, concretely the risk of Resource consumption, the risk arising from Pollution and waste and the risk of Natural disasters.

For all these risks, possible mitigation strategies were then proposed. Specifically for the risk of a Decline in demand, which was assessed to be the greatest, the recommendation to mitigate the probability of occurrence and the potential impact was to more diversify products, for example through innovative technologies to follow market trends, or to increase communication with customers through marketing and sales strategies. The second risk with also the highest rating, the risk from Pollution and waste, could be reduced by optimising production processes and switching to less wasteful technologies.



In conclusion, the highest risk groups threatening the company XY are Market risks and Environmental risks, and an effective mitigation strategy should be developed for them as a priority by the risk management of the company. But in the fast changing environment in which the company operates, it is essential to consider all the risks that affect the company to ensure that it always achieves the best result and is protected from potential risks not only now but also in the future.

## References

ACEA, 2024. New car registrations: +13,9% in 2023; battery electric 14,6% market share. online. In: *ALCEA, Driving Mobility for Europe*. Brussels, Belgium: Acea. 18 January 2024 [2024-01-18]. Available from: <https://www.acea.auto/pcregistrations/new-car-registrations-13-9-in-2023-battery-electric-14-6-marketshare/>. [Accessed 2024-04-08].

ALANZI, Salem, 2018. *Pestle Analysis Introduction*. PDF; online. Manchester: University of Salford. September 2018 [2018-09]. Available from: [https://www.researchgate.net/publication/327871826\\_Pestle\\_Analysis\\_Introduction](https://www.researchgate.net/publication/327871826_Pestle_Analysis_Introduction).

ANDRIIUK, Anastasia and Victoria SOKOLOVA, 2023. Key Technology Trends in the Automotive Industry in 2024. online. In: *Epicflow*. Last update November 28, 2023 [2023-11-28]. Available from: <https://www.epicflow.com/blog/5-latest-trends-in-the-automotive-industry/> [Accessed 2024-03-21].

BAZZONI, Enrico; Marcus JACOB; Simon LAND; Marina RUPP and Sandra Welchering, 2022. 9 charts that show how inflation and the Ukraine war are impacting European consumers. online. In: *World Economic Forum*. Geneva, Switzerland: World Economic Forum. Jun 13, 2022 [2022-06-13]. Available from: <https://www.weforum.org/agenda/2022/06/how-inflation-and-the-conflict-inukraine-are-impacting-european-consumers/>. [Accessed 2024-04-05].

CORNET, Andreas; Ruth HEUSS; Patrick SCHAUFUSS and Andreas TSCHIESNER, 2023. A Road Map for Europe's Automotive Industry. online. In: *McKinsey & Company*. August 31, 2023 [2023-08-31]. Available from: <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/aroamap-for-europes-automotive-industry>. [Accessed 2024-04-02].

DIONNE, Georges, 2013. Risk Management: History, Definition, and Critique. online. *Risk Management and Insurance Review*, vol. 16. no. 2, p. 147-166. ISSN 1098-1616. Available from: [https://onlinelibrary.wiley.com/doi/epdf/10.1111/rmir.12016?saml\\_referrer](https://onlinelibrary.wiley.com/doi/epdf/10.1111/rmir.12016?saml_referrer).

EMR, 2023. *Global Mobility as a Service Market Outlook*. online. Sheridan, USA: EMR Claight. Available from: <https://www.expertmarketresearch.com/reports/mobility-asa-service-market>. [Accessed 2024-04-16].

EUROPEAN CENTRAL BANK, 2024. US dollar (USD). online. In: *European Central Bank*. Frankfurt am Main, Germany: European Central Bank. Available from: [https://www.ecb.europa.eu/stats/policy\\_and\\_exchange\\_rates/euro\\_reference\\_exchange\\_rates/html/eurofxref-graph-usd.en.html](https://www.ecb.europa.eu/stats/policy_and_exchange_rates/euro_reference_exchange_rates/html/eurofxref-graph-usd.en.html). [Accessed 2024-04-02].

EUROPEAN COMMISSION A, 2024. CO<sub>2</sub> emission performance standards for cars and vans. online. In: *Climate Action*. Brussels, Belgium: Directorate-General for Climate Action. Available from: [https://climate.ec.europa.eu/euaction/transport/road-transport-reducing-co2-emissions-vehicles/co2-emissionperformance-standards-cars-and-vans\\_en](https://climate.ec.europa.eu/euaction/transport/road-transport-reducing-co2-emissions-vehicles/co2-emissionperformance-standards-cars-and-vans_en). [Accessed 2024-04-19].

EUROPEAN COMMISSION B, 2024. Vehicle Safety and automated/connected vehicles. online. In: *Internal Market, Industry, Entrepreneurship and SMEs*. Brussels, Belgium: Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. Available from: [https://single-market-economy.ec.europa.eu/sectors/automotiveindustry/vehicle-safety-and-automatedconnected-vehicles\\_en](https://single-market-economy.ec.europa.eu/sectors/automotiveindustry/vehicle-safety-and-automatedconnected-vehicles_en). [Accessed 2024-04-19].

EUROPEAN COMMISSION C, 2024. Environmental aspects of the automotive industry. online. In: *Internal Market, Industry, Entrepreneurship and SMEs*. Brussels, Belgium: Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. Available from: [https://single-market-economy.ec.europa.eu/sectors/automotiveindustry/environmental-protection\\_en](https://single-market-economy.ec.europa.eu/sectors/automotiveindustry/environmental-protection_en). [Accessed 2024-04-19].

EUROPEAN UNION, 2024. Easy to read – The European Union. online. In: *European Union*. Available from: [https://european-union.europa.eu/easy-read\\_en](https://european-union.europa.eu/easy-read_en). [Accessed 2024-04-15].

EUROSTAT, 2024. Ageing Europe – statistics on population developments. online. *Statistics Explained*. ISSN 244-8219. Data extracted in July 2020 [2020-07]. Planned

article update: February 2024 [2024-02]. Available from: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Ageing\\_Europe\\_statistics\\_on\\_population\\_developments](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Ageing_Europe_statistics_on_population_developments). [Accessed 2024-04-07].

FABBE-COSTES, Nathalie, and Lucie LECHAPTOIS, 2022. Automotive supply chain digitalization. online. In: MCCARTHY, Bart L.; Dmitry IVANOV (eds.) *The Digital Supply Chain*, pp. 289-308. Amsterdam: Elsevier. ISBN 978-0-323-91614-1. Available from: <https://www.sciencedirect.com/topics/social-sciences/automotive-industry>.

FOTR, Jiří and Jiří HNILICA, 2014. *Aplikovaná analýza rizika ve finančním management a investičním rozhodování*. Praha: Grada Publishing. ISBN 978-80-247-9185-2.

GATTIKER, Christian; Stephanie KENNEDY; Mathieu RACHETER and Roberto Cominotto, 2023. Technology's wins in the US and China outshine Europe. online. In: *Julius Bär*. Zurich, Switzerland: JuliusBär. September 13, 2023. [2023-09-13]. Available from: <https://www.juliusbaer.com/en/insights/market-insights/marketoutlook/technologys-wins-in-the-us-and-china-outshine-europe/>. [Accessed 2024-04-12].

GMI, 2022. *Artificial Intelligence (AI) in Automotive Market Size By Component (Software, Hardware, Service), By Technology (Computer Vision, Context Awareness, Deep Learning, Machine Learning, Natural Language Processing (NLP)), Process, Application, 2018-2032. PDF*; online. Selbyville, USA: Global Market Insights. Report ID: GMI 3199. Dec 2022. Available from: <https://www.gminsights.com/industry-analysis/artificial-intelligence-ai-inautomotive-market>. [Accessed 2024-04-19].

GÜREL, Emet, 2017. SWOT Analysis: A Theoretical Review. online. *The Journal of International Social Research*, vol. 10, no. 51, pp. 994-1006. ISSN 1307-9581. Available from: [https://www.researchgate.net/publication/319367788\\_SWOT\\_ANALYSIS\\_A\\_THEORETICAL\\_REVIEW](https://www.researchgate.net/publication/319367788_SWOT_ANALYSIS_A_THEORETICAL_REVIEW).

HARVEY, George E., 2012. The Process of Risk Management: Important Steps to Take. online. *Petroleum Accounting and Financial Management Journal*, vol. 31, no. 1, p. 77-86. ISSN 15542904. Available from: <https://www.proquest.com/docview/1013673696/fulltext/D2B4D89E4ECC45A5PQ/?accountid=17116&sourcetype=Scholarly%20Journals>.

HIDA, Edward and Julian LEAKE, 2017. *The Future of Risk in Financial Services*. PDF; online. London: Deloitte Touche Tohmatsu Limited. Available from: <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Financial-Services/gx-global-RA-Future-of-Risk-POV.pdf>.

HOPKIN, Paul, 2018. *Fundamentals of Risk Management – Understanding, evaluating, and implementing effective risk management*. PDF; online. 5<sup>th</sup>. Ed. London: Kogan Page Limited. ISBN 978-0-7494-5943-7. Available from: <http://dspace.vnbrims.org:13000/jspui/bitstream/123456789/4826/1/Fundamentals%20of%20Risk%20Management%20Understanding%2C%20Evaluating%20and%20Implementing%20Effective%20Risk%20Management.pdf>.

HOWARTH, Josh, 2024. *10 Important Auto Industry Trends (2024-2026)*. Blog post; online. March 13, 2024 [2024-03-13]. Available from: <https://explodingtopics.com/blog/auto-industry-trends> [Accessed 2024-04-10].

INTERNATIONAL MONETARY FUND, 2024. European Union Datasets. online. In: *International Monetary Fund*. Washington D.C., USA: International Monetary Fund. April 2024 [2024-04]. Available from: <https://www.imf.org/external/datamapper/profile/EU>. [Accessed 2024-03-29].

INTERNATIONAL TRADE ADMINISTRATION, 2024. EU – Country Commercial Guide. online. In: *International Trade Administration*. Washington D.C., USA: International Trade Administration. Data extracted on 3 Feb 2024 [2024-02-03]. Available from: <https://www.trade.gov/country-commercial-guides/eu-import-tariffs>. [Accessed 2024-04-19].

JEHAN, Mussarrat, 2021. Automotive Transportation Logistics. online. In: MD SARDER. *Logistics Transportation Systems*, pp. 331-362. Amsterdam: Elsevier. ISBN 978-0-12-815974-3. Available from: <https://doi.org/10.1016/B978-0-12-815974-3.00013-7>.

JUNGO, 2024. *Driving Safety in the Age of GSR 2024: How Driver Monitoring Systems Can Help*. Blog post; online. Netanya, Israel: Jungo. Available from: <https://jungo.com/driving-safety-in-the-age-of-gsr-2024-how-driver-monitoring-systems-can-help/#:~:text=Advanced%20Driver%20Assistance%20Systems%20>. [Accessed 2024-03-15].

JUNGWIRTH, Tomáš, 2024. Výroba autoprůmyslu nad předkrizovými hodnotami. online. In: *AutoSAP*. 21/3/2024 [2024-03-21]. Available from: <https://autosap.cz/aktualita/vyroba-autoprumsly-nad-predkrizovymi-hodnotami/>. [Accessed 2024-04-02].

MARKER, Andy, 2017. *Download Free, Customizable Risk Matrix Templates*. Blog post; online. Washington D.C., USA: Smartsheet. Available from: <https://www.smartsheet.com/legal/site-terms>. [Accessed 2024-04-15].

O'NEILL, Aaron, 2023. European Union: Gross domestic product (GDP) from 2018 to 2028. online. Dec 7, 2023 [2023-12-07]. In: Statista. Hamburg, Germany: Statista [2023-08-21]. Available from: <https://www.statista.com/statistics/527869/europeanunion-gross-domestic-product-forecast/>. [Accessed 2024-03-29].

OBOOLO, 2022. *PESTEL Analysis of The European Union – Environment*. Blog post; online. Hong-Kong, China: Oboolo. 9 Nov 2022 [2022-11-09]. Available from: <https://www.oboolo.com/blog/our-tips/pestel-analysis-the-european-union-environment-09-11-2022.html>. [Accessed 2024-04-04].

OECD, 2024. Gross domestic spending on Research and Development. online. In: *OECD Data*. Paris, France: Organization for Economic Co-operation and Development. Available from: <https://data.oecd.org/rd/gross-domestic-spendingon-r-d.htm>. [Accessed 2024-04-10].

PANJEHFOULADGARAN, Hamidreza and Stanley Frederick WT LIM, 2020. *Reverse logistics risk management: identification, clustering and risk mitigation strategies*. online. *Management Decision*, vol. 58, no. 7, p. 1449-1474. ISSN 00251747. Available from: <https://www.proquest.com/docview/2499028025/4121F364A7B4991PQ/1?accountid=17116&sourcetype=Scholarly%20Journals>.

PRITCHARD, Carl L., 2015. *Risk Management – Concepts and Guidance*. PDF; online. 5<sup>th</sup>. Ed. Boca Raton: Taylor and Francis Group. ISBN 978-1-4822-5846-2. Available from: [https://zu.edu.jo/UploadFile/Library/E\\_Books/Files/LibraryFile\\_151624\\_32.pdf](https://zu.edu.jo/UploadFile/Library/E_Books/Files/LibraryFile_151624_32.pdf).

PRZETACZNIK, Sylwia, 2022. The Evolution of Risk Management. *Zeszyty Naukowe Małopolskiej Wyższej Szkoły Ekonomicznej w Tarnowie*, tom 53, nr. 1-2. ISSN 1506-2635.

RAHMAN, Muhammad, 2021. PESTEL analysis of the European Union (EU). online. In: *Howandwhat*. London, UK: Howandwhat. [2024-08-21]. Last update 06 April 2021 [2021-04-06]. Available from: <https://www.howandwhat.net/pestel-analysis-european-union-eu/>. [Accessed 2024-04-03].

REJDA, George E., 2008. *Principles of Risk Management and Insurance*. PDF; online. Boston: Pearson Education. ISBN 978-12-923-4974-9.

SMEJKAL, Vladimír and Karel RAIS, 2013. *Řízení rizik ve firmách a jiných organizacích*. Praha: Grada Publishing. ISBN 978-80-247-7005-5.

SRINIVAS, Kalyanaraman, 2019. Process of Risk Management. online. In: HESSAMI, Ali G(ed.). *Perspectives on Risk, Assessment and Management Paradigms*. Pune: National Institute of Construction Management and Research. March 2019 [2019-03]. ISBN 978-1-83962-138-3. Available from: <https://doi.org/10.5772/intechopen.80804>.

VOLKAN, Evrin, 2021. Risk Assessment and Analysis Methods: Qualitative and Quantitative. online. *ISACA Journal*, 2021, vol.2. 28 April 2021 [2021-04-28]. ISSN 1944-1975. Available from: <https://www.isaca.org/resources/isaca-journal/issues/2021/volume-2/riskassessment-and-analysis-methods>.

WITS, 2021. European Union Trade Summary 2021 Data. online. In: *WITS, World Integrated Trade Solution*. Washington D.C., USA: World Bank Group. Refreshed Apr-20-2024 [2024-04-20]. Available from: <https://wits.worldbank.org/CountryProfile/en/Country/EUN/Year/LTST/Summary>. [Accessed 2024-04-22].

WOODWARD, John, 2024. *How can you identify risks with brainstorming?*. online. Available from: <https://www.linkedin.com/advice/1/how-can-you-identify-risksbrainstorming-skills-risk-management>. [Accessed 2024-03-25].