

Master Thesis

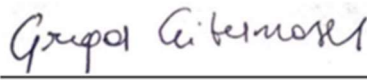
Title of the Master Thesis	The COVID-19 pandemic and its impact on the performance of companies
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I hereby declare that:

1. I have written this Master thesis myself, independently and without the aid of unfair or unauthorized resources. Whenever content has been taken directly or indirectly from other sources, this has been indicated and the source referenced.
2. This Master Thesis has not been previously presented as an examination paper in this or any other form in Austria or abroad.
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Vienna, July 27, 2022



Gregor Eitermoser

Abstract

Shocks and crises have been present in the economies of the world throughout the last decades and centuries. However, the COVID-19 pandemic has reached new heights with its fatal impact. Lockdowns, restrictions, and measures were implemented in most countries of the world to stop the spreading of the virus. This has not only changed social life as we had known it before, but it also significantly altered the corporate world. This thesis aims to analyze the impact of the COVID-19 pandemic on the performance of companies. In this context, a systematic literature review is conducted to examine the current status quo of the literature on this topic. Furthermore, a case study on the mechanical engineering industry in Lower Austria is carried out in which company representatives are interviewed and statistical data is analyzed. According to the findings, various factors such as the company's strategic behavior, financial flexibility, and proactiveness are detrimental to their proneness to the impact of COVID-19. Moreover, the results indicate that the taken support measures by the governments have a majorly positive impact on the performance of the companies. In addition, companies undertook a variety of countermeasures such as cost-cutting, employment optimization, and changes in the supply chain to respond to the impact of the pandemic. All in all, the findings reveal that the COVID-19 pandemic has a significant impact on companies, but the severity of the impact on the performance depends on the measures, industry, country, and strategy of the individual company.

Keywords:

COVID-19, pandemic, shock, crisis, performance, strategy

TABLE OF CONTENTS

List of figures	V
List of tables	VI
Abbreviations.....	VII
1. Introduction	1
1.1. Introduction to the topic	1
1.2. Problem definition.....	4
1.3. Relevance of the topic	5
1.4. Objective of the thesis	5
2. Methods	7
2.1. Research strategy	7
2.2. Systematic literature review	8
2.2.1. Keyword strategy	10
2.2.2. Search string.....	10
2.2.3. Execution & analysis of systematic literature review	11
2.3. Case study	14
2.3.1. Expert interviews	15
2.3.2. Statistical data	21
3. Systematic literature review.....	23
3.1. Impact of COVID-19 on the performance of companies	23
3.1.1. Finance	23
3.1.2. Supply chain	26
3.1.3. Strategy	26
3.1.4. Innovation	29
3.1.5. ESG (Environmental, Social, Governance)	29
3.2. Impact of past crises on the performance of companies	31
3.2.1. Finance	31
3.2.2. Strategy	32
3.2.3. Innovation	33
3.2.4. ESG (Environmental, Social, Governance)	33
4. Results	35
4.1. Measures of the Austrian government	35

4.1.1.	Overview	35
4.1.2.	Short-time work.....	36
4.1.3.	Financial aid measures.....	38
4.1.4.	Tax measures	39
4.1.5.	Guarantees	41
4.1.6.	Corporate test streets	41
4.1.7.	Corporate vaccination programs	41
4.2.	Mechanical engineering industry in Lower Austria	42
4.3.	Expert interviews	44
4.3.1.	Overview	44
4.3.2.	General COVID-19 impact.....	44
4.3.3.	Financial impact.....	45
4.3.4.	Supply chain impact	47
4.3.5.	Strategic impact	47
4.3.6.	Innovation impact.....	48
4.3.7.	ESG impact.....	48
4.3.8.	Countermeasures	49
4.3.9.	Past shocks & crises	50
4.3.10.	Lower Austria.....	51
4.3.11.	Mechanical Engineering	51
4.3.12.	Analysis in retrospect	52
5.	Discussion.....	53
5.1.	Comparison to other crises.....	53
5.2.	Comparison of findings of literature and case study	55
5.3.	Guideline for companies.....	58
6.	Implications, limitations, and future research.....	61
6.1.	Implications and limitations	61
6.2.	Future research	62
7.	Conclusion	64
	List of references.....	66
	Appendices	75
I.	Papers selected for the systematic literature review.....	75
II.	Interview guidelines.....	78

III.	A/A+ rated journals used for search string	81
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List of figures

Figure 1: Development of COVID-19 cases in Austria and Lower Austria.....	3
Figure 2: Overview of methods.....	7
Figure 3: Research strategy.....	8
Figure 4: Systematic literature review.....	9
Figure 5: Systematic literature review – Flowchart.....	13
Figure 6: Sub-branches of interview partners' companies.....	17
Figure 7: Support measures of the Austrian government.....	35
Figure 8: Number of people in short-time work.....	37
Figure 9: Orders released development.....	43
Figure 10: Orders on hand development.....	43

List of tables

Table 1: “Star” papers of the COVID-19 search string	9
Table 2: List of keywords	10
Table 3: Interview setting	18
Table 4: Categories and sub-categories of interview analysis.....	20
Table 5: Paid out subsidies by COFAG	36
Table 6: List of journal articles for the systematic literature review	77
Table 7: Interview guideline	80
Table 8: Interview analysis.....	Fehler! Textmarke nicht definiert.

Abbreviations

CEO	Chief Executive Officer
CFO	Chief Financial Officer
COFAG	COVID-19 Finanzierungsagentur des Bundes GmbH
e.g.,	Exempli gratia (for example)
ESG	Environmental, Social and Governance
EUR	Euro
MNC	Multinational corporation
NACE	Nomenclature statistique des activités économiques
VUCA	Volatility, uncertainty, complexity, and ambiguity
WHO	World Health Organization

1. Introduction

1.1. Introduction to the topic

“It is in times of crisis that heroes are born.” (Schneider, 2020)

The COVID-19 pandemic has had a significant impact on the performance of companies around the world (Carlsson-Szlezak et al., 2020). In this context, various indicators such as stock price indices (Ding et al., 2021), liquidity, revenue, profitability, or solvency (Alstadsæter et al., 2020) underline the effect of the COVID-19 pandemic. Some industries and countries have been hit harder than others, which is also related to the regulatory measures imposed by various governments (Shen et al., 2020).

The literature shows that COVID-19 has not only impacted one area of companies' businesses but has manifold effects on various parts, such as finance (Ding et al., 2021), supply chain (Parast & Subramanian, 2021) or strategy (Dong, 2021). Thus, it is crucial to understand which measures have been taken to tackle the negative effects of the pandemic and how companies have reacted or proactively set up their organizations to function during a global crisis.

COVID-19 has not been the first shock that directly impacted companies and economies around the world. There have been health-related shocks such as Ebola, Malaria, SARS, and Yellow Fever (Cevik & Miryugin, 2021) or SARS, H5N1, and H7N9 pandemics before (Nguyen et al., 2021). Moreover, exogenous shocks such as the Global Financial Crisis (Zouaghi et al., 2018) or Asian Crisis (Arslan-Ayaydin et al., 2014) were tremendously influential and impactful as well. Therefore, it can be said that shocks and crises have to be considered by companies to stay competitive in this rapidly changing environment (Dong, 2021).

According to Bundy et al. (2017), a crisis is an event that can potentially lead to a disruptive change. Crises are characterized by their salience and unexpectedness, which can result in tremendous consequences for companies (Bundy et al., 2017). COVID-19 is a prime example of a crisis that has led to implications worldwide and affected the performance of various companies (Carlsson-Szlezak et al., 2020). Therefore, it is crucial to have effective crisis management in place which can be used by the practitioners to guide the company in times of disruptive changes, volatility, and shock (Bundy et al., 2017).

In general, shocks can be classified as events that are closely related to crises (Carlsson-Szlezak et al., 2020). In that regard, the demand and supply sides can be hit by the shock, which could significantly impact the performance of companies (Li & Tallman, 2011). There are various types of shocks in the literature. Exogenous shocks have the attributes of being unanticipated and of low likelihood but could lead to significant changes that could threaten the existence of companies (Taleb, 2007). Environmental shocks are triggered by the company's surroundings and can be characterized as unanticipated and disruptive, potentially needing radical organizational changes as a response (Chakrabarti, 2015). Economic shocks are closely related to the macro and micro changes in conditions (Tybout & Bark, 1988) which could result in a sudden reduction in available capital and liquidity as well as a tremendous decline in market demand (Chakrabarti, 2015).

COVID-19 can be classified as a pandemic that has significantly impacted the performance of companies (Alstadsæter et al., 2020). Mauboussin (2012) defines performance as the way that a firm operates and conducts business. There are various measures to assess the performance of a company which can be financial (e.g., earnings-per-share) or non-financial (e.g., product quality). In general, the type of performance measure always depends on the company, with the industry and stage in the company lifecycle playing a crucial role (Mauboussin, 2012).

When focusing on the COVID-19 pandemic in more detail, one can realize the impact that it had on all parts of the world. The first cases of the COVID-19 pandemic were recorded in China, in December 2019 (World Health Organization, n.d.-b). On the 11th of March 2020, the World Health Organization declared COVID-19 a pandemic (World Health Organization, n.d.-b). Lockdowns and other measures especially hit the economies of Western companies almost overnight making the situation volatile with turnover and costs being directly affected (Alstadsæter et al., 2020).

In total, more than 544 million positive cases have been reported worldwide by the 30th of June 2022 with six million people losing their lives by that day (World Health Organization, n.d.-a). These two figures show how dramatic the impact of the pandemic has been not only on the economies around the world but also on society itself.

When focusing on the COVID-19 pandemic in Austria and the federal state of Lower Austria, one can see that the situation was lagging a little bit with the first cases being recorded in February 2020, however, the distribution and effect of the pandemic were rather similar. 4,479,380 people were positively tested in Austria by the 30th of June 2022, with 20,072 people's lives lost by the pandemic by that day (Bundesministerium für Digitalisierung und Wirtschaftsstandort, n.d.-a). In Lower Austria, 835,842 positive cases and 3,939 deaths were recorded by the 30th of June 2022. The development of positive COVID-19 cases for both regional areas is shown in figure 1.

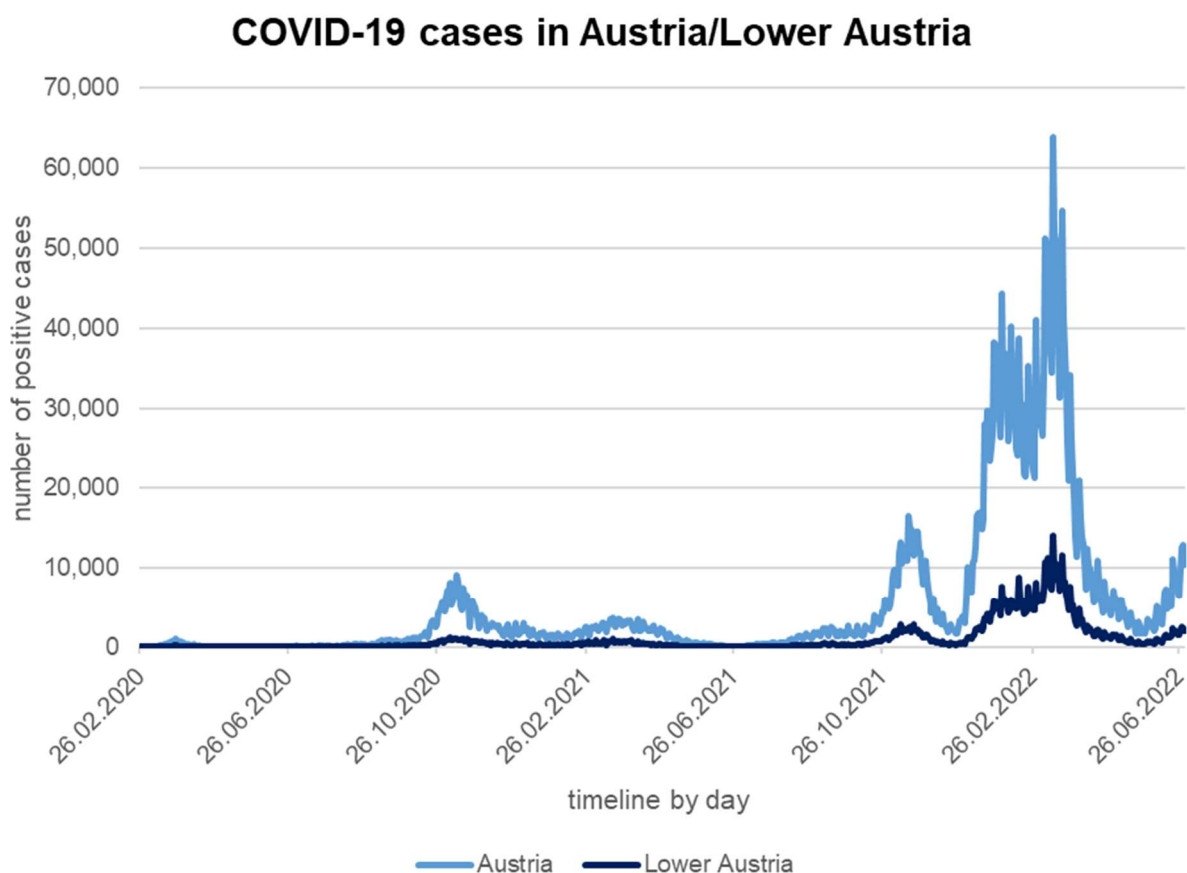


Figure 1: Development of COVID-19 cases in Austria and Lower Austria

Source: Compiled by the author based on data from
Bundesministerium für Digitalisierung und Wirtschaftsstandort (n.d.-a)

To deal with the spreading virus, governments worldwide implemented measures (Alstadsæter et al., 2020). In Austria specifically, the government directed its first full lockdown from the 16th of March 2020 to the 13th of April 2020 (Bundesministerium für Digitalisierung und Wirtschaftsstandort, n.d.-b). In the course of the next two years, three further full lockdowns were implemented by the Austrian government (Bundesministerium für Digitalisierung und Wirtschaftsstandort, n.d.-b). These

measures also had consequences for the businesses in Austria as additional regulations such as FFP2-masks and keeping distances had to be executed (Bundesministerium für Digitalisierung und Wirtschaftsstandort, n.d.-b). As the regulations had a significant impact on society, the impact also hit the companies and economies hard (Bundesministerium für Digitalisierung und Wirtschaftsstandort, n.d.-b).

1.2. Problem definition

In general, COVID-19 underlines the fact that proactiveness, agility, and responsiveness are more important than ever (Zainal, 2020). Different frameworks are used by scholars and organizations to analyze the crisis management of businesses (Bundy et al., 2017). Concepts such as the VUCA (volatile, uncertain, complex, and ambiguous) world (Ruesga Rath et al., 2021) and “new normal” (Corpuz, 2021) indicate that economies and societies around the world are facing challenges because of the rapidly changing environment and an increasing amount of “black swan events” (Taleb, 2007).

Thus, a guideline with practical input from company representatives would be of high importance to give executives a better understanding of possible measures and ways forward. Businesses need to be able to adapt to the circumstances and volatile environments, they are operating in, to maintain or even increase their level of performance.

Hence, this master thesis tries to address the following research question:

➤ How does the COVID-19 pandemic impact the performance of companies?

To narrow down the topic in a more precise way, the following sub-research questions are formulated:

- How is the COVID-19 pandemic different from prior shocks and crises?
- How were specific areas of the companies such as supply chain, strategy, finance, or innovation affected by the pandemic?
- How do the theoretical findings of the systematic literature review differ from the answers in the semi-structured expert interviews?
- How can companies best prepare themselves for future shocks and crises?

1.3. Relevance of the topic

Although the COVID-19 pandemic has been a dominant subject in the news worldwide in the early years of the 2020s (Shen et al., 2020), there is only limited literature about this topic so far. Moreover, there is no systematic literature review available that would give an overview of the scientific landscape. Therefore, choosing this approach could close this gap in the research and gain important findings. Furthermore, this thesis adds to the literature on the impact of crises on companies' performance, as there are only a few papers out there that compare the impact of the COVID-19 pandemic with other shocks and crises such as the Global Financial Crisis. Executives could better understand the differences and prepare the organizations accordingly if more literature on this topic would be available. Furthermore, a comparison between the findings of the literature and the input of experts is also not available as of now, thus, closing the research gap here could be especially important for practitioners.

In general, the topic has immense relevance as COVID-19 significantly impacts the majority of companies worldwide and leads to tremendous consequences (Suci & Chandra, 2021). With the help of this master thesis, valuable insights can be drawn which could be of utmost importance for companies and practitioners. Furthermore, the information from the COVID-19 pandemic and shocks and crises of the past can help future businesses in their situations with shocks and give them guidance about how to proceed in a rapidly changing and volatile environment. In total, the combination of theoretical input and practical findings should make a valuable contribution to research on this topic.

1.4. Objective of the thesis

This master thesis aims to examine the impact of the COVID-19 pandemic on the performance of companies and, thus, answer the research question. It is critical for the reader to understand the key terms of the paper. Therefore, a specific emphasis is put on the definitions of the umbrella terms shock, crisis, and performance in the introduction which are of high importance for the foundation of the master thesis.

To answer the research question from a theoretical point of view, a systematic literature review on the impact of COVID-19 and other shocks and crises of the past on the performance of companies is conducted. The goal of this approach is to give a detailed overview of the status quo of the existing literature and examine the differences

between the current pandemic and past shocks and crises. In this way, scientific papers are analyzed to note down the most important findings of the literature and use them as the theoretical foundation of this thesis.

Another main objective of this master thesis is to analyze the topic from a practical standpoint. This thesis should serve as a guideline for practitioners to understand the impact of a possible pandemic or crisis on the performance of a firm. To achieve this target, experts of Lower Austrian companies in the mechanical engineering industry are interviewed to understand the practical effect that COVID-19 has on their companies. Additionally, statistical data is obtained from Statistik Austria (2022), COVID-19 Finanzierungsagentur des Bundes GmbH (2022), and Arbeitsmarktservice Österreich (2022) to quantitatively challenge the findings of the literature. In total, nine interviews are conducted, and multiple data sets are analyzed to support this objective of the master thesis.

2. Methods

This chapter aims to describe the chosen methods for this master's thesis. In the following sub-chapters, the taken steps and approaches are described in more detail. Figure 2 shows a general overview of the set-up of the master thesis with a specific highlighting of the steps involved in the methods part of it.

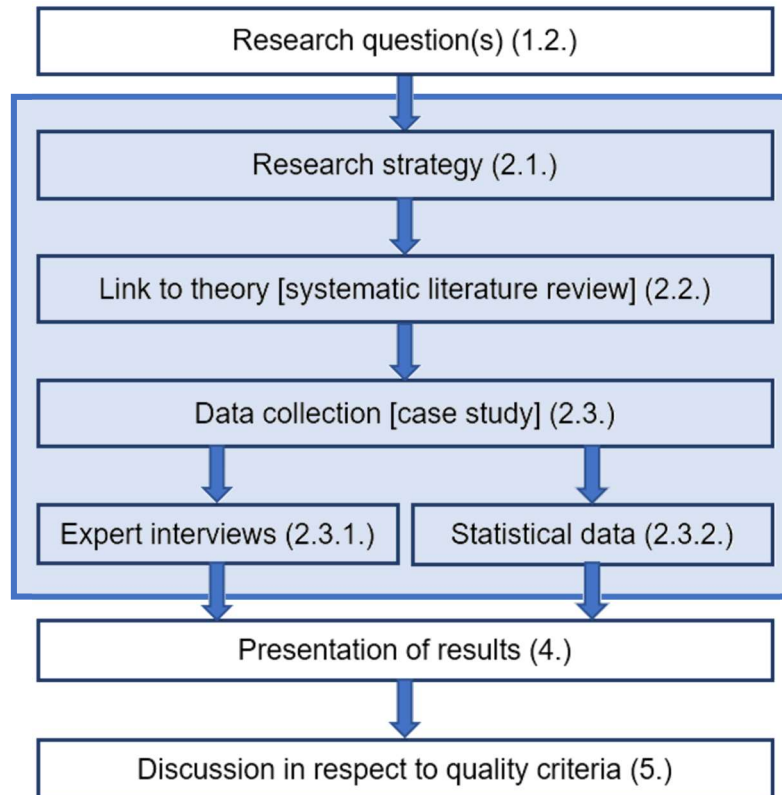


Figure 2: Overview of methods

Source: Compiled by the author based on Mayring (2014), p. 15

2.1. Research strategy

To analyze the problem in the best way possible, two approaches were chosen. The first part of the master thesis was centered around a systematic literature review. This served as the theoretical foundation of the master thesis. Secondly, a case study approach was chosen. In this context, statistical data and expert interviews were analyzed to observe the effects of the COVID-19 pandemic on the mechanical engineering industry in Lower Austria. Therefore, as quantitative, and qualitative data were analyzed in the course of this paper, a mixed approach was chosen. In total, both procedures should give the reader a good understanding of the theoretical and practical impact of the COVID-19 pandemic on the performance of companies.

Figure 3 shows the research strategy in an illustration.

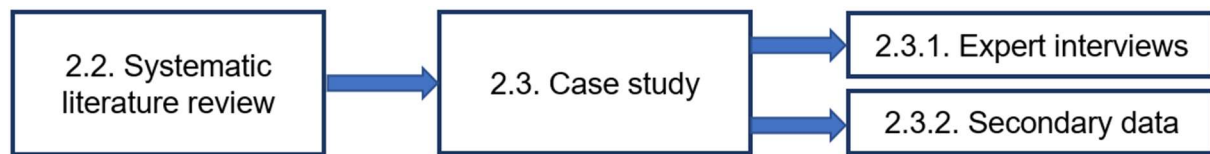


Figure 3: Research strategy

Source: Compiled by the author

2.2. Systematic literature review

Firstly, a systematic literature review according to the standards of the theory by Tranfield et al. (2003) and Denyer and Tranfield (2009) was conducted which can be split into three stages: The first stage dealt with the planning phase, which was concerned with the identification of the problem. The implementation of the review was the focus of the second stage. This focused on the way of searching the database, the data utilization, and the method of synthesis. The third and final stage dealt with the processing of the generated findings. In this step, recommendations and guidelines for practice were proposed and gaps in the current research were highlighted. In general, this systematic approach is characterized by placing a special focus on traceability and transparency (Tranfield et al., 2003).

Using this method, academic insights and the best-suitable studies could be picked and examined. The systematic literature review was conducted with the database ABI/Inform Global | T&I (ProQuest). As the master thesis does not only focus on literature about COVID-19 but also on crises and shocks of the past, the search string was divided. On the one hand, scholarly journals and working papers on the topic of COVID-19 were analyzed. On the other hand, a search string about past crises and shocks was created.

To ensure that highly ranked journals were represented in the specific search string, a manual check with three relevant lists of the university, which are the “WU Journalrating”, “WU Star-Journal-Liste” and the ranking from the Department for Strategy and Innovation, were done. The full list of journals from these lists that are rated A or A+ can be found in the appendix (Appendix X). However, as the COVID-19 pandemic is a rather new phenomenon, these papers are rarely included in high-end journals at the time of writing the master thesis as there is a lengthy peer-review process needed. Thus, a special approach that built on three different search strings was chosen to fulfill the quality criteria:

- The **COVID-related search string (Scholarly Journals)** only included peer-reviewed literature that was already published in journals.
- The **COVID-related search string (Working Papers)** focused on all working papers available of which the authors usually publish in highly ranked journals and have a high reputation and, thus, should display the current status-quo of the literature when it comes to the COVID-19 pandemic.
- The **past crises-related search string** only focused on highly rated journals that are A+ or A ranked as indicated above.

In this way, the best of both worlds of quality and recentness was covered in this thesis. In general, a further focus was put on the number of times that the papers had already been cited by other authors and the impact factor of the journal ranking. For all papers, the limit was put to literature that is in the English language.

Figure 4 shows the steps from the keyword strategy to the final execution and analysis:

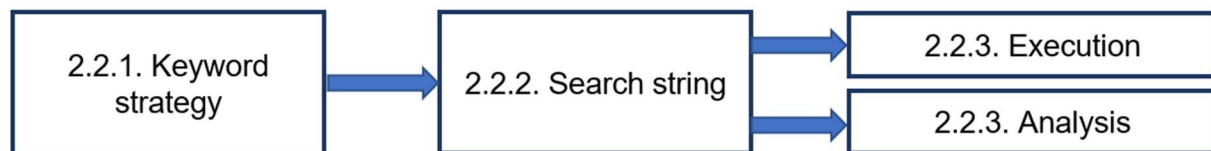


Figure 4: Systematic literature review

Source: Compiled by the author

Two papers of the COVID-related search string need to be mentioned specifically as these were already ranked in the “WU Star Journal List”, which ranks the best academic journals in the world, at the time of conducting the systematic literature review and are displayed in table 1:

Authors	Year	Title	Journal	Topic
Dong, J. Q	2021	Technological choices under uncertainty: Does organizational aspiration matter?	Strategic Management Journal	Impact of COVID-19 on strategic performance
Ding, W., Levine, R., Lin, C., & Xie, W.	2021	Corporate immunity to the COVID-19 pandemic	Journal of Financial Economics	Impact of COVID-19 on financial performance

Table 1: “Star” papers of the COVID-19 search string

Source: Compiled by the author

2.2.1. Keyword strategy

Table 2 shows a list of the main keywords and abbreviations for the systematic literature review. It ensured that all the important terms were included and built the basis for the search string. The words in bold embody the main keywords and are followed by synonyms which were also crucial for the different search strings.

Crisis	Company	Performance
9/11	Business	Earnings
COVID-19	Corporation	Profitability
Ebola	Enterprise	Outcome
Epidemic	Firm	Result
H1N1	MNC	Return
Pandemic	SME	
Sars		
Shock		
War		

Table 2: List of keywords

Source: Compiled by the author

2.2.2. Search string

After the list with all the keywords was finished, a search string was developed which was used for the searches in the database. The Boolean operators AND and OR were used to increase the specification of the search. While AND connects the parts of the search string, OR was used to search for different synonyms of the keywords. Moreover, the operator NEAR/3 was used to connect the second part of the search string with the third one. In this way, it was confirmed that the performance part of the search string had a maximum distance of three words to the company part. Therefore, it could be avoided that the performance and pandemic search terms gave out results that were not suitable for the systematic literature review. To ensure that both singular and plural for the word crisis were found, the wildcard “?” was used (ABI/Inform Global, T&I (ProQuest), n.d.).

Furthermore, one additional modification regarding the position of the keyword in the paper was made. As it was crucial to have the key terms in the most important parts of the papers, the field NOFT was used. This abbreviation makes sure that the buzzword is present in the abstract, or list of keywords. In this way, it was ensured that no search results were displayed where the key terms were mentioned in a side note,

but the articles had no relevance for the systematic literature review. Moreover, the functions STYPE.EXACT, PEER, and PD were used to select specific types of sources, only show peer-reviewed literature, and restrict the date of publication for parts of the search strings (ABI/Inform Global, T&I (ProQuest), n.d.).

Finally, the three search strings looked the following way:

- **COVID-related search string (Scholarly Journals):** NOFT((performance OR earning* OR result OR return* OR profitability OR outcome) NEAR/3 (compan* OR business* OR corporate* OR firm* OR enterprise* OR mnc OR sme)) AND NOFT(covid* OR corona*) AND STYPE.EXACT("Scholarly Journals") AND PEER(yes) AND PD(20190901-20220520) AND LA.EXACT("ENG")
- **COVID-related search string (Working Papers):** NOFT((performance OR earning* OR result OR return* OR profitability OR outcome) NEAR/3 (compan* OR business* OR corporate* OR firm* OR enterprise* OR mnc OR sme)) AND NOFT(covid* OR corona*) AND STYPE.EXACT("Working Papers") AND PD(20190901-20220520) AND LA.EXACT("ENG")
- **Past crises-related search string:** NOFT((performance OR earning* OR result OR return* OR profitability OR outcome) NEAR/3 (compan* OR business* OR corporate* OR firm* OR enterprise* OR mnc OR sme)) AND NOFT(pandemic OR shock* OR cris?s OR epidemic OR h1n1 OR 911 OR 9/11 OR ebola OR sars or war) AND STYPE.EXACT("Scholarly Journals") AND PEER(yes) AND PD(19000101-20220520) AND LA.EXACT("ENG") AND PUB.EXACT(*journals that are ranked A or A+ - see Appendix X*)

2.2.3. Execution & analysis of systematic literature review

After defining the search strategy and performing the initial search, multiple further steps were performed to get the final papers and studies for the systematic literature review. The search with ABI/Inform Global | T&I (ProQuest) was conducted on the 20th of May 2022 and resulted in 1,619 hits. This literature consisted of 42% papers from the COVID-related search string (Scholarly Journals), 10% from the COVID-related search string (Working Papers), and 48% of papers from the past crises-related search string.

In the first phase, all hits of the search were noted down in a spreadsheet. The next step (step 1) was to check possible duplicates from the search and mark those. This

was done by sorting the paper titles in ascending order and checking one for one if the same title, author, abstract, and publication were in place. In this step, 207 papers had been excluded as the three search strings were not mutually exclusive.

Next, the titles of the papers and studies were examined to exclude unfitting literature. To be more precise, unfitting literature was classified as having no context to the actual topic and was not able to answer the research questions. In this context, vast literature was excluded that focused on the medical influence of COVID-19 or dealt with political influences of past crises and shocks. Furthermore, many papers did not focus on the performance aspect of the topic and, thus, were excluded. This step (step 2) led to an exclusion of 1,259 papers. Thus, 153 papers remained after the eliminations in step 2.

An in-depth reading of the introductions and abstracts was done in the next phase, to get more information on the content of the studies. If the studies were not attributable to the impact of COVID-19 or past shocks and crises on the performance of companies, the papers were excluded. In this step (step 3), 98 papers were excluded leading to 55 papers under further examination.

This was followed by the reading of the full texts of the literature in detail to ensure high-quality papers and a fit to answer the research question. Once again, this step also included the exclusion of unfitting literature. In light of this, a check on the quality criteria that are described in section 2.2. was done. Furthermore, a specific emphasis was put on the research setting, hypotheses, and variables. However, as already two exclusion rounds had taken place prior, the number of excluded papers was rather low (=25 papers excluded in step 4).

30 papers fulfilled all quality criteria and showed a focus on the impact of COVID-19 or past shocks and crises on the performance of companies. For all the involved filtering and screening, the ABI/Inform Global | T&I (ProQuest) database and an Excel spreadsheet were used to keep track of all the changes and ensure traceability and transparency. Moreover, the combination of these two tools was a great way to have all information at hand and use it in the best systematic way possible. In general, all the selected papers conducted a quantitative research approach. The publication years of the final selection of papers are between 2020 and 2022 for the COVID-related search strings and 2003 and 2020 for the past crises-related search string.

The selection process and the number of excluded papers are displayed in figure 5.

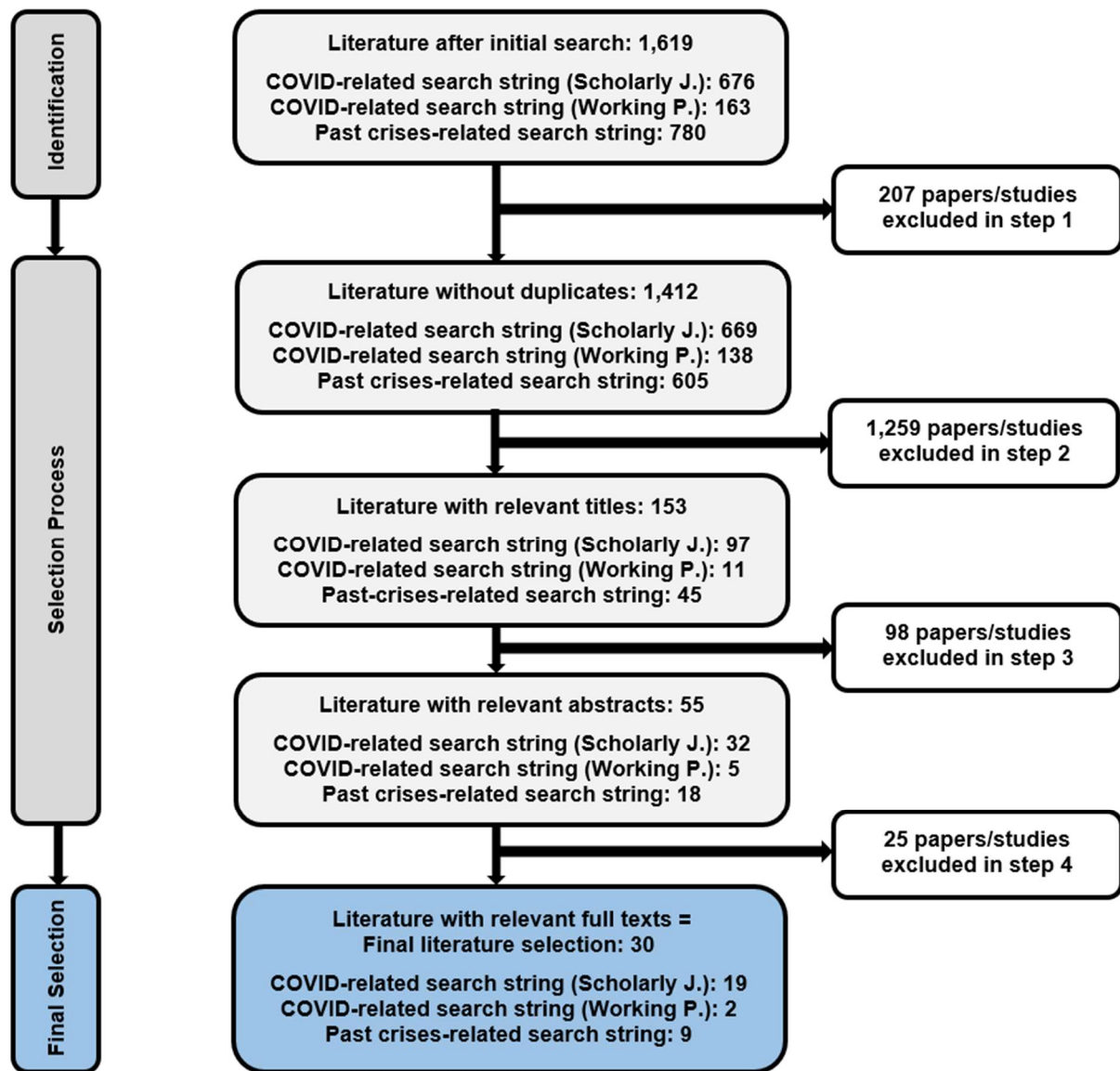


Figure 5: Systematic literature review – Flowchart

Source: Compiled by the author

After finishing the selection process, the relevant literature was listed in a table form in this document. In this context, the authors, years, titles, journals, and topics were displayed to give the reader an insightful overview. Thus, this was done in a similar way as the spreadsheet with all the information. This list can be found in the appendix (Appendix I = Table 6). Papers 1 to 19 were derived from the COVID-related search string (Scholarly Journals), papers 20 and 21 from the COVID-related search string (Working Papers), and 22 to 30 from the past crises-related search string.

This list was then the basis for the systematic literature review. In chapter 3, a specific emphasis was put on the findings of the systematic literature review in connection to the research question.

2.3. Case study

Harling (2012, p. 1) defines a case study as *“a holistic inquiry that investigates a contemporary phenomenon within its natural setting.”*

Moreover, a case study also has the attributes of being a qualitative method with input coming from multiple situations of evidence (Gerring, 2007). Case studies can be conducted in various forms such as a single-case or multiple-case (Yin, 2017). For this master thesis, a single-case study approach was chosen. The intuition behind this was to gather as much information as possible on one specific industry and regional area. This was achieved by getting two key inputs. On the one hand, valid secondary statistical data should build a quantitative foundation. On the other hand, expert interviews with a significant number of interviewees should be conducted to give an insightful qualitative component to the case study.

The mechanical engineering industry in Lower Austria was selected for the case study. The reasons for this choice were manifold. On the one hand, the federal state of Lower Austria is the biggest federal state of Austria in terms of size, is projected to grow by an estimated 3.7% in the year 2022, and is a major force in the economic landscape of Austria with approximately 109,000 companies having their location there (Niederösterreichs Wirtschaftsagentur GmbH, n.d.). On the other hand, personal interest played an important role as the mechanical engineering industry was hit in a particular way by the COVID-19 pandemic which includes topics such as problems with the supply chain, decreasing turnover, and liquidity issues which embody interesting facts that should be analyzed in more detail.

Dixit et al. (2017) define the mechanical engineering industry as a broad discipline with a wide scope. Furthermore, the authors mention that many industries have touchpoints with the mechanical engineering setting. In general, the process of mechanical engineering goes through multiple stages beginning at the design phase, to various management and service sections. Moreover, supportive roles are performed to keep the process in shape. Various disciplines have sub-divided from the mechanical engineering roots. Industrial engineering and automobile engineering are two prime examples here. Digitalization and the increasing importance of technology are two trends that push the importance of mechanical engineering and enrich its scope (Dixit et al., 2017).

In general, the different industries are classified according to the NACE code by the European Commission (n.d.). In the context of the mechanical engineering industry, the NACE code C28 is used which stands for the “*manufacture of machinery and equipment n.e.c.*”, which can be further split into the following sub-categories (European Commission, n.d.):

- C28.1 - Manufacture of general-purpose machinery
- C28.2 - Manufacture of other general-purpose machinery
- C28.3 - Manufacture of agricultural and forestry machinery
- C28.4 - Manufacture of metal forming machinery and machine tools
- C28.9 - Manufacture of other special-purpose machinery

Statistik Austria (2022) is using a different classification and is including the mechanical engineering industry in the section of machinery, metal goods, and foundry industry.

2.3.1. Expert interviews

Expert interviews were conducted to challenge the theoretical findings of the literature and get more insights into the practical implications of COVID-19 on the performance of companies in the mechanical engineering industry in Lower Austria.

An important factor in this context was the choice of experts. It was vital to interview practitioners from different companies to get a full understanding of the sentiment of the whole industry. Thus, it was ensured that representatives from firms in different stages of the company lifecycle were interviewed. Moreover, companies of different sizes and international orientations were included. In conclusion, this gave a very good picture of how the performance of Lower Austrian companies in the mechanical engineering industry had been impacted by the pandemic.

The interview partners were chosen based on the industry, company, location of the company, and their position in the firm. To ensure that the experts had sufficient knowledge and insights about the company, top or middle management members were chosen as interviewees. These people should be able to give valuable insights into the company's performance, resulting in highly useful answers. Moreover, the focus of the case study was on the federal state of Lower Austria. Therefore, only companies and interview partners from this area were picked to ensure the most value for the analyses. In that regard, this master thesis was supported by the federal state of Lower Austria.

Additionally, the topic was advertised on the website of the federal state of Lower Austria to have bigger awareness and find further interview partners.

Meuser & Nagel (2009) characterize expert interviews as a qualitative measure that is based on an interview guide. It is centered around the expert's knowledge and builds on the practitioner's field of action (Meuser & Nagel, 2009). Expert interviews are seen as a tool to analyze the perspectives of the interviewees to get more information about the connection between theory and practice (Edwards & Holland, 2013). Regarding the interview style, a semi-structured approach was chosen. On the one hand, this should in principle lead to subjective input and perspectives from the interviewee while having a conversational setup (Longhurst, 2003). On the other hand, a big advantage in this context is the level of flexibility, which allows the interview to be focused on the most important topics while being able to navigate (Bryman & Bell, 2011).

Guidelines for the interviews

The systematic literature review built the theoretical foundation for the master thesis. In this context, valuable pieces of information were won to holistically understand the impact and challenges of the COVID-19 pandemic. This also led to the sub-areas, topics, and questions that were asked in the interview. In this way, a comparison between the findings of the literature and the answers of the interviewees could be drawn. Furthermore, the Austrian Institute for Economic Research published various surveys since the beginning of the COVID-19 pandemic which were used for inspiration as well (e.g., Hölzl et al. (2022) or Hölzl et al. (2021)).

All the interview partners were asked the same questions. However, follow-up questions were asked to better understand the answers if they were not understood at first. In general, two sets of questions were prepared to give the interviewees the chance to get asked the questions in German or English. Every interview partner chose to interview in German.

Selection of interview partners

To identify the right interview partners for the expert interviews, an online search was conducted. In that context, Lower Austrian companies in the mechanical engineering industry were researched to find a suitable group of potential interviewees. In the next step, three approaches were chosen to raise awareness for the interviews. Firstly, companies were contacted via e-mail. To be precise, a recommendation letter by the

federal state of Lower Austria was created to underline the ambitions of the interview which was then attached to the e-mail. Secondly, the personal network was leveraged to find suitable interview partners. Lastly, the topic was put on the website of the Lower Austrian Research Promotion Agency. In that way, a maximum level of awareness should be raised for the topic.

A specific emphasis was put on the role of the interview partners within the companies. To ensure that the interview partners had the knowledge to answer all the questions, only company representatives from the top and middle management were selected for the interviews. At the time of the interview, six of the interview partners held the position of Chief Executive Officers in the company, while two of them were Chief Financial Officers and one was a Business Unit Head. Furthermore, every interviewee except one had already been in the company for multiple years which was especially important to give further information on the way that COVID-19 had impacted the company and which crises and shocks had challenged the organization in the past to understand potential differences.

When analyzing the companies of the interview partners, all of them are part of the mechanical engineering industry. However, as this term is rather broad, the companies can be assigned to different sub-parts of the mechanical engineering industry as these companies operate in their niche. Figure 6 shows the split of sub-industries:

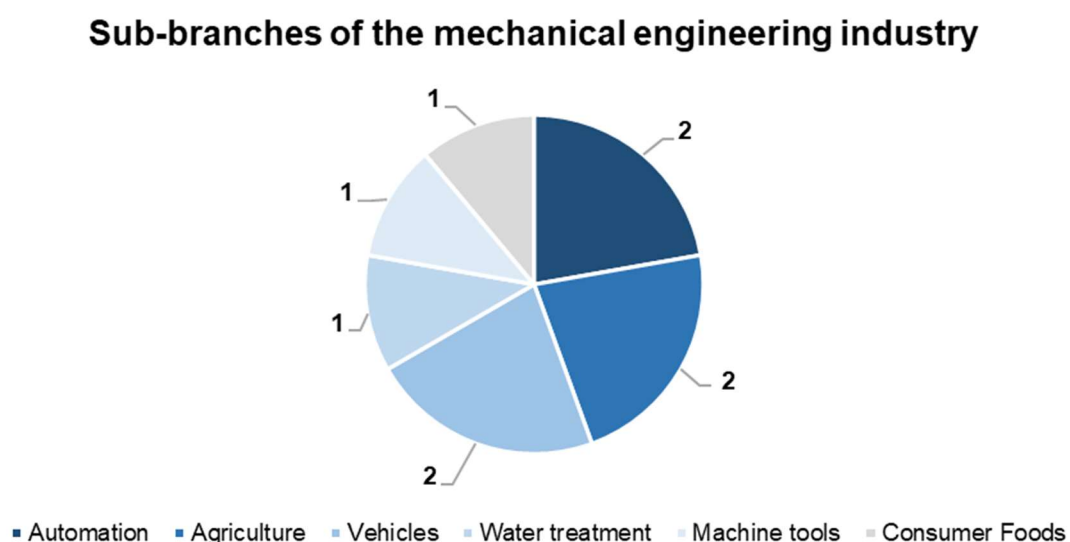


Figure 6: Sub-branches of interview partners' companies

Source: Compiled by the author

In total, nine interviews were conducted. For anonymization, the interview partners got assigned numbers in chronological order of the interview dates. Moreover, the companies were anonymized by naming their companies A to I. These were also used for the interview analysis. The first interview was conducted on the 27th of May 2022, while the last one took place on the 1st of July 2022. Seven of the nine interviews happened online, while two of them were conducted via phone. It is critical to mention here that the interview partners were given the choice to pick their favorite way of communication (personal, telephone, MS Teams or Zoom) to ensure a comfortable setting for them. In terms of duration, the longest interview lasted 52 minutes while the shortest interview was finished after 24 minutes. Table 3 shows the interviews in an anonymous form, split per interview number, date, length, setting, and function of the interviewed company representative.

Interview	Date	Length	Setting	Function
1	2022-05-27	47:30 min	Online - MS Teams	Chief Executive Officer
2	2022-06-02	49:06 min	Telephone	Chief Executive Officer
3	2022-06-03	43:50 min	Online – MS Teams	Business Unit Head
4	2022-06-07	52:01 min	Online – MS Teams	Chief Executive Officer
5	2022-06-15	51:04 min	Online – MS Teams	Chief Financial Officer
6	2022-06-17	49:52 min	Online – MS Teams	Chief Financial Officer
7	2022-06-17	30:38 min	Online – MS Teams	Chief Executive Officer
8	2022-06-21	24:08 min	Telephone	Chief Executive Officer
9	2022-07-01	36:43 min	Online - Zoom	Chief Executive Officer

Table 3: Interview setting

Source: Compiled by the author

Interview approach

When sending out the invitations for the interviews, the interviewees were already asked whether it would be ok to record the interviews to be able to transcribe them afterward. Only after receiving their consent, the interviews were finally conducted. A semi-structured interview approach was chosen, which means that the same set of questions was asked to the interviewees, however, follow-up questions were posed, if further clarification or explanation was needed or the interviewee mentioned a topic that required further information. The interview guide does not contain these questions.

To document the interviews in the best way possible, the interviews were recorded for later transcription. This was done in two different ways. Firstly, online interviews were transcribed using the interface of the video communication tool. Secondly, interviews conducted via mobile phone were then recorded by using the record function of a second mobile phone. Already in the interview setting, notes were taken which already gave an important indication about possible findings.

The interview guidelines, questions, and transcripts can be observed in the appendix section of the master thesis (Appendix II and Appendix III). Some parts of the questions and answers were redacted to ensure anonymity. Every interviewee's name was replaced by an assigned number. This procedure was also used for the name of the company by assigning letters from A to I.

Interview analysis

There are several types of interview analyses in the literature. For this specific thesis, the qualitative content analysis by Mayring (2014) was selected to analyze the semi-structured expert interviews. The reason here was that it is the best suitable approach in terms of analytics and transparency for the interviews in place. The approach by Mayring (2014) is used for the analysis of text and the subsequent combination with qualitative assessment criteria and categorization, and, thus, is considered a systematic approach. In general, the approach by Mayring (2014) can be divided into three sub-categories. The summary approach's goal is to dissect the input from the interviewees to the most crucial points. Secondly, the explication approach focuses on creating new information by analyzing the input. Thirdly, the structuring approach aims at examining the input and assigning it to the criteria which were predetermined. In the course of this master thesis, the structuring approach by Mayring (2014) was chosen.

After conducting the interviews, all of them were transcribed which can be found in the appendix (Appendix III). Furthermore, the interviews were carefully analyzed. In this way, text strings were highlighted, saved in a spreadsheet, and then used for the master thesis. However, if text strings were off-topic and could not contribute to answering the research questions, they were not taken into further consideration. The text strings were saved and linked to the interview partner to keep track of the different findings. In the next step, the findings were consolidated. In the course of the interview analysis, 242 paraphrases were generated, ranging from 22 to 32 paraphrases per interview.

After finding the critical text strings from the interviews, an inductive approach according to the literature of Mayring (2014) was chosen. In light of this, the text passages were used to create main- and sub-categories. This was done by analyzing the paraphrases and assigning them to preliminary categories which then were confirmed as sub-categories. In the next step, the sub-categories were summarized into main categories according to their field of action. Table 4 provides an overview of the different main- and sub-categories:

MC 1: General impact	SC 1.1: Extent of impact	SC 1.2: Duration	SC 1.3: Investment behavior	SC 1.4: Impact on workforce
MC 2: Financial impact	SC 2.1: Sales, orders released & orders on hand	SC 2.2: Business units & departments	SC 2.3: Forecast	SC 2.4: Financial measures
MC 3: Supply chain impact	SC 3.1: Impact on supply chain	SC 3.2: Supply chain measures		
MC 4: Strategic impact	SC 4.1: Change in strategy	SC 4.2: Business models		
MC 5: Innovation impact	SC 5.1: Change in innovation	SC 5.2: R&D spending		
MC 6: ESG impact	SC 6.1: Governance	SC 6.2: Sustainability		
MC 7: Counter- measures	SC 7.1: Government measures	SC 7.2: Impact of governmental measures	SC 7.3: Different measures	SC 7.4: Planning perspective
MC 8: Past shocks & crises	SC 8.1: Focus on past crises & shocks	SC 8.2: Focus on Ukraine/Russia		
MC 9: Lower Austria	SC 9.1: Involvement of Lower Austria	SC 9.2: Proposals for Lower Austria		
MC 10: Mechanical engineering	SC 10.1: Competitive situation	SC 10.2: Industry-specific trends		
MC 11: Analysis in retrospect	SC 11.1: Approach in hindsight			

Table 4: Categories and sub-categories of interview analysis

Source: Compiled by the author

After finishing the qualitative content analysis, eleven main categories and 27 subcategories were established. All text passages were assigned to a code consisting of the interview number and line number (e.g., I1/1-2). In the next step, the text strings were then allocated to the different sub-categories which built the main categories. A table with all paraphrased text passages can be found in the appendix (Appendix IV).

2.3.2. Statistical data

To analyze the case study from a quantitative point of view, statistical data was used to examine the impact of COVID-19 on the performance of companies in the mechanical engineering industry in Lower Austria. On the one hand, data were obtained and analyzed from the COVID-19 Finanzierungsagentur des Bundes GmbH (2022) which has been responsible for distributing subsidies to the companies as a measure to balance the impact of the COVID-19 pandemic and Arbeitsmarktservice Österreich (2022) which has been responsible for the handling of the short-time work. On the other hand, secondary data was requested and examined from Statistik Austria (2022) to get further insights into the development of the mechanical engineering industry in Lower Austria.

Mechanical engineering industry in Lower Austria

The mechanical engineering industry in Lower Austria is rather prominent when comparing it to the other federal states in Austria (Statistik Austria, 2022). Data from Statistik Austria (2022) shows that 127 companies with a total of 25,808 people belong to this industry on average in 2022. These figures show the importance of the industry to the economy of the federal state of Lower Austria and also Austria as a whole (Statistik Austria, 2022).

In sub-section 4.2., a detailed insight is given into the development of relevant key performance indicators by using data from Statistik Austria (2022). In that regard, a specific emphasis was put on comparability, as the main goal here was to understand the differences between the period before the COVID-19 pandemic (e.g., the financial year of 2019 or the first months of 2020) and the development of these key performance indicators during the time of the COVID-19 pandemic. Moreover, it was critical to understand how the situation of companies differed when comparing the COVID-19 pandemic to a prior crisis such as the Global Financial Crisis.

Measures of the Austrian government

The Austrian government has imposed measures to curb the impact of the COVID-19 pandemic (Bundesministerium für Digitalisierung und Wirtschaftsstandort, n.d.-b). These actions were partially dependent on the industries in which the companies were operating. In this context, the COVID-19 Finanzierungsagentur des Bundes GmbH (2022) has played a crucial role as this was the institution that allocated financial resources to the companies. Furthermore, the Arbeitsmarktservice Österreich (2022) has processed the short-time work measure for the Austrian government. The data for this master thesis was obtained from the beginning of the implementation of the governmental measures until the 30th of June 2022. A more detailed overview of the measures and allocation to the mechanical engineering industry in Lower Austria is given in sub-section 4.1.

3. Systematic literature review

This chapter analyzes the findings of the systematic literature review. A systematic literature review was conducted to analyze the current status quo of the literature about the impact of the COVID-19 pandemic and previous shocks and crises on the performance of companies. In this context, several steps were performed to reach the final number of papers which can be found in sub-chapter 2.2.3. In the final selection, every paper was read in detail and the most important findings were listed in the following paragraphs.

In general, the impact of COVID-19 and past shocks and crises can be observed in different fields. Furthermore, the current literature presents characteristics and measures that should be applied to counter the negative influences of the COVID-19 pandemic. In this master thesis, the impact on the financial situation, supply chain, strategy, innovation behavior, and ESG dimensions of companies is analyzed. Moreover, it is differentiated between the impact of COVID-19 and other shocks and crises of the past on the performance of companies. Thus, two sub-chapters were created to differentiate between the impact of the COVID-19 pandemic and prior shocks and crises.

3.1. Impact of COVID-19 on the performance of companies

The COVID-19 pandemic has affected all businesses around the world in some way (Ding et al., 2021). The following sub-chapters describe the impact of the pandemic on the performance of companies and various dimensions in more detail.

3.1.1. Finance

COVID-19 has not only affected the revenue and costs of most companies. In contrast, factors such as liquidity or financial flexibility have also been impacted by the pandemic. When looking at the number of scholarly journals on the financial impact of the COVID-19 pandemic, one can see that a specific emphasis has been put here as a lot of companies have been concerned in this dimension.

Ding et al. (2021) assessed the relationship between corporate performance, financial initiatives, strategic measures, and the response of stock returns to COVID-19 cases. The findings of the paper showed that the decline in stock value was weaker for companies with strong and robust financial situations during 2020, e.g., if they had

better liquidity, less debt, and higher profits. Furthermore, less exposure to the COVID-19 pandemic was shown if the companies had good global supply chains and relations with their customers. Thirdly, location, the focus on corporate social responsibility, and the motivation of the executives also played important roles in showing the impact of COVID-19. Moreover, possible measures to mitigate the effects were needed in many dimensions of corporate life according to the study. Another finding was that companies controlled by families, large corporations, or governments had generally performed better than companies that were owned by hedge funds and other asset management companies. Thus, companies with a little amount of managerial ownership were rewarded and others were penalized in the study (Ding et al., 2021).

Golubeva (2021) found in her study that equity was important for company performance during the COVID-19 crisis, with the results being statistically significant in both models. The author explained this by using the trade-off theory as the companies could use equity instead of debt because of the increased costs of bankruptcy under the pandemic scheme. Moreover, she found that liquidity was significantly important when it came to the closures of companies, however, loan financing became a viable option when productivity levels were declining. These findings showed that robust financing solutions were built on equity, cash, and debt in the early stages of the COVID-19 pandemic (Golubeva, 2021).

Alstadsæter et al. (2020) showed in their paper that COVID-19 significantly impacted the performance of companies in terms of revenue and liquidity. They argued that this economic distress could lead to serious consequences for the companies. Therefore, most countries put policies in place to support local firms. A simulation by the authors illustrated how important these measures were in the context of the crisis as they were showing the impact on various indicators, such as solvency or profitability. Thus, their paper could be seen as a guideline for future shocks and crises (Alstadsæter et al., 2020).

A study by Hung et al. (2021) with data from companies in Asia revealed that the COVID-19 pandemic significantly impacted the performance of companies listed on the stock exchange. This impact varied from industry to industry which was also highlighted by the fact that not all firms were hit with the same severity. Interestingly, the study by the authors showed that businesses in the medical sector were affected less than other industries. Furthermore, results indicated that the pandemic could be

split into different event phases. However, the impact was not on the same level for all of these phases (Hung et al., 2021).

Teng et al. (2021) investigated how financial flexibility impacted the performance of enterprises during the COVID-19 pandemic. The results indicated that the impact of financial flexibility was significant and positive on the performance of companies during the early stages of the COVID-19 pandemic for the asset-heavy manufacturing industry. However, having a lot of financial flexibility did not seem to have a major impact on the performance of companies in the manufacturing of asset-light and semiconductor sectors. The key performance indicator used for the study was “return on assets”. The findings showed that the effect of the pandemic was different from industry to industry. Moreover, a key result was that having financial flexibility and paying attention to liquidity management were important ways to reduce the impact of the COVID-19 pandemic on company performance (Teng et al., 2021).

Shen et al. (2020) conducted one of the first studies about the impact of COVID-19 on firm performance. Analyzing company data from listed Chinese businesses, the authors outlined that the pandemic had a significantly negative impact on the performance of companies. In this context, it was shown that the impact tended to be negative if the firms had a small investment scale or sales revenue. Furthermore, the study showed two more findings. On the one hand, industries that were hit harder by the pandemic (e.g., tourism, catering, or transportation) also experienced a bigger decline in company performance. On the other hand, companies in regions with more severe restrictions such as quarantine measures or lockdowns had a significantly worse company performance (Shen et al., 2020).

Cui et al. (2021) examined whether companies with more conservative practices when it comes to accounting were generating higher shareholder returns compared to other companies during the first period of the COVID-19 pandemic. The results showed that companies with more conservative accounting schemes exhibited considerably lower downturns in the performance of their companies and stocks. This impact got stronger if the companies had a greater amount of information asymmetry in their companies during the COVID-19 pandemic. Thus, the findings showed that the positive side of conservatism was lower when the companies were facing little to no information asymmetry during economic distress like the COVID-19 pandemic (Cui et al., 2021).

3.1.2. Supply chain

Supply chains have been one of the key topics in the discussion of the impact of COVID-19. Papers mention (e.g., Parast and Subramanian (2021)) that supply chain disruptions have been particularly a problem with the current pandemic as various companies and industries are impacted.

Parast and Subramanian (2021) showed that disruptions in supply chains could have a big impact on the performance of companies. According to them, COVID-19 had been an event that significantly impacted and altered the supply chains of companies. Their paper highlighted, that disruptions in supply, demand, and processes were closely related to company performance. Moreover, one of their findings was that disruptions in a company's supply chain could have various impacts on its performance, depending on the part of the supply chain concerned. This could also lead to large losses in sales and affect logistics. Managers should be aware that risk drivers of disruption could impact business performance differently than supply chain performance (Parast & Subramanian, 2021).

Oikawa et al. (2021) examined the impact of the COVID-19 pandemic on the performance of companies. Furthermore, a specific emphasis was put on the supply chain topic. The authors showed that adapting to the situation caused by the COVID-19 pandemic – especially when it comes to the supply chain – was crucial to maintaining the performance of the company. The findings of the paper were that various companies were restructuring their supply chains as a response to the caused shock. Moreover, the pandemic led to multiple reductions in links between supply chains, while it also saw an uptick in the number of links between those chains. In conclusion, the authors constituted that the COVID-19 crisis was also a supply chain crisis and that the pandemic impacted the supply chains on various levels (Oikawa et al., 2021).

3.1.3. Strategy

According to the findings of the systematic literature review (Golubeva, 2021), the strategic sphere of the companies has also been significantly impacted by the COVID-19 pandemic.

Dong (2021) analyzed strategic decisions considering uncertainty. A specific emphasis was put on the process of setting goals. According to the general literature, many

people think that having more information is a way for executives to deal with uncertain situations like the COVID-19 pandemic. However, the paper showed that having goals in place that are internally and externally focused on performance might not be the right approach for choices of technological nature. Moreover, a single focus on internal goals for performance could even lead to negative effects. The author showed that the best way would be to gather external information from a fitting peer group such as companies in similar industries and with similar performance levels. However, this approach benefited companies more with rapidly changing technologies and showed less usefulness when crises and shocks such as COVID-19 hit the companies (Dong, 2021).

Golubeva (2021) highlighted that the performance of companies during the COVID-19 pandemic was significantly impacted by the firm, size, industry, and export orientation of the company. Furthermore, the market demand for the services and products and the financial set-up had significant importance when it came to the performance of companies. As a further note, the corporate governance situation of the company played a decisive role as well, showing that the impacts of the COVID-19 pandemic had manifold dimensions (Golubeva, 2021).

Mattera et al. (2021) analyzed the COVID-19 pandemic and its impact on the business models of companies. The findings showed two things: Having sustainable business models in place and implementing long-term corporate social responsibility strategies were valuable approaches to fighting the impact of the crisis. The implementation of the Global Reporting Initiative's standards guidelines of the United Nations in connection to the business models was a further way to overcome situations of business distress with COVID-19 being a prime example of a crisis. Moreover, it was crucial to be close to stakeholders and consumers as this gave companies an idea of the needs and preferences that were required to cater the products and services to the demand of the customers and create the highest value possible (Mattera et al., 2021).

Chu et al. (2021) examined how different geographic areas fared during the COVID-19 pandemic and what factors might have contributed to their different outcomes. The authors showed that the COVID-19 pandemic negatively impacted the returns of real estate companies, however, if the companies had a broader geographic reach and the real estate properties were more diversified in terms of geography, the negative impact of the COVID-19 pandemic was weaker. In total, the paper showed that diversification

is an important measure in times of economic downturns such as the COVID-19 pandemic. Furthermore, this was also important when making strategic and financial choices during the early stages of the pandemic. Especially larger companies could use this strategy as the financial resources might be more available than for smaller firms. Thus, an important finding of the study was that diversification is a way to reduce the negative effects which were caused by COVID-19 (Chu et al., 2021).

The main purpose of Clampit et al.'s (2021) paper was to analyze the performance of companies during the COVID-19 pandemic. In that regard, the authors investigated different strategies and measures to examine the most successful ones. The findings showed that firms with higher research and development spending and, thus, riskier behavior, had a better performance during the COVID-19 pandemic if the prerequisite of having low cash in comparison to the level of inventory was given. Moreover, the paper indicated that specific strategies could forecast the performance of companies during the COVID-19 pandemic. Another finding of the paper was that inventory should be prioritized over cash retention as this could stop possible supply chain problems, especially in times of turbulence. The study showed that companies with higher levels of operating risk registered a 60% higher sales growth than comparable companies. Thus, the findings showed that riskier strategic behavior was a way to mitigate the economic downturn of the COVID-19 pandemic (Clampit et al., 2021).

Fang et al. (2022) examined how firms responded to the COVID-19 pandemic and what strategic choices were taken to influence the performance of the companies by measuring their survival status and growth of sales. Furthermore, the authors analyzed what role the resources played, and how strategic choices influenced demand, liquidity, and innovation. The findings of the study were manifold. Firstly, bigger companies with ownership by foreign institutions or the state and subsidiaries were better at having stable supplies, keeping good liquidity management, and innovating into new products during the course of the COVID-19 pandemic. Moreover, CEOs who were already in the company for a long time, were also a factor when it came to company survival. Companies in wealthier countries tended to perform better during the pandemic, with government measures being important in this context (Fang et al., 2022).

3.1.4. Innovation

Keywords such as agility, creativity, or proactiveness have been more used than ever to describe the “new normal” as a result of the COVID-19 pandemic.

A study by Zainal (2020) found that creativity, risk-taking, and future orientation had a significant impact on the performance of companies. In contrast, the factors of openness to change and proactiveness did not entail a significant relationship when it came to business performance. Furthermore, the author showed that innovation was growing in importance, especially in rapidly changing environments. COVID-19 in particular constitutes a situation with never been seen before uncertainty which needs innovation capabilities by the companies to handle the crisis (Zainal, 2020).

In a study by Dovbischuk (2022), a range of capabilities, that was designed to help organizations become more resilient, were found to be statistically significant factors in business performance. Firstly, knowledge transfer was an important topic for two reasons: Being able to spread new knowledge and know-how and having the ability to train the workforce efficiently and effectively are crucial tools in a time of turbulence. Moreover, the study showed that development of collaborations on a cross-functional and inter-firm level was important to connect with business partners. Furthermore, it was key to learn from rivals and implement a win-win connection, to challenge the organization. These factors in total should support leaders in managing their innovative and strategic decisions and gaining a competitive advantage. This is especially important in times of crisis in a turbulent and rapidly changing environment (Dovbischuk, 2022).

3.1.5. ESG (Environmental, Social, Governance)

ESG is a concept that is described through the environmental, social, and governance dimensions of a company (Zhou & Zhou, 2022). In this context, the ESG view gains importance due to the changes in the environment, society, and economy.

A quantitative study by Zhou and Zhou (2022) compared the relationship between ESG rating and stock price volatility in light of the COVID-19 pandemic. Controlling for enterprise scale, financial leverage, Tobin Q value, and cash-holding ratio, their paper showed that a better ESG rating led to less volatility in terms of stock price. In general, companies with good or excellent ESG ratings had also been hit by the pandemic. However, having an excellent rating is a reliable indicator that shows that these

companies have a stronger resilience and are able to recover faster from the impact of the pandemic on the stock. Furthermore, the study showed that COVID-19 increased the volatility in the stock prices of companies. If the companies held a decent ESG rating, the volatility became smaller (Zhou & Zhou, 2022).

Li (2021) analyzed the impact of COVID-19 on the governance situation of companies. The author concluded that the impact of the COVID-19 pandemic was significantly negative on the performance of companies, however, if an organizational slack was involved, the effect got easier. In that regard, slack can be considered resources available to the company in a higher amount than needed to fulfill the business goals and, thus, acts as a buffer. When there was a positive performance aspirational gap in place, meaning that companies compared their current with their historical performance, the negative relationship between the COVID-19 pandemic and company performance was weaker. This was true for firms that had a high amount of slack in their organizations (Li, 2021).

Hwang et al. (2021) investigated how a company's environmental, social, and governance activities impacted its financial performance during an acute period of uncertainty caused by the COVID-19 pandemic. In general, the COVID-19 pandemic led to a significant drop in the financial performance of most companies. The purpose of this study was to determine whether a company's environmentally responsible activities had any effect on its financial performance during a crisis. The results of the study showed that the performance of a company could be impacted by the firm's environmental and social business activities. This study suggested that the relationship between a company and its stakeholders, which is formed through interactions, is beneficial to the business. This showed that the ESG activities of companies led to a weaker impact of the COVID-19 pandemic on the performance of companies (Hwang et al., 2021).

Samson and Sterner (2020) analyzed the impact of COVID-19 on the performance of listed businesses. In this context, they asked the question of whether "green" companies (measured by their CO₂ emission) were hit significantly by the pandemic. The authors mentioned that carbon-intensive companies and industries performed relatively worse compared to more environmentally friendly ones and, thus, were experiencing more severe consequences. Moreover, the study showed that ESG-related information within industries was not a good indicator of explaining business

performance during the COVID-19 pandemic and suggested new ways, categories, and indices to measure the CO₂ footprint of companies (Samson & Sterner, 2020).

Bose et al. (2022) studied the impact of the COVID-19 pandemic on the value of companies and the impact of sustainability performance and stakeholder orientation in that regard. In general, the findings revealed that companies in countries where COVID-19 had more devastating effects, had bigger declines in the company performance and value. However, if companies exhibited a higher level of sustainability, the impact was weakened. Furthermore, the impact of the COVID-19 pandemic on the performance of companies was weaker, if environmental actions and stakeholder relations played an important role, leading to less dramatic impacts on the company's performance and value. This shows that stakeholder-value orientation and sustainability efforts are indeed ways to weaken the negative impacts of the COVID-19 pandemic on the performance of companies (Bose et al., 2022).

3.2. Impact of past crises on the performance of companies

When comparing findings of past crises and shocks with the effects of the COVID-19 pandemic, it becomes clear that these shocks also impacted the performance of companies but have generally not reached the level of impact which COVID-19 has. In light of this, prior crises, and shocks such as the Global Financial Crisis, the 9/11 scandal, or the Asian Crisis were investigated. The following sub-chapters describe the impact of past crises and shocks on the performance of companies and various dimensions in more detail.

3.2.1. Finance

A study by Arslan-Ayaydin et al. (2014) investigated the impact of financial flexibility on the performance of companies during two periods of crisis: the Asian Crisis and the Global Financial Crisis. The authors found that financial flexibility could be attained mainly by having a borrowing behavior that was rather conservative and minorly by having a high amount of cash. Furthermore, the study showed that financial flexibility led to three situations that could support competitive advantage: Firstly, investment opportunities could be used. Secondly, the organization was independent of internal funds. Thirdly, performance could be enhanced in comparison to inflexible companies. These factors were true for both periods of crises, however, played a bigger role during the Asian Crisis. In general, the role of the area where the business was located played

a significant role when analyzing the value of financial flexibility which could be explained by different economic environments (Arslan-Ayaydin et al., 2014).

Botta (2020) analyzed the relationship between financial indicators such as the capital structure as well as investments and the performance of companies during the time of crisis which was in this case the Global Financial Crisis and the European Debt Crisis. The author mentioned that companies with higher flexibility in terms of financing recorded better investments and returns. On the other hand, over-leveraged businesses were hurt by their debt situation which hindered them from making investments, leading to worse company performance. The paper underlined that capital structure and being financially flexible with investments led to significantly better performance and competitive advantage. Thus, companies need to stay financially flexible to use their chances and outperform companies that are over-leveraged and inflexible (Botta, 2020).

3.2.2. Strategy

The impact of strategy on company performance during a shock – in this context the 9/11 scandal – was examined by Li and Tallman (2011). Their paper analyzed whether the international diversification of a multinational corporation helped or hindered the performance of companies after a shock or crisis. As these events are accompanied by a turbulent environment, they study the time of the aftermath in connection to international diversification. Their study showed two important things: the level of a company's international diversification before the 9/11 scandal led to worse performance immediately after 9/11. However, when using a long-term perspective, being internationally diversified led to better company performance in the long term (Li & Tallman, 2011).

Wan and Yiu (2009) investigated the impact of strategic choices – in that regard, corporate acquisitions – on the performance of companies during the Asian Crisis. The authors found that corporate acquisitions had a positive and significant impact on the performance of companies before and after a situation of economic downturn or environmental jolt. Moreover, the authors examined the effect of organizational slack as this would also positively impact acquisitions and corporate performance during a crisis. In contrast, this changed before and after an economic downturn as organizational slack acted negatively here. Finally, the paper concluded that

companies could definitely benefit from the opportunities that come along with a shock or crisis (Wan & Yiu, 2009).

3.2.3. Innovation

Kraus et al. (2012) analyzed the relationship between entrepreneurial orientation and firm performance during times of crisis. In the context of the paper, they picked the Global Financial Crisis. The authors showed that crises and shocks were mostly accompanied by a rapidly changing environment which led to organizational uncertainty. The study found that proactivity led to significantly better company performances in times of economic downturn. Furthermore, they showed that innovative companies had a better business performance during crises, however, these companies should balance the level of risk and reject projects which entail too much risk (Kraus et al., 2012).

3.2.4. ESG (Environmental, Social, Governance)

The environmental, social and governance dimensions of companies were especially important topics during past crises and shocks which can be seen when looking at the big number of scholarly journals on it.

Mok and Chau (2003) analyzed the level of ownership during economic downturns like in this context the Asian Crisis, and, thus, analyzed the factor of governance. The authors concluded that hybrid companies were less profitable and less valuable than fully privatized blue chips, however, red chips performed better and more efficiently better than blue chips when the market moved in their favor. Furthermore, they conducted a regression analysis which found that two measures, namely an increased amount of ownership by the government as well as incentivizing employees by giving them higher salaries, did not lead to more profitability when a shock or crisis hit. Moreover, in times of the Asian Crisis, liquidity management and leverage increased meaning that the companies were more aggressive and undergoing riskier operations, leading to higher profitability (Mok & Chau, 2003).

Ferrero-Ferrero et al. (2012) analyzed the impact of corporate governance measures on the performance of companies before and during a crisis. For their study in 2012, they were using the Global Financial Crisis as a situation of economic downturn. The purpose of their paper was to find out if corporate governance mechanisms failed to protect stakeholders from risk-taking behavior without significant control by the

companies. In that regard, the characteristics of the board and the structure of capital were analyzed. The study found that the board's effectiveness was dependent on the economic period, while the capital structure was a key indicator in times of crisis to mitigate the level of risk within the business. Furthermore, the paper showed that a good set of corporate governance measures could reduce the level of risk-taking from the companies to safeguard the stakeholders (Ferrero-Ferrero et al., 2012).

Chang et al. (2015) examined the impact of corporate governance measures on the performance of companies during the Global Financial Crisis. The study showed that corporate governance had a significant impact on the relationship between risk-taking and company performance before and during times of economic downturn. Corporate governance is particularly important during these times as it serves as a risk safeguard to shield firms. Furthermore, the paper showed that companies with a higher level of corporate governance measures performed better and showed less company risk in the analyzed times of crisis. The authors proved that executives put their emphasis on participation in annual general meetings, the separation of chairman and CEO, and the remuneration, composition, transparency, and ownership structure of the board of directors (Chang et al., 2015).

Aebi et al. (2012) analyzed the impact of corporate governance measures on the performance of companies during a situation of economic downturn which in this case was the Global Financial Crisis. To be specific, the study focused on risk-management-related choices, e.g., whether the installation of a chief risk officer and his reporting lines would be related to better company performance. The measure of performance was twofold with buy-and-hold returns and return on equity, while the authors had control variables like ownership, board size, and board independence in place. The study showed that companies with directly reporting chief risk officers to the board of directors – and not the CEO – performed significantly better during economic downturns. However, just standard corporate governance mechanisms had a non-significant or even negative relation to the company's performance during the Global Financial Crisis (Aebi et al., 2012).

4. Results

In this chapter, the findings of the case study consisting of statistical data and input from expert interviews are presented.

4.1. Measures of the Austrian government

The Austrian government has adopted various measures to counter the impact of the COVID-19 pandemic. In the following sub-sections, an overview is given, and the different measures are elaborated on in further detail.

4.1.1. Overview

The Austrian government has implemented financial and non-financial actions to fight the impact of the COVID-19 pandemic on companies. The financial measures can be divided into short-time work, financial aid measures, tax measures, and guarantees. Furthermore, the Austrian government in collaboration with the different federal states of Austria has also supported the companies by helping them test (corporate test streets) and vaccinate (corporate vaccination programs) their employees. Figure 7 shows the different financial and non-financial measures of the Austrian government.

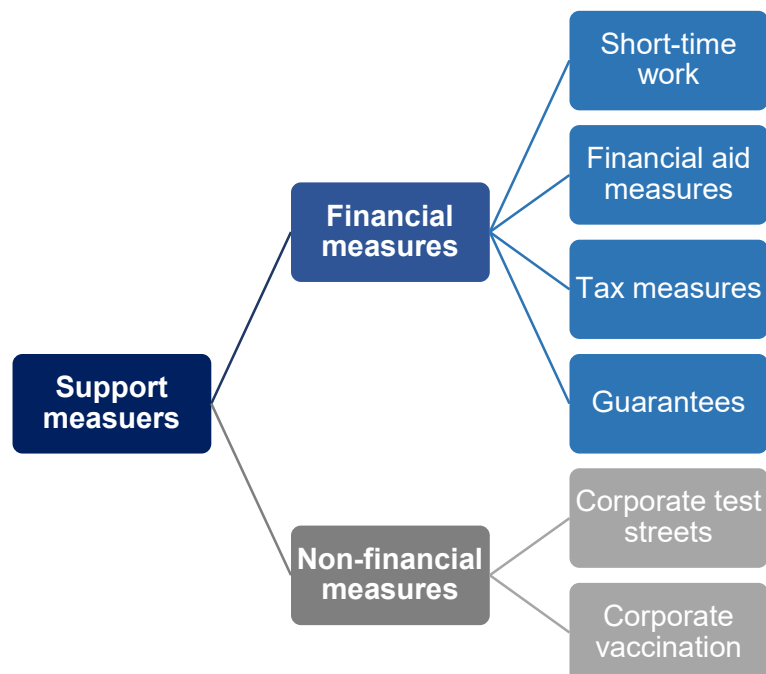


Figure 7: Support measures of the Austrian government

Source: Compiled by the author

Measures of irrelevant industries (e.g., NPO measures) are not touched upon in more detail as it is not relevant in the context of this master thesis. Moreover, certain measures such as the “Härtefallfonds” or “Lockdown Umsatzersatz” which do not apply to the mechanical engineering industry, are not elaborated on in further detail.

When focusing on the subsidies of the COFAG, table 5 shows the approved applications per measure for the mechanical engineering industry in Lower Austria by the 30th of July 2022 (COVID-19 Finanzierungsagentur des Bundes GmbH, 2022):

Subsidy	Paid applications	Amount paid out in EUR
Revenue shortfall bonus	278	6,640,444.91
Fixed-cost subsidy I	29	1,497,465.73
Fixed-cost subsidy 800k	12	507,626.03
Total	319	8,645,536.67

Table 5: Paid out subsidies by COFAG

Source: Compiled by the author based on data from COFAG (2022)

4.1.2. Short-time work

Short-time work has been a way for the Austrian government to help companies and employees during the COVID-19 pandemic and has been handled by Arbeitsmarktservice Österreich (n.d.). In this context, employees’ working hours are reduced, however, not the total difference between salary and the reduced salary is lost for the employees, but compensation is given based on the salary in gross. The number of hours worked per week can be minimized by a percentage of 90% or less of the initial hours. The salary can be reimbursed up to a percentage of at least 80% or a maximum of 90%. Full reimbursements are given to apprentices (Arbeitsmarktservice Österreich, n.d.).

The companies have benefited from this measure in two ways according to Arbeitsmarktservice Österreich (n.d.). Firstly, costs have been reduced as the employees’ costs are partially taken over. Secondly, the workforce can be retained which assured that the qualified employees can stay with the business and the latter is not pushed into firing and then re-hiring personnel which would be costly in terms of money and time. The workforce has benefited by having an ongoing employment contract, job security, and security for the future. There have already been five phases of short-time work, the last one running until the 30th of June 2022. However, another

phase was introduced starting on the 1st of July 2022 (Arbeitsmarktservice Österreich, n.d.).

According to the information by the Arbeitsmarktservice Österreich (2022), 116 companies in the mechanical engineering industry in Lower Austria used short-time work for a total of 6,025 employees in 2020. When comparing this to the statistical data of Statistik Austria (2022), one can see that 93.7% of the companies in this area and industry used this governmental measure. In total, this amounted to 1.3 million hours of the workforce and resulted in a payout of 30.5 million EUR to the companies in the mechanical engineering industry in Lower Austria in 2020.

In 2021, the figures decreased with 52 companies applying for short-time work with 1,710 people being concerned. In that regard, 310,228 hours were compensated and the companies of that industry and region received 6.0 million EUR. For the period from the 1st of January to the 30th of June 2022, eight companies applied short-time work for 283 employees involving 52,710 hours and a sum of 0.9 million EUR as the payout. The figures show that short-time work was especially demanded in 2020 when a substantial part of the workforce was registered for this supporting measure (Arbeitsmarktservice Österreich, 2022). The development of people in short-time work from companies in the mechanical engineering industry in Lower Austria can be seen in figure 8.



Figure 8: Number of people in short-time work

Source: Compiled by the author based on data by Arbeitsmarktservice Österreich (2022)

4.1.3. Financial aid measures

Financial aid measures can be classified as subsidies that were directly allocated to support companies in Austria. In this context, different measures such as the fixed-cost subsidy, loss compensation, or revenue shortfall bonus were implemented to help the companies survive the impact of the pandemic. In the following sub-sections, each of the measures is described in more detail.

Fixed-cost subsidy

As the name already indicates and according to the Bundesministerium für Finanzen (n.d.-a), the fixed-cost subsidy was implemented to support companies in covering their fixed costs. Two iterations of this measure were implemented, namely “fixed-cost subsidy I” and “fixed-cost subsidy 800,000”. A company had to provide evidence of a loss of revenue during the COVID-19 pandemic to be eligible for the fixed-cost subsidy. Only the fixed costs occurring in that period were covered by the subsidy, which was dependent on the percentage of lost revenue. A maximum amount of 75% of the fixed costs was covered by this measure. In that regard, insurance payments, financing costs, rental expenditures, or leasing expenses were included in the list of fixed costs (Bundesministerium für Finanzen, n.d.-a). “Fixed-cost subsidy I” ran until the 31st of August 2022 and “fixed-cost subsidy 800,000” ended on the 31st of March 2022 (COVID-19 Finanzierungsagentur des Bundes GmbH, n.d.).

According to COFAG (2022), the mechanical engineering industry in Lower Austria received a total sum of 1.5 million EUR in the course of the “fixed-cost subsidy I” with 29 applications being accepted by the 30th of June 2022. When it comes to the “fixed-cost subsidy 800,000”, 12 applications were approved by the COFAG with a sum of 0.5 million EUR being paid out by the 30th of June 2022 (COVID-19 Finanzierungsagentur des Bundes GmbH, 2022).

Loss compensation

Loss compensation has been a measure adopted by the Austrian government to compensate companies for losses in their financial statements (Bundesministerium für Finanzen, n.d.-b). Evidence has to be provided that the company has faced a turnover reduction of a certain percentage during the time of the COVID-19 pandemic. However, the total amount has been capped at 12 million EUR (10 million EUR for the first

iteration) per company, with the company's size being the dependent factor for the potential loss percentage (Bundesministerium für Finanzen, n.d.-b).

There have already been three iterations of the loss compensation measure. "Loss compensation I" was running until the 31st of March 2022, "loss compensation II" was available until the 30th of June 2022, and "loss compensation III" has been planned until the 30th of September 2022 (COVID-19 Finanzierungsagentur des Bundes GmbH, n.d.).

Revenue shortfall bonus

The revenue shortfall bonus was a measure of the Austrian government to compensate for a shortfall in turnover during the COVID-19 pandemic (Bundesministerium für Finanzen, n.d.-c). There had been two iterations of the revenue shortfall bonus with "Revenue shortfall bonus I" running until the 15th of September 2021 and "revenue shortfall bonus II" available until the 15th of January 2022. Both had different requirements (loss of 40% vs. 50% of turnover during a specific period) and should have supported companies in their fight against the COVID-19 pandemic (COVID-19 Finanzierungsagentur des Bundes GmbH, n.d.)

According to COVID-19 Finanzierungsagentur des Bundes GmbH (2022), the mechanical engineering industry in Lower Austria received a total amount of 6.6 million EUR with 278 applications being accepted by the 30th of June 2022.

Compensation for loss of earnings in isolation

Another measure of the government has dealt with the effects of the COVID-19 pandemic on the workforce (Wirtschaftskammer Österreich, n.d.). If the staff of a company was isolated in Austria, it was possible for companies to get compensation from the district authority. The prerequisite for this is that the authority has issued a so-called separation notice. Compensation could be requested from the responsible district authority within three months of the quarantine being lifted (Wirtschaftskammer Österreich, n.d.).

4.1.4. Tax measures

The tax measures of the Austrian government can be grouped into investment premiums, deferred taxes, and carryback of losses. In the following section, the various tax measures by the Austrian government are explained in further detail.

Investment premium

The COVID-19 investment premium supported investments of Austrian governments to revive the economy and was handled by Austria Wirtschaftsservice GmbH (n.d.-b). In this context, investments into fixed assets, that can be depreciated, were subsidized. These investments had to be made in the period of the 1st of September 2020 and the 28th of February 2021 to qualify for the subsidy. Commissioning and payment for the specific fixed assets had to be done until the 28th of February 2023 for investments valued at a maximum of 20 million EUR. If this value was higher, the deadline was set for the 28th of February 2025. Moreover, the initial order for the investments had to be already put in place in the time between the 1st of August 2020, and the 31st of May 2021. Depending on the investment and its type, the subsidy of the Austrian government could have been the following: 14% were subsidized if the investments were done in healthcare, ecology, or digitization. 7% for all other investments. The investment premium consisted of a tax-free subsidy where no repayment of the amount was required. The range of amount per company was between 5,000 EUR and 50 million EUR (Austria Wirtschaftsservice GmbH, n.d.-b).

Deferred taxes

According to Kaniovski et al. (2021), the goal of this measure of the Austrian government was to give the companies the possibility to defer their payments of income taxes and corporate income taxes. In that regard, payments were eligible which had a due date of the 15th of March 2020. What is more, this procedure did not require any interest to be paid in that period. Furthermore, the tax payments in advance could be minimized if the companies foresaw reducing profits (Kaniovski et al., 2021).

Carryback of losses

The loss carryback could be used by companies to balance losses in the financial year 2020 with profits arising in the years 2018 and 2019 (Bundesministerium für Finanzen, n.d.-d). The amount was capped at an amount of 5 million EUR per company. However, if the companies could not make use of this measure as no profits in 2018 or 2019 were feasible, a loss carry forward could be exercised which should balance the loss in 2020 with future profits (Bundesministerium für Finanzen, n.d.-d).

4.1.5. Guarantees

The Austrian government used guarantees as a way of supporting the Austrian companies by having a funding agency that guarantees the payment of the debts of the companies (Austria Wirtschaftsservice GmbH, n.d.-a). When focusing on the mechanical engineering industry, it depended on the size of the business and export orientation whether the “Österreichische Kontrollbank”, or “Austria Wirtschaftsservice Gesellschaft” was responsible. The goal of the guarantees was to give additional security to the companies’ creditors and to bolster the liquidity of the companies themselves. The payment of current expenditures such as salaries or wages was the main focus here. In general, the guarantees were fully dedicated to supporting companies, that had not been in financial distress before the outbreak of the COVID-19 pandemic. To emphasize this goal of the government, the relevant date for measurement was set to be the 31st of December 2019, so a point in time when the COVID-19 outbreak had not hit Austria (Austria Wirtschaftsservice GmbH, n.d.-a).

4.1.6. Corporate test streets

The federal state of Lower Austria also supported companies in their fight against COVID-19. Together with the Austrian Wirtschaftsservice and the chamber of commerce, they implemented the possibility for companies to test their workforce on their premises. Per COVID-19 test, AWS subsidized the expenditure with 10 EUR which should have led to the financial burden being taken away from the companies and costs should be covered to support the testing strategy of the Austrian government. Moreover, the federal state of Lower Austria helped with the organization of the corporate test streets (Rechtsinformationssystem des Bundes, n.d.).

4.1.7. Corporate vaccination programs

The execution and organization of the corporate vaccination programs were done in the different federal states of Austria in collaboration with Wirtschaftskammer Österreich (n.d.). In this context, the federal state of Lower Austria also supported companies in their fight against COVID-19. In collaboration with the chamber of commerce and chamber of labor, they created a plan to vaccinate the workforce together with the companies in Lower Austria which were interested in this procedure. Certain requirements had to be fulfilled to be able to participate in the program (Wirtschaftskammer Österreich, n.d.):

- Needs assessment of employees who wished to be vaccinated.
- Availability of medical staff: physician, support staff
- Availability of suitable infrastructure
- Entry in the e-vaccination passport could be guaranteed
- Approval from the state vaccination coordinator was given

If these conditions were met, the companies were able to apply for corporate vaccination programs (Wirtschaftskammer Österreich, n.d.).

4.2. Mechanical engineering industry in Lower Austria

The impact of the COVID-19 pandemic can be shown quantitatively. In this context, it is interesting to compare the development of key performance indicators over the last years to get an understanding before and during the COVID-19 pandemic. In the following section, the development of the indicators workforce, external personnel, orders released, and orders on hand are analyzed to examine the development. All of the data was obtained from Statistik Austria (2022).

The workforce without external staff at the beginning of 2020 for the mechanical engineering industry in Lower Austria amounted to 26,704. When looking at the average of people employed in 2022, one can see that this figure dropped to 25,808 which is a decline of more than 3% within that period (Statistik Austria, 2022).

Moreover, the amount of external personnel saw a drop, especially in 2020. On average, 1,374 people were employed in this context in 2019 which decreased to 1,031 in 2020. A reason here could be that companies have an easier situation of cutting external than internal personnel. In this way, they can reduce personnel costs and structure costs without firing internal personnel (Statistik Austria, 2022).

Interestingly, the orders released amounts only experienced a significant drop in 2020. The year 2021 saw steady increases in this key performance indicator and almost reached 9 billion EUR in that year. The reason here could be that the customers of the companies in this industry posed investment stops for the first year of the pandemic. However, this led to orders of higher quantity in the upcoming year which could also have been strengthened by measures of the government such as investment premia. Figure 9 shows the orders released development of the mechanical engineering industry in Lower Austria during the months of the COVID-19 pandemic (Statistik Austria, 2022).



Figure 9: Orders released development

Source: Compiled by the author

When analyzing the levels of orders on hand, it is observable that the figures increased throughout the COVID-19 pandemic from about 4 billion EUR to approximately 6 billion EUR, which is a clear sign that orders released could not be converted to turnover. The reasons here could be problems in the supply chains and the shortage of critical components. Figure 10 shows the orders on hand development of the mechanical engineering industry in Lower Austria during the months of the COVID-19 pandemic (Statistik Austria, 2022).



Figure 10: Orders on hand development

Source: Compiled by the author

All in all, these indicators prove on a quantitative base that the COVID-19 pandemic has manifold impacts on the performance of companies in the mechanical engineering industry in Lower Austria (Statistik Austria, 2022).

4.3. Expert interviews

4.3.1. Overview

The firms of the interview partners can be classified as mechanical engineering companies in Lower Austria. However, all of them focus on different sub-fields where they market their machines and offerings. These foci range from agriculture to automation and can be shown in figure 6. In sum, all the companies engage in mechanical engineering tasks and cater their specific products to customer needs.

4.3.2. General COVID-19 impact

Every interviewee stated from the very beginning that the COVID-19 pandemic had an impact on their companies, e.g., I1 (19, 2022). Two interviewees mentioned that even a positive impact of COVID-19 could be observed (I4 (1226-1241, 2022); I7 (2511-2517, 2022)). The reason for this positive reaction was a governmental measure, namely the investment premium which led to an increase in demand due to their customer base making use of the government grant (I4, 1226-1241, 2022). Interviewee 3's company was only impacted minorly as the main customer is the public sector which had a stable demand (I3, 799-803, 2022). However, all the other interview partners highlighted the negative effects of the pandemic which led to problems on many levels, e.g., issues with the supply chain (I1, 27-34, 2022), less demand (I6, 2163-2170, 2022) or missing payments (I2, 402-406, 2022). What can be seen here is that the COVID-19 impact has not been feasible on a single sphere of a company. In contrast, various parts and even different parts of industries have been impacted which makes the COVID-19 pandemic a multi-faceted challenge.

In terms of the timely effect of the COVID-19 pandemic, all interviewees except one mentioned the months of February and March 2020 to be the starting point where they felt the impact of the pandemic first (I2, 414-416, 2022). The reason here was that certain measures had to be put in place by the companies and were put in place by the government (I5, 1747-1750, 2022) to deal with the effects of the pandemic. A big factor here was the implementation of home office (I7, 2572-2577, 2022). Interviewee

8's company was already impacted at the end of 2019 as the company has a subsidy in China (I8, 2836-2845, 2022).

A fact that was similar for all industries, was the change in customer behavior for all sectors. As already mentioned, companies in the agriculture industry benefited from the COVID-19 investment premium which led to a steep increase in demand (I4, 1264-1266, 2022). However, most of the other interview partners saw an opposing effect which was characterized by investment stops or postponements of their key customers (I8, 2849-2852, 2022). The reason here was uncertainty in most cases as especially in the beginning the situation was rather hard to cope with and the fact that international projects were hard and partially impossible to fulfill (I1, 32-34, 2022).

When asked about the impact that the pandemic had on their employees, it could be observed that every company was affected. In general, a differentiation between blue-collar workers and white-collar employees needs to be made here (I6, 2232-2236, 2022). The first group mentioned was particularly impacted as the option for home office was not feasible. Thus, companies mostly applied for short-time work here or used company vacations to deal with the impact (I1, 242-250, 2022). On the other hand, all interview partners mentioned that home office was the preferred solution for all white-collar employees which turned out to be a feasible option to deal with the pandemic (I5, 1784-1793, 2022). In terms of companies being affected by employees in quarantine or COVID-19 positive, a similar trend occurred for all of them: all companies implemented strict COVID-19 regulations which led to the prevention of clusters (I9, 3117-3131, 2022). In the first stages of the pandemic, nearly no impact was felt in the workforce as the infection level was rather low (I3, 842-848, 2022). However, the omicron and delta variants at the end of 2021 and the beginning of 2022 had enormous impacts on the workforce (I5, 1728-1733, 2022). Interview partner 7 mentioned that at one point in time, 25% of the entire workforce was out due to COVID-19 infections (I7, 2538-2546, 2022). The findings show that the workforce was significantly impacted by the COVID-19 pandemic.

4.3.3. Financial impact

In terms of annual turnover, orders on hand, and orders released, interview partners had very different answers. Following the fact that the investment premium led to higher demand for two interview partners, their turnover and orders released situation developed similarly positive (I7, 2551-2563, 2022). Most companies benefited at the

beginning of the pandemic from a high level of orders released and, thus, only felt the financial impact of the pandemic later (I2, 451-453, 2022). However, the drop in turnover was significant for most of the companies and ranged between 40% and 5% (I8, 2870-2873, 2022). Moreover, the problem of turning orders released into turnover was a problem as critical components or ships were not available which led to the fact that orders on hand grew throughout the pandemic (I9, 3139-3150).

When asked whether some business units, business areas, or departments were particularly positively or negatively influenced by the pandemic, it could be seen that this was the case for some of the companies (I9, 3153-3157, 2022). Interviewee 5 mentioned that the long-term project business was especially negatively influenced during the pandemic, while, on the other hand, the short- and medium-term automation business saw a boom because companies wanted to back source to Europe as a reaction to the pandemic (I5, 1822-1826, 2022). When focusing on departments of the companies, the productions were especially hit (I2, 457-459, 2022).

The forecasting aspect has also been a crucial one in the pandemic. The company representatives were asked about naming a year when the turnover level would reach its pre-COVID standard again. Similar to the turnover question, the two companies in the agriculture industry were at that time of the interviews exceeding turnover levels and forecasting a reduction in turnover in the next cycle (I7, 2583-2586, 2022). For the other companies, the answers were quite different. Interview partner 5 mentioned that the company foresees returning to a pre-COVID level this year (I5, 1819, 2022), the other interview partners mentioned 2023 or 2024 as the year of returning to that standard (I1, 99-100, 2022). Interestingly, Company F is forecasted to be on a pre-COVID level in 2023, however, this could be moved back to 2024 due to the Ukraine and Russia situation (I6, 2241-2244, 2022).

The financial goal that was mentioned by most interview partners was liquidity (I8, 2885-2887, 2022). In this way, companies tried to achieve higher levels of liquidity in various ways:

- Debtor management (I4, 1353-1360, 2022)
- Interim financing (I2, 477-488, 2022)
- Payment terms (I6, 2258-2264, 2022)
- Screening of contracts (I3, 1078-1090, 2022)

4.3.4. Supply chain impact

The supply chain was impacted in several ways by the COVID-19 pandemic, which was the case for all interviewed company representatives. On the one hand, critical parts such as electronic components, steel, or sheet metal were not available on the market or were bound to delivery times of up to 16 months (I9, 3197-3210, 2022). On the other hand, ships for transporting the goods were not available on the docks which made turnover realization a big problem (I6, 2269-2280, 2022). Thirdly, the interviewees mentioned increasing energy prices and raw material prices which had been causing further problems in the supply chain (I1, 112-114, 2022). Furthermore, the Ukraine/Russia situation increased these effects tremendously and led to enormous impacts on the supply chain (I9, 3197-3210, 2022). These factors show that the COVID-19 pandemic also brought up a supply chain shock.

The companies were asked in the next step, whether changes in the supply chains were pursued to tackle possible bottlenecks of the current supply chain problems. One interview partner indicated that supplier evaluations happen regularly which was continued and intensified during the pandemic (I3, 933-939, 2022). Due to the missing parts, the overall message was that it was necessary to work on the supply chain and find ways to get the critical components to keep the production running, e.g., by stocking them up early or looking for alternative suppliers (I8, 2900-2904, 2022). One fact that all the interview partners mentioned was that the key components are not that easily exchangeable and there are no substitutes as they are very dependent on big suppliers such as Siemens or fixed by customers (I1, 126-129, 2022). To manage the critical components best on a group level and leverage the power, supply chain calls were implemented for Company E (I5, 1844-1856, 2022). The optimization of replenishment times was also a mentioned measure in this context (I3, 933-939, 2022).

4.3.5. Strategic impact

Most interviewees neglected the effect of the COVID-19 pandemic on the strategic dimension of the business (e.g., I1 (134-143, 2022)). However, Interviewee 3 later concluded that there was a change as the company incorporated the pandemic in their mid-term planning strategy as it changed strategy 2025 to strategy 2030 as the market environment changed significantly (I3, 883-892, 2022). Moreover, Company H made a strategic change when it comes to business units as the company wanted to diversify (I8, 2909-2913, 2022). A strategic change was planned to be implemented by

Company E as well to satisfy a new need in the market with back sourcing (I5, 1875-1881, 2022). Company I implemented a change in strategy by installing a continuous improvement team (I9, 3213-3219, 2022). Furthermore, technological and sustainability changes in connection to the strategy were named but the interview partners mentioned that COVID-19 was not the key driver here (I6, 2291-2302, 2022).

A follow-up question dealt with the idea of changing the business model as a reaction to the COVID-19 pandemic. While most of the interview partners neglected this, Interviewee 7 indicated that due to the rising prices, the company was planning to invent leasing and renting options for their machines to deal with the rising prices and incentivize customers to still take advantage of their offering. Company C considered inventing a new business model which would cater to the needs of the customers during the pandemic, however, this was not particularly successful and no further ideas for new business models were pursued (I3, 975-986, 2022). A change in Company I's business model took place as a three-way concept was implemented (I9, 3224-3231, 2022).

4.3.6. Innovation impact

The interview partners unanimously answered that the innovation behavior had not changed due to the COVID-19 pandemic. However, Interviewee 8 mentioned that Company H tried to be more flexible and creative to counter the impact of the COVID-19 pandemic (I8, 2923-2924, 2022).

When being asked, whether the budgets for research and development were decreased (to improve structure costs) or increased (to act anticyclical and make use of the lacking behind of competition), some interview partners said that the budgets stayed the same (I1, 162, 2022) while others explained that they had to make budgetary cuts in these areas (I9, 3235-3236, 2022).

4.3.7. ESG impact

The governance situation was analyzed by questioning whether the focus on governance, meaning the structure, organization, and steering of the business, changed during the pandemic. In light of this, most of the interviewees mentioned that they invented steering committees and crisis management teams on C-level to tackle the problems arising from the COVID-19 pandemic (I3, 1017-1019, 2022). Interestingly, two interview partners concluded that they also invented global supply

chain calls to analyze the projects and how they could be converted to turnover (I6, 2349-2357, 2022). Company I implemented a continuous improvement team and changed the structure in that way (I9, 3251-3253, 2022). Although the interview partners neglected a connection to COVID-19, some companies hired new managing directors (I5, 1911-1912, 2022).

When being asked about whether the impact of the COVID-19 pandemic had led to a stronger focus on the environment and sustainability, most interviewees answered that sustainability was already a high priority before the pandemic and that no additional focus was put on the topic because of the COVID-19 pandemic (I4, 1494-1497, 2022). However, one company hired a dedicated person responsible on C-level for corporate social responsibility (I3, 1034-1037, 2022) and Company F implemented solar panels on its roofs (I6, 2363-2366, 2022) but both could not say if these were consequences from the COVID-19 pandemic.

4.3.8. Countermeasures

The interviewed companies made use of various countermeasures, and measures of the Austrian government and the federal state of Lower Austria. The most prominent measure was the offering of getting money from the authorities refunded for employees who were in quarantine due to the pandemic. Moreover, all but one company used short-time work for parts of their workforce (I8, 2951, 2022). Furthermore, the innovation premium, fixed-cost subsidy, and loss carry forward were also financial government measures that the interviewed companies in the mechanical engineering industry had taken advantage of (I4, 1502-1507, 2022). Moreover, non-financial measures of the federal state of Lower Austria like corporate vaccination programs and corporate testing were also made use of by the questioned companies (I4, 1646-1648, 2022).

The most positive impact of the countermeasures was said to be short-time work as it significantly reduced the structure costs of the companies (I1, 211, 2022). Moreover, the companies were able to keep their workforce and the accompanying qualities which were crucial for them (I5, 1974-1977). One company argued that the investment premium had the most positive impact on the company as it bought an expensive laser in this context (I4, 1524-1530, 2022). Companies pursued various countermeasures to tackle the impact of the COVID-19 pandemic and increase profitability:

- Inventory management (I7, 2591-2595, 2022)
- Short-time work (I2, 477-488, 2022)
- Investment stops (I5, 1832-1838, 2022)
- Reduction of the external workforce (I3, 897-909, 2022)
- Continuous improvement team (I9, 3179-3187, 2022)
- Workforce restructuring (I1, 242-250, 2022)
- Employment stop (I9, 3179-3187, 2022)
- Travel stops (I5, 1832-1838, 2022)
- Holiday stock reduction (I3, 1078-1090, 2022)
- Reduction of consulting costs (I3, 897-909, 2022)
- Operational stop (I3, 897-909, 2022)

The companies were faced with a lot of uncertainty as they could not give a detailed answer whether the measures were set in the short-, medium, or long-term (I4, 1159-1563, 2022). The interviewees concluded that some measures were set in the short-term, however, it was not observable at the beginning whether the pandemic would last for weeks, months, or years (I1, 256-259, 2022). After the first year, it was noted that the pandemic would require measures in the long-term which also changed how companies reacted to its impact (I7, 2711, 2022).

4.3.9. Past shocks & crises

Not all interview partners were able to give an indication of past shocks and crises as they had not been part of the company back then. However, the ones already being in the company during past crises indicated the impact they experienced. The Global Financial Crisis had an impact on some companies and their stakeholders such as banks and suppliers. The impact was for some of them minor and for one company even more severe than the current COVID-19 pandemic (I8, 2998-3002, 2022). The companies in the agriculture industry mentioned that two political situations – Austria joining the EU and the opening of the Iron Curtain – led to crises in their specific companies as on the one hand, customers considered leaving the market due to stricter regulations, and, on the other hand, Eastern European countries were able to produce at way lower costs which led to a price dump in the market (I4, 1570-1605, 2022). However, most companies indicated that the COVID-19 pandemic brought along an impact that had never been seen before (I2, 686-688, 2022).

The Ukraine/Russia situation has been very impactful on the companies as well. Firstly, Interviewee 6 mentioned that the company has a key market in that area and lost big orders due to the political situation there (I6, 2437-2444, 2022). Secondly, the raw material prices and availability were massively impacted especially when it comes to steel (I1, 286-289, 2022). Thirdly, the energy prices increased substantially, especially gas which was used in many interviewed companies (I4, 1609-1621, 2022). Many interview partners argued that there are no real differences or similarities between the COVID-19 pandemic and Ukraine/Russia situation, but rather the situation was already severe because of the pandemic and got significantly aggravated due to the crises in Eastern Europe (I7, 2750-2756, 2022).

4.3.10. Lower Austria

The role of Lower Austria during the COVID-19 pandemic was rather special as the federal state did not participate in financial measures and support packages that were managed on an Austrian federal level. However, non-financial support was given as the federal state of Lower Austria engaged in corporate testing streets and corporate vaccination programs, which some of the companies had taken advantage of (I4, 1646-1648, 2022).

The interview partners agreed that this procedure was excellent as a breakdown of the different federal states of Austria would have not been the way forward. The only thing that one interview partner mentioned in terms of possible improvements was more transparent communication from the very beginning (I2, 722-727, 2022).

4.3.11. Mechanical Engineering

Regarding the question, of whether the interviewees observed any changes in the market environment and competitive situation, the answers were rather mixed. Interviewee 2 argued that two competitors left the market (I2, 741-743, 2022). Interview partner 6 did not observe any additional players but reported a more hostile and competitive situation mainly forced by the company's biggest competitor (I6, 2463-2465, 2022). Interviewee 9 mentioned that low-price companies entered the market (I9, 3365-3367, 2022). The other interviewees had not witnessed any changes in the market environment which left the competitive situation rather similar (I1, 315-317, 2022).

Most interview partners had not really observed any industry-specific trends in the mechanical engineering industry due to the COVID-19 pandemic. Just two interview partners highlighted the trend of customer service which could be attributable to the COVID-19 pandemic as it is crucial to be close to the customer and the business also involves higher margins (I3, 871-874, 2022). However, they observed adaptations in the market that had been caused by the general change in society and demand, e.g., the products were getting greener (I9, 3378-3379, 2022).

4.3.12. Analysis in retrospect

When being asked whether they would change measures or initiatives in retrospect when being put two years in the past to the start of the pandemic, the company representatives would have changed little to nothing. It was just mentioned that they would have purchased test kits, masks, and raw materials in bigger quantities to proactively compete with the impact of the COVID-19 pandemic on the company's performance (I3, 1186-1191, 2022). Furthermore, short-time work would have been reconsidered by some companies (I1, 343-345, 2022) and others would have fostered more calmness (I7, 2802-2807, 2022), transparency (I5, 2144-2146, 2022), and flexibility of the company (I9, 3390-3394, 2022).

5. Discussion

Systematic literature review (Ding et al., 2021) and case study (I1, 19, 2022) confirm that the COVID-19 pandemic has a significant impact on the performance of companies. Moreover, both show that the COVID-19 pandemic has not been the first shock or crisis that appeared in the last decades. In contrast, the Asian Crisis (Mok & Chau, 2003) or Global Financial Crisis (Ferrero-Ferrero et al., 2012) hit the economies around the world significantly as well. The following sub-chapters focus on the comparison between the COVID-19 pandemic and prior shocks and crises on the performance of companies. Moreover, a comparison is drawn between the input from the systematic literature review and the findings of the case study. Lastly, a guideline for practitioners with the findings of the systematic literature review and case study is created to prepare for future shocks and crises.

5.1. Comparison to other crises

The COVID-19 pandemic is not the first epidemic that has hit the economic world. Nguyen et al. (2021) analyzed the impact of pandemics – in this context SARS, H5N1, H7N9, and COVID-19 – on the performance of companies. In general, the impact of the mentioned epidemics was different on the performance of companies. Furthermore, the impact of the different epidemics was different across the various sectors of the economy. However, most of the companies in the study experienced a negative impact. The authors found that COVID-19 has had the greatest impact when it comes to the performance of companies (Nguyen et al., 2021).

Moreover, Cevik and Miryugin (2021) compared the COVID-19 pandemic to prior epidemics like Ebola, Malaria, SARS, and Yellow Fever as well. The paper found that the listed epidemics had a significant negative impact on the non-financial performance of companies. When comparing smaller and younger firms with bigger and older firms, the first group was hit significantly harder. When comparing the different pandemics with each other, the COVID-19 pandemic's impact was significantly harder than other pandemics on the performance of companies due to its bigger scale and effect on the economies (Cevik & Miryugin, 2021).

These findings are similar to the ones in the case study, indicating that the COVID-19 pandemic has more significantly impacted the companies than any other pandemic, shock, or crisis before. Some crises have impacted single companies more (I8, 2022).

3002, 2022) but in general, no economic downturn had as significant consequences for the companies as the COVID-19 pandemic (I2, 686-688, 2022).

In the literature, other crises such as the Global Financial Crisis (Ferrero-Ferrero et al., 2012), the Asian Crisis (Mok & Chau, 2003), and the 9/11 shock (Li & Tallman, 2011) have been analyzed in particular. One of the major differences here is the duration of the impacts. The COVID-19 pandemic is unique in a way as the impact is already observable for more than two and a half years when writing this thesis, and there is still no end foreseeable. Moreover, when analyzing the shocks and crises in terms of geographics, the COVID-19 pandemics' impact can be observed globally which could only be seen in the Global Financial Crisis as well. In contrast, the Asian Crisis was more or less only observable in Asia and the impact of the 9/11 scandal was particularly in North America, but both had only a minor impact on other continents. When analyzing the impact on the industries, the current COVID-19 pandemic is special as several different industries are impacted negatively and only a few, e.g., agriculture (I7, 2583-2586, 2022), saw a positive impact.

Another interesting factor is the role of the supply chain in the COVID-19 pandemic and prior shocks and crises. Although the research strings for the systematic literature review were similar in terms of impact on different areas of the company, the COVID-19 pandemic saw various literature on the role of the supply chain and its impact on the performance of companies. In contrast, the search for past crises and shocks and their impact on the supply chain of companies found almost no hits, and no literature on this topic was used in the final selection of papers for the systematic literature review.

When solely focusing on the mechanical engineering industry in Lower Austria, the statistical data by Statistik Austria (2022) shows one more major downturn in the data for orders released. The Global Financial Crisis hit the Austrian economy especially hard in the years 2008 and 2009 when looking at the data of Statistik Austria (2022). In 2008, there was an annual drop of 6% for this key performance indicator compared to the year prior. This effect even worsened in 2009 when a significant drop in orders released of 23% was recorded in the data (Statistik Austria, 2022).

However, when analyzing the impact of the COVID-19 pandemic on the performance of companies through the data by Statistik Austria (2022), an even bigger impact could be seen. The workforce without external staff saw a drop of more than 3%, the amount

of external personnel saw a decline of approximately 25%, the orders released amounts experienced a significant drop in 2020, and the orders on hand amount grew substantially as orders could not be converted to turnover as a result to problems in the supply chain (Statistik Austria, 2022). All these figures show how hard the mechanical engineering industry in Lower Austria was hit by the impact of the COVID-19 pandemic.

The special thing about the COVID-19 pandemic is not only the impact it had on the economic sphere of the world but also the social one as the lives of people were impacted directly with positive cases, deaths, through lockdowns and regulatory measures which led to a never seen before restriction of corporate and social life. This can be specially noticed when comparing the COVID-19 pandemic to other shocks, crises, and epidemics of the past, e.g., the Global Financial Crisis, Asian Crisis, or Malaria. This shows that the COVID-19 pandemic already has its role in history as it has impacted the world significantly and changed the lives of people in various ways.

In conclusion, it can be said that previous shocks, crises, and economic downturns had impacted the performance of companies worldwide and the mechanical engineering industry of Lower Austria when narrowing down on one specific case. However, this was all overshadowed by the impact of the COVID-19 pandemic which had not only influenced the performance of companies globally but also changed social life tremendously leading to a never seen before impact on the economy and society.

5.2. Comparison of findings of literature and case study

The systematic literature review proves that the COVID-19 pandemic has significantly impacted the performance of companies. This was also confirmed by the expert interviews in the case study (e.g., I1 (19, 2022)) and the secondary data. Furthermore, the findings show that this impact has not been restricted to one dimension of the corporate spheres. In contrast, more areas have been concerned and the impact from one dimension, e.g., supply chain, has influenced other spheres of the company in a similar way, e.g., the recognition of turnover.

Firstly, the findings and results regarding the financial situation in both systematic literature review and case study come to a similar conclusion. It can be observed in both sources that the COVID-19 pandemic has a significant impact on the performance of companies which can be especially seen in the financial sphere. This impact was

mainly negative (I8, 2870-2873, 2022); however, this also depended on the sub-industry of the company as some companies in the case study benefited due to the investment premium (I7, 2551-2563, 2022). Examples here are the declining positions of turnover and orders released and the growing number of orders on hand (I9, 3139-3150). Furthermore, as already mentioned in the literature (Golubeva, 2021), companies confirmed (I8, 2885-2887, 2022) that liquidity and financial flexibility were of high priority to take care of fixed costs and structure costs and pursue investment opportunities.

Moreover, government measures have also been ways to fight the impact of the COVID-19 pandemic. Both literature (Alstadsæter et al., 2020) and case study (I1, 211, 2022) show that government measures should be used if the companies are eligible for it. When analyzing the mechanical engineering industry in Lower Austria, one can see that 319 applications were approved by COVID-19 Finanzierungsagentur des Bundes GmbH (2022) leading to a volume of 8.6 million EUR paid out to that industry in the federal state. Short-time work saw even more demand with 93.7% of the companies in the mechanical engineering industry in Lower Austria using this governmental measure resulting in a payout of 37.5 million EUR by the 30th of June 2022 (Arbeitsmarktservice Österreich, 2022).

Secondly, when analyzing the impact of the COVID-19 pandemic on the supply chain of companies, the findings of the systematic literature (Parast & Subramanian, 2021) indicate that a significant disruption, which negatively affected the companies, happened. These findings are also covered by the case study as each of the interview partners indicated that supply chain problems arose due to various reasons such as scarce raw materials (I9, 3197-3210, 2022), increasing prices (I1, 112-114, 2022) or missing transport possibilities (I6, 2269-2280, 2022).

The findings in the strategic sphere are mixed when comparing the findings of the systematic literature review and the case study. The prior argues that the COVID-19 pandemic had a significant impact on the strategic orientation of all companies (Clampit et al., 2021). However, half of the experts (e.g., I1 (134-143, 2022)) in the interviews argued that the strategic focus was rather similar. However, other interview partners mentioned strategic changes that were also found in the literature. Firstly, one company planned to diversify its business (I8, 2909-2913, 2022). Secondly, a strategic change was planned to be implemented by another company to satisfy a new need on

the market with back sourcing (I5, 1875-1881, 2022). Thirdly, one company implemented a strategic change by installing a continuous improvement team (I9, 3213-3219, 2022).

The innovation aspect of the systematic literature review concluded that companies that are agile and flexible will have an easier time dealing with the impact of the COVID-19 pandemic (Dovbischuk, 2022). Although the interview partners unanimously concluded that they did not change their innovation behavior as a reaction to the COVID-19 pandemic, they also highlighted that they became more flexible and creative which are key factors in their fight against the COVID-19 pandemic (I8, 2923-2924, 2022).

When analyzing the ESG dimensions and their affectedness by the pandemic, the results of the systematic literature review and case study deviate partially. The literature shows that the pandemic led to changes in the governance sphere of companies (Li, 2021). This can be confirmed by the case study as various new control mechanisms such as steering committee meetings or supply chain calls were implemented (I3, 1017-1019, 2022). Moreover, the interviews showed that two of the CEO positions in the companies were changed during the pandemic and a new CFO was appointed for one of the interviewed companies, leading to a change in the company's organization (I5, 1911-1912, 2022).

When it comes to the sustainability part of the ESG theorem, the literature suggests that greener companies would perform significantly better in times of crises such as the COVID-19 pandemic (Samson & Sterner, 2020). However, some companies with massively declining turnovers were already engaging in measures to reduce their CO₂ footprint, e.g., building on renewable energy, avoiding gas, or reducing traveling at the beginning of the pandemic (I4, 1494-1497, 2022). Thus, it could be the case that the industry is mainly influencing the company's performance here and the focus on sustainability could have been a factor to reduce the adversity of the pandemic. A prime example here is that companies, that focus on solar energy through solar panels, save costs as the prices for gas have exploded in 2022 (I6, 2363-2366, 2022).

In conclusion, the comparison between the systematic literature review and expert interviews of the case study show rather similar answers as both are indicating that the COVID-19 pandemic has a significant impact on the performance of companies and manifold dimensions of the company sphere have been concerned.

5.3. Guideline for companies

What does this mean for companies specifically, especially focusing on the ones in the mechanical engineering industry in Lower Austria? The COVID-19 pandemic embodies a situation that has unique effects on companies. Not only has it impacted the financial situation (I8, 2870-2873, 2022) and supply chain (I9, 3197-3210, 2022) of a company, but also the whole corporate and social life in general. These challenges need to be tackled to stay competitive. The findings of the systematic literature review and case study give a clear indication that is focused on the mechanical engineering industry in Lower Austria but is also applicable to a wider audience of executives.

Companies need to stay flexible and agile to deal with the current volatile, uncertain, agile, and ambiguous environment (Zainal, 2020). In light of this, flat hierarchies, creativity, risk-taking, and the ability to adapt to the market conditions are key, this can be seen when looking at the literature (Dovbischuk, 2022) and case study (I8, 2923-2924, 2022). This also goes hand in hand with strategy, where it makes sense to incorporate the effects of the pandemic into the mid-term planning of the companies (I3, 883-892, 2022). Furthermore, business models could be adapted to cater to the needed products in the market and satisfy demand (I5, 1875-1881, 2022). Moreover, diversification could be used to spread the risk across different locations and business areas (e.g., I8 (2909-2913, 2022) or Chu et al. (2021)).

When it comes to the financial situation of a company, liquidity, and financial flexibility are two important topics that are said to be important in both literature (Teng et al., 2021) and practice (I8, 2885-2887, 2022). If these requirements are met, companies can pay their obligations timely and also pursue investment opportunities during an economic downturn which gives them a competitive advantage over their rivals (Arslan-Ayaydin et al., 2014). Furthermore, the goal is to have a high level of orders on hand before the beginning of the downturn, and stable orders released to keep the business afloat (I2, 451-453, 2022). Turnover recognition could be a serious problem as the supply chains could be troubled because of rising prices and missing shipping capacities (I6, 2269-2280, 2022). Thus, the focus on the supply chain is critical.

The supply chains of most companies have been massively impacted during the COVID-19 pandemic. This gives a clear indication that companies regularly need to check their suppliers, e.g., monthly screenings and close contact, to keep a supply of critical components feasible (I3, 933-939, 2022). Moreover, options should be

evaluated to substitute specific products or resources which are scarce with more available ones. If companies are part of a group or have multiple locations, supply chain calls could be implemented to use the whole bargaining power and distribute the critical components (I5, 1844-1856, 2022). As some prices are increasing substantially, e.g., gas or steel, it could be recommended to switch the offerings to more sustainable ones which would also benefit the customers. If the supply chains are kept intact, other departments (e.g., finance with a solution for turnover recognition) would be supported as well.

The ESG dimensions of environmental, social, and governance are key factors to deal with the impact of the pandemic. The governance dimension is about the steering of the company – also in times of crises and shocks. In this context, it is valuable to announce a steering committee or dedicated people to directly face the shock or crises (I3, 1017-1019, 2022). COVID-19 is a pandemic that also influences the social dimension of a company. Thus, it is critical to reduce the fear of employees and to create a concept (e.g., home office for dedicated people, rotational models for specific teams) that gives clear communication and direction to employees and other stakeholders. The environmental dimension also needs to be considered as the literature proves, that environmentally conscious companies perform better during times of crisis (Samson & Sterner, 2020).

When it comes to the countermeasures by the companies, one needs to differentiate between governmental and internal countermeasures. If governments are offering measures then these measures should be taken advantage of, this can be seen by the literature (Alstadsæter et al., 2020) and responses of the interview partners (I8, 2951, 2022). Moreover, internal measures are critical to balance the adverse effects of economic distress. The following list gives a good overview of countermeasures that should be considered:

- Debtor management (I4, 1353-1360, 2022)
- Interim financing (I2, 477-488, 2022)
- Payment terms (I6, 2258-2264, 2022)
- Screening of contracts (I3, 1078-1090, 2022)
- Inventory management (I7, 2591-2595, 2022)
- Short-time work (I2, 477-488, 2022)
- Investment stops (I5, 1832-1838, 2022)

- Reduction of the external workforce (I3, 897-909, 2022)
- Continuous improvement team (I9, 3179-3187, 2022)
- Workforce restructuring (I1, 242-250, 2022)
- Employment stop (I9, 3179-3187, 2022)
- Travel stops (I5, 1832-1838, 2022)
- Holiday stock reduction (I3, 1078-1090, 2022)
- Reduction of consulting costs (I3, 897-909, 2022)
- Operational stop (I3, 897-909, 2022)

COVID-19 is a severe pandemic that has hit companies stronger than most epidemics, crises, and shocks before (Nguyen et al., 2021). Moreover, the COVID-19 pandemic is a prime example that characterizes the VUCA (volatile, uncertain, complex, and ambiguous) world concept (Ruesga Rath et al., 2021). “Black swan events” (Taleb, 2007) like this are likely to increase in the future with the Ukraine/Russia situation already making the world hold its breath. Furthermore, it can be shown that not one dimension of corporate life is influenced but manifold impacts across the whole company are witnessed showing the interconnectedness of the business world. However, if the companies follow a clear plan, live the “new normal” (Corpuz, 2021), and execute the mentioned measures, a competitive advantage can be achieved and the likelihood of survival can be significantly increased.

6. Implications, limitations, and future research

This chapter analyzes the implications and limitations of this master thesis. Furthermore, future research topics are highlighted and elaborated on in more detail.

6.1. Implications and limitations

The findings of both the theoretical literature and practical input from both secondary data and expert interviews bear important implications for various stakeholders of this thesis. On the one hand, interesting findings are derived for companies and executives, while on the other hand, the roles of the government and federal state of Lower Austria are also examined in further detail.

Shocks and crises have been part of the economy in the past and will most likely also play a role in the future. Thus, companies need to be ready and competitive if situations like these arise. In this context, both proactive measures and reactive actions are crucial. The first mentioned aspect aims at the strategic orientation of the company. Especially these days, flexibility and agility are key cornerstones to dealing with the rapidly changing environment. If the company has the capability to proactively tackle potential shocks or crises, it has a better chance to be successful in the long run. Reactive actions are needed to quickly identify potential risks that could harm the company's performance. The first days and months after the outbreak of a pandemic or shock are crucial to take the right actions and steer the company in the right way. If the company can set countermeasures early, it will have an advantage over its competition.

Furthermore, this piece of research should once again highlight how volatile the environment can be. The arising effects can hit the company landscape in various ways, impact stakeholders such as the workforce, suppliers, or customers and shift demand and supply of products and services. Moreover, this influence can impact the firm on manifold levels leading to situations of uncertainty. Thereby, this thesis adds to the literature in that it acts as a guideline for executives to be prepared in times of crises and shocks.

Although this study attempts to explore the impact of COVID-19 on the performance of companies in the best way possible and holistically, it is still subject to several limitations. Firstly, the sample of interview partners is only composed of nine companies in the mechanical engineering industry in Lower Austria. This might not

reflect the full picture, as one could argue that more companies should be included to achieve a higher external validity. Furthermore, companies in the same industry experienced different consequences as each company operates in its niche, leaving room for differentiation. Thus, findings in a different industry or different federal state other than Lower Austria could lead to different outcomes.

Another limitation in connection to the interviews was the time and detail of answers. As all interviewees were asked the same open questions, the level of detail should be rather similar in theory. However, it was observable that some interview partners had core topics and messages that they wanted to bring across while others switched faster from one question to the next, giving less detail about the specific situations in their represented companies.

As COVID-19 is a very recent topic, there has not been very much literature on it available. Furthermore, to be published in a prestigious journal, academic papers need to undergo a lengthy peer-review process. In that way, only a small portion of the used literature on COVID-19 in the systematic literature review was published in highly ranked journals.

A further limitation of the master thesis deals with the time frame of its execution. The interviews were conducted in May, June, and July 2022. However, at this point in time, the COVID-19 pandemic has not been declared finished. Thus, companies were only able to reflect on the impact of the pandemic from the outbreak till the time of the interview. However, there cannot be made a final judgment on the full impact of the COVID-19 pandemic.

6.2. Future research

As the master thesis shows some limitations, this section focuses on proposals for future research that could close possible research gaps.

Future studies might include a broader set of companies in an even greater national and international context. In this current paper, only the federal state of Lower Austria was examined with targeted expert interviews. However, it could be of great interest to extend the geographical focus to Austria as a whole or even an international aspect as the impact of COVID-19 is a predominant factor in today's economy.

Similar to the paragraph before, a broader perspective of industries could be analyzed to put this research in a different contextual environment. In light of this, it could be

very relevant to analyze the impact of the pandemic and previous shocks on different industries to examine possible similarities and differences.

Another important topic is the importance of governmental and company-driven countermeasures. Firstly, further emphasis should be put on the actions that were taken by the companies themselves to deal with the impact of the pandemic to confirm or rejected the actions proposed by this master thesis. Additionally, a strong focus should also be put on the impact of government-driven measures to understand how governmental resources can be used in the best way to support companies in the future. Moreover, a comparison of governmental measures of different countries would be interesting to establish best practices for future times when governmental measures are needed.

On the last note, future research should analyze the long-term impact of the COVID-19 pandemic in ex-post research. In a near future, the exact extent of the virus can be estimated, and this would also be the time to specifically analyze why some companies coped with the pandemic better than others. In this context, pieces of information from financial statements, expert opinions, company representatives, and government institutions could be gathered to present a guideline for all the stakeholders involved on how to tackle future crises and shocks. This could especially be beneficial for practitioners of every field all around the world.

7. Conclusion

This master thesis aimed to analyze the impact of the COVID-19 pandemic on the performance of companies. In this context, a systematic literature review and case study of the mechanical engineering industry in Lower Austria were conducted.

As a first step, a research strategy was defined to analyze the topic systematically. To analyze the current status quo on the subject, a systematic literature review was conducted. The aim here was to find factors that positively or negatively influence the company's performance in times of the COVID-19 pandemic or other shocks and crises. The literature shows that the measures can be classified into the dimensions of financial situation, supply chain, strategy, innovation behavior, and ESG measures. To be precise, the findings show that companies that were proactive, agile, financially flexible, innovative, and had a strong focus on the environmental, social, and governmental spheres of the company performed better during past crises and shocks as well as the current COVID-19 pandemic.

Furthermore, secondary data of COVID-19 Finanzierungsagentur des Bundes GmbH (2022), Arbeitsmarktservice Österreich (2022), and Statistik Austria (2022) of the mechanical engineering industry in Lower Austria were analyzed. The data shows that key performance indicators such as revenue or people employed significantly decreased when comparing pre-COVID19 data and data from the years 2020 to 2022. Furthermore, the subsidies from the Austrian government were analyzed. Austria supported the companies with tax measures, financial aid, guarantees, and short-time work. The data indicates that companies operating in this environment and geographical location have taken advantage of the measures provided by the Austrian government with short-time work being the most demanded measure. The interview partners mentioned that these measures were crucial for the firms to survive and stay competitive in the long run.

To deal with the adversity of the pandemic, companies have used a variety of countermeasures. Here, the findings of the literature are very much aligned with the ones of the interview partners. Both sources indicate that firms on the one hand tried to keep their turnover and the level of orders released on a stable base, while on the other hand, cost-reducing measures were implemented. In light of this, the employment structure was optimized, budgets were reduced, and the inventory situation was optimized. Another unique factor of the COVID-19 pandemic was the

impact it had on supply chains all around the world. This led to needed changes and adaptations from the corporate side to ensure having the needed input for their products and services.

When comparing this current COVID-19 pandemic to other crises and shocks of the past, the case study and systematic literature review concluded that the impact of the current pandemic has not been seen before. There had been various crises and shocks before, e.g., the Asian Crisis or the Global Financial Crisis, but none of them had such severe impacts on the economy and society as the COVID-19 pandemic. This shows the uniqueness of this pandemic as everyone has been affected in some way and gives a clear indication that topics such as strategy, agility, and proactiveness will gain even more importance in the future of corporate life.

As Schneider (2020) already said at the beginning of the COVID-19 outbreak: *“It is in times of crisis that heroes are born.”* This message still holds true after more than two years of the COVID-19 pandemic as directors, executives, department heads, and employees are all affected and can influence the impact of the COVID-19 pandemic on the performance of companies.

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Appendices

I. Papers selected for the systematic literature review

No	Authors	Year	Title	Journal	Topic
1	Dong, J. Q	2021	Technological choices under uncertainty: Does organizational aspiration matter?	Strategic Management Journal	Impact of COVID-19 on strategic performance
2	Ding, W., Levine, R., Lin, C., & Xie, W.	2021	Corporate immunity to the COVID-19 pandemic	Journal of Financial Economics	Impact of COVID-19 on financial and strategic performance
3	Alstadsæter, A., Bjørkheim, J., B., Kopczuk, W., & Økland, A.	2020	Norwegian And U.S. Policies Alleviate Business Vulnerability due to the COVID-19 shock equally well	National Tax Journal	Impact of COVID-19 on financial and business performance
4	Parast, M. M., & Subramanian, N.	2021	An examination of the effect of supply chain disruption risk drivers on organizational performance: Evidence from Chinese supply chains	Supply Chain Management: An International Journal	Impact of COVID-19 on supply chain performance
5	Li, Z.	2021	Exploring the role of organizational slack in the COVID-19 pandemic: An empirical study of the manufacturing industry	Corporate Governance	Impact of COVID-19 on ESG performance
6	Golubeva, O.	2021	Firms' performance during the COVID-19 outbreak: International evidence from 13 countries	Corporate Governance	Impact of COVID-19 on strategic and financial performance
7	Zainal, M.	2020	Innovation orientation and performance of Kuwaiti family businesses: Evidence from the initial period of COVID-19 pandemic	Journal of Family Business Management	Impact of COVID-19 on innovation performance
8	Zhou, D., & Zhou, R.	2022	ESG Performance and Stock Price Volatility in Public Health Crisis: Evidence from COVID-19 Pandemic	International Journal of Environmental Research and Public Health	Impact of COVID-19 on ESG performance
9	Hung, D. N., Thuy, V. V. T., & Van, C. L.	2021	Covid 19 pandemic and Abnormal Stock Returns of listed companies in Vietnam	Cogent Business & Management	Impact of COVID-19 on financial performance

10	Dovbischuk, I.	2022	Innovation-oriented dynamic capabilities of logistics service providers, dynamic resilience and firm performance during the COVID-19 pandemic	The International Journal of Logistics Management	Impact of COVID-19 on innovation performance
11	Teng, X., Bao-Guang, C., & Kun-Shan, W.	2021	The Role of Financial Flexibility on Enterprise Sustainable Development during the COVID-19 Crisis—A Consideration of Tangible Assets	Sustainability	Impact of COVID-19 on financial performance
12	Hwang, J., Kim, H., & Jung, D.	2021	The Effect of ESG Activities on Financial Performance during the COVID-19 Pandemic—Evidence from Korea	Sustainability	Impact of COVID-19 on ESG and financial performance
13	Mattera, M., Alba, R.-M. C., Gava, L., & Soto, F.	2021	Sustainable business models to create sustainable competitive advantages: Strategic approach to overcoming COVID-19 crisis and improve financial performance.	Competitiveness Review: An International Business Journal	Impact of COVID-19 on strategic performance
14	Shen, H., Fu, M., Pan, H., Yu, Z., & Chen, Y.	2020	The Impact of the COVID-19 Pandemic on Firm Performance	Emerging Markets Finance and Trade	Impact of COVID-19 on financial performance
15	Cui, L., Kent, P., Kim, S., & Li, S.	2021	Accounting conservatism and firm performance during the COVID-19 pandemic	Accounting & Finance	Impact of COVID-19 on financial performance
16	Bose, S., Shams, S., Ali, M. J., & Mihret, D.	2022	COVID-19 impact, sustainability performance and firm value: International evidence	Accounting & Finance	Impact of COVID-19 on ESG performance
17	Chu, X., Lu, C., & Tsang, D.	2021	Geographic Scope and Real Estate Firm Performance during the COVID-19 Pandemic	Journal of Risk and Financial Management	Impact of COVID-19 on strategic performance
18	Clampit, J., Hasija, D., Dugan, M., & Gamble, J.	2021	The Effect of Risk, R&D Intensity, Liquidity, and Inventory on Firm Performance during COVID-19: Evidence from US Manufacturing Industry	Journal of Risk and Financial Management	Impact of COVID-19 on strategic performance
19	Samson, M., & Sterner, T.	2020	Charting a “Green Path” for Recovery from COVID-19	Environmental and Resource Economics	Impact of COVID-19 on ESG performance

20	Oikawa, K., Todo, Y., Ambashi, M., Kimura, F., & Urata, S.	2021	The Impact of COVID-19 on Business Activities and Supply Chains in the ASEAN Member States and India	Working Papers (DP-2021-17; Working Papers)	Impact of COVID-19 on supply chain performance
21	Fang, S., Goh, C., Li, S., & Xu, L. C.	2022	Firm Resources, Strategies, and Survival and Growth during COVID-19: Evidence from Two-Wave Global Surveys	Policy Research Working Paper Series (Nr. 9997)	Impact of COVID-19 on strategic performance
22	Mok, H. M. K., & Chau, S. S. M.	2003	Corporate Performance of Mixed Enterprises	Journal of Business Finance & Accounting	Impact of crises and shocks on ESG performance
23	Kraus, S., Rigtering, J. P., Coen, Hughes, M., & Hosman, V.	2012	Entrepreneurial orientation and the business performance of SMEs: A quantitative study from the Netherlands	Review of Managerial Science	Impact of crises and shocks on innovation performance
24	Li, S., & Tallman, S.	2011	MNC strategies, exogenous shocks, and performance outcomes	Strategic Management Journal	Impact of crises and shocks on strategic performance
25	Ferrero-Ferrero, I., Fernández-Izquierdo, M. Á., & Muñoz-Torres, M. J.	2012	The impact of the board of directors characteristics on corporate performance and risk-taking before and during the global financial crisis	Review of Managerial Science	Impact of crises and shocks on ESG performance
26	Arslan-Ayaydin, Ö., Florackis, C., & Ozkan, A.	2014	Financial flexibility, corporate investment and performance: Evidence from financial crises	Review of Quantitative Finance and Accounting	Impact of crises and shocks on financial performance
27	Chang, C.-S., Yu, S.-W., & Hung, C.-H.	2015	Firm risk and performance: The role of corporate governance	Review of Managerial Science	Impact of crises and shocks on ESG performance
28	Wan, W. P., & Yiu, D. W.	2009	From crisis to opportunity: Environmental jolt, corporate acquisitions, and firm performance	Strategic Management Journal	Impact of crises and shocks on strategic performance
29	Aebi, V., Sabato, G., & Schmid, M.	2012	Risk management, corporate governance, and bank performance in the financial crisis	Journal of Banking & Finance	Impact of crises and shocks on ESG performance
30	Botta, M.	2020	Financial crises, debt overhang, and firm growth in transition economies	Applied Economics	Impact of crises and shocks on financial performance

Table 6: List of journal articles for the systematic literature review

Source: Compiled by the author

II. Interview guidelines

General data

Interviewee:

Company:

Function:

Date:

Place:

Introduction

I am writing my master thesis on the topic "The COVID-19 pandemic and its impact on the performance of companies" at the Institute for Strategic Management of the Vienna University of Economics and Business.

After a systematic literature review of the current academic status quo of the effect of COVID-19 on the performance of companies, interviews with representatives of companies in the mechanical engineering industry in Lower Austria are conducted.

All information will be kept strictly confidential so that no conclusions about a specific company will be possible.

Administrative remarks and data protection

Participation in this interview is voluntary. The interview will be recorded, if permission has been granted by the interviewee beforehand, either by giving permission in oral form or by signing a consent form. The interview will be transcribed to be included in the master thesis.

Goal of the interview

When investigating the effect of COVID-19 on the performance of companies, a tendency can be observed in the existing literature. To confirm this, additional information from the practitioners' point of view and their subjective experiences and assessments of the topic will be captured. I am interested in how COVID-19 has impacted the performance of your company. Therefore, please answer the questions truthfully, unembellished, and as honestly as you can.

Structure of the interview

The interview is scheduled to take around 60 minutes and the structure of the interview is as follows:

- 1) Questions on the interviewee's company and position within the company
- 2) General COVID-related questions:
- 3) Financial questions
- 4) Supply chain questions
- 5) Strategic questions
- 6) Innovation questions
- 7) ESG-related questions
- 8) Countermeasures
- 9) Comparison to other crises and shocks

<p>10) Questions related to Lower Austria</p> <p>11) Questions related to the mechanical engineering industry</p> <p>12) Potential changes in hindsight</p>
<p>1) Questions on the interviewee's company and position within the company</p> <ul style="list-style-type: none"> - Can you please give a short overview of your company regarding its background and industry? - Could you please elaborate shortly on your position within the company?
<p>2) General COVID-related questions</p> <ul style="list-style-type: none"> - To what extent was your company affected by the economic impact of COVID-19? - How long was/is your company affected by the COVID-19 pandemic? - Have any changes in customer/purchasing behavior in terms of investments been observed? <ul style="list-style-type: none"> o If yes, which ones? - To what extent were employees directly or indirectly affected and absent from your company? (Keyword: K1 person)
<p>3) Financial questions</p> <ul style="list-style-type: none"> - How did the COVID-19 pandemic affect your annual sales and orders released? - Were there any sub-divisions within your company that was particularly positively or negatively impacted? - When did your company, or when do you estimate your company, will reach a pre-COVID-19 level of sales? - Financially speaking, which measures have been adopted to counter the effects of the pandemic?
<p>4) Supply chain questions</p> <ul style="list-style-type: none"> - How has your supply chain been affected by the COVID-19 pandemic? - Have there been made any changes in the supply chain to cope with shortages? <ul style="list-style-type: none"> o If yes, how?
<p>5) Strategic questions</p> <ul style="list-style-type: none"> - Has COVID-19 led to a change in strategy in your company? <ul style="list-style-type: none"> o If yes, what specifically? - Have you considered developing new business models to counter the effects of COVID-19? <ul style="list-style-type: none"> o If yes, how?
<p>6) Innovation questions</p> <ul style="list-style-type: none"> - Has COVID-19 led to a change in innovation in your company? <ul style="list-style-type: none"> o If yes, which? - How has R&D spending developed during the times of the pandemic?
<p>7) ESG-related questions</p> <ul style="list-style-type: none"> - How has COVID-19 influenced the governance situation in your company? - Has more focus been put on the environment since the outbreak of COVID-19?

<ul style="list-style-type: none"> ○ If yes, what specifically has been done?
<p>8) Countermeasures</p> <ul style="list-style-type: none"> - What government support measures have you taken advantage of? - How have the measures you have taken affected your company's performance? - Which government measure had the greatest positive effect on your company's performance? - As a business owner, what actions did you take in response to the COVID-19 pandemic? <ul style="list-style-type: none"> ○ Reduce holiday stock ○ Build inventory ○ Register for short-time work ○ Reduce costs <ul style="list-style-type: none"> ▪ How? - Did you set these measures in the short term, medium term, or long term?
<p>9) Comparison to other crises and shocks</p> <ul style="list-style-type: none"> - Has your company already existed during other crises in the past (e.g., the financial crisis in 2008)? <ul style="list-style-type: none"> ○ If yes, how was the company affected by that back then? ○ Do you observe differences and similarities between prior crises and shocks and the COVID-19 pandemic? - Can you draw a comparison between the COVID-19 pandemic and the current crisis in Ukraine and Russia?
<p>10) Questions related to Lower Austria</p> <ul style="list-style-type: none"> - How has the federal state of Lower Austria supported your company during the pandemic? - Is there anything that you would wish for or change in this context?
<p>11) Questions related to the mechanical engineering industry</p> <ul style="list-style-type: none"> - Has the competitive situation changed? <ul style="list-style-type: none"> ○ If so, how? - Have you observed any industry-specific trends during the pandemic?
<p>Closing question & remarks:</p> <p>Thank you very much!</p> <ul style="list-style-type: none"> - In hindsight, when reflecting on the impact of COVID-19 on your company's performance, would you have done something differently? <p>Your insights and experiences are very interesting and contribute a great deal to my master thesis! If you like to read the finished master thesis, let me know and I will send it to you.</p> <p>Looking back on the interview, do you want to add something to a question, or do you have something else you would like to mention?</p> <p>Thank you and have a nice day!</p>

Table 7: Interview guideline

Source: Compiled by the author

III. A/A+ rated journals used for search string

pub.exact("Academy of Management Annals" OR „Discrete Applied Mathematics“ OR „Entrepreneurship: Theory and Practice“ OR „European Accounting Review“ OR „European Journal of Information Systems“ OR „European Journal of Operational Research“ OR „Experimental Economics“ OR „Governance“ OR „Health Care Management Science“ OR „Health Economics“ OR „Health Services Research“ OR „IIE Transactions“ OR „Information Systems Journal“ OR „INFORMS Journal on Computing“ OR „Journal of Business Venturing“ OR „Journal of Consumer Psychology“ OR „Journal of Economic Behavior and Organization“ OR „Journal of Economic Dynamics & Control“ OR „Journal of Economics and Management Strategy“ OR „Journal of Financial and Quantitative Analysis“ OR „Journal of Financial Intermediation“ OR „Journal of Health Economics“ OR „Journal of Industrial Ecology“ OR „Journal of Industrial Economics“ OR „Journal of Information Technology“ OR „Journal of International Business Studies“ OR „Journal of Labor Economics“ OR „Journal of Management“ OR „Journal of Management Information Systems“ OR „Journal of Management Studies“ OR „Journal of Money, Credit and Banking“ OR „Journal of Operations Management“ OR „Journal of Organizational Behavior“ OR „Journal of Product Innovation Management“ OR „Journal of Public Administration Research and Theory“ OR „Journal of Public Economics“ OR „Journal of Retailing“ OR „Journal of Risk and Insurance“ OR „Journal of Scheduling“ OR „Journal of Service Research“ OR „Journal of Strategic Information Systems“ OR „Journal of the Academy of Marketing Science“ OR „Journal of the Association for Information Systems“ OR „Leadership Quarterly“ OR „Management Accounting Research“ OR „Manufacturing & Service Operations Management“ OR „Mathematical Programming“ OR „Mathematics of Operations Research“ OR „Medical Decision Making“ OR „National Tax Journal“ OR „Spectrum“ OR „Organization Studies“ OR „Organizational Behavior and Human Decision Processes“ OR „Organizational Research Methods“ OR „Personnel Psychology“ OR „PharmacoEconomics“ OR „Proceedings of the International Conference on Information Systems“ OR „Production and Operations Management“ OR „Research Policy“ OR „Review of Accounting Studies“ OR „Review of Derivatives Research“ OR „Review of Finance“ OR „SIAM Journal on Computing“ OR „Strategic Entrepreneurship Journal“ OR „Transportation Science“ OR „Academy of Management Journal“ OR „Academy of Management Review“ OR „Accounting Review“ OR „Accounting, Organizations and Society“ OR „Administrative Science Quarterly“ OR „American Economic Review“ OR „Econometrica“ OR „Economic Journal“ OR „Information Systems Research“ OR „International Economic Review“ OR „International Journal of Research in Marketing“ OR „Journal of Accounting and Economics“ OR „Journal of Accounting Research“ OR „Journal of Consumer Research“ OR „Journal of Econometrics“ OR „Journal of Economic Literature“ OR „Journal of Economic Theory“ OR „Journal of Finance“ OR „Journal of Financial Economics“ OR „Journal of Marketing“ OR „Journal of Marketing Research“ OR „Journal of Political Economy“ OR „Management Science“ OR „Marketing Science“ OR „MIS Quarterly“ OR „Nature“ OR „Operations Research“ OR „Organization Science“ OR „Quarterly Journal of Economics“ OR „RAND Journal of Economics“ OR „Review of Economic Studies“ OR „Review of Financial Studies“ OR „Science“ OR „Strategic Management Journal“ OR „Abacus: Journal of accounting, finance and business studies“ OR „Academy of Management Journal“ OR „Academy of Management Perspectives“ OR

"Academy of Management Review" OR "Accounting and Business Research" OR "Accounting Business and Financial History" OR "Accounting Horizons" OR "Accounting Review" OR "Accounting, Auditing & Accountability Journal" OR „Accounting, Organizations and Society“ OR „ACM Computing Surveys“ OR „ACM Transactions on Database Systems“ OR „ACM Transactions on Information Systems“ OR „Administrative Science Quarterly“ OR „Advances in Applied Probability“ OR „Advances in Experimental Social Psychology“ OR „American Economic Review“ OR „American Journal of Economics and Sociology“ OR „American Journal of Political Science(s)“ OR „American Journal of Public Health“ OR „American Journal of Sociology“ OR „American Political Science Review“ OR „American Psychologist“ OR „American Sociological Review“ OR „American Sociologist“ OR „Annals of Operations Research“ OR „Annals of Probability“ OR „Annals of Regional Science“ OR „Annals of Statistics“ OR „Annals of the Association of American Geographers“ OR „Annual Review of Psychology“ OR „Annual Review of Sociology“ OR „Applied Economics“ OR „Applied Economics Letters“ OR „Applied Mathematics and Optimization“ OR „Applied Statistics: Journal of the Royal Statistical Society Series C“ OR „Artificial Intelligence“ OR „Auditing Journal of Practice and Theory“ OR „Australian Economic Papers“ OR „Behavioral Research in Accounting“ OR „Biometrika“ OR „British Journal of Industrial Relations“ OR „British Journal of Management“ OR „British Journal of Sociology“ OR „Brookings Papers on Economic Activity“ OR „Business & Society“ OR „Business Ethics Quarterly“ OR „Business History Review“ OR „Business Strategy and the Environment“ OR „California Management Review“ OR „Cambridge Journal of Economics“ OR „Canadian Journal of Economics“ OR „Cognitive Psychology“ OR „Communications of the ACM CACM“ OR „Computer Journal“ OR „Computers and Operations Research“ OR „Contemporary Accounting Research“ OR „Critical Perspectives on Accounting“ OR „Data & Knowledge Engineering“ OR „DATA BASE for Advances in Information Systems“ OR „Decision Sciences“ OR „Decision Support Systems“ OR „Discrete Applied Mathematics“ OR „Ecological Economics“ OR „Econometric Reviews“ OR „Econometric Theory“ OR „Econometrica“ OR „Econometrics Journal“ OR „Economic Development & Cultural Change“ OR „Economic Geography“ OR „Economic History Review“ OR „Economic Inquiry“ OR „Economic Journal“ OR „Economic Modelling“ OR „Economic Policy“ OR „Economic Theory“ OR „Economica“ OR „Economics Letters“ OR „Economy & Society“ OR „Energy Economics“ OR „Entrepreneurship, Theory and Practice“ OR „Environment & Planning“ OR „A Environment & Planning B“ OR „Environment & Planning C“ OR „Environment & Planning D“ OR „European Accounting Review“ OR „European Economic Review“ OR „European Financial Management“ OR „European Journal of Health Economics“ OR „European Journal of Information Systems“ OR „European Journal of Law and Economics“ OR „European Journal of Operational Research EJOR“ OR „European Journal of Political Economy“ OR „European Sociological Review“ OR „Finance and Stochastics“ OR „Financial Management“ OR „FinanzArchiv“ OR „Fuzzy Sets and Systems“ OR „Games and Economic Behavior“ OR „Geneva Papers on Risk and Insurance Issues and Practice“ OR „Geneva Papers on Risk and Insurance Theory“ OR „Geographical Analysis“ OR „German Economic Review“ OR „Harvard Business Review“ OR „Health Care Management Review“ OR „Health Care Management Science“ OR „History of Political Economy“ OR „Human Performance“ OR „Human Relations“ OR „Human Resource Management“ OR „Human Resource Management Journal“ OR „IEEE Transactions on Computers“ OR „IEEE Transactions on Engineering

Management“ OR „IEEE Transactions on Software Engineering“ OR „IIE Transactions“ OR „Industrial and Labor Relations Review“ OR „Industrial Relations“ OR „Information and Management“ OR „Information Processing & Management“ OR „Information Systems“ OR „Information Systems Journal“ OR „Information Systems Management“ OR „Information Systems Research“ OR „INFORMS Journal on Computing“ OR „Insurance, Mathematics & Economics“ OR „Interfaces“ OR „International Business Review“ OR „International Economic Review“ OR „International Journal of Electronic Commerce“ OR „International Journal of Game Theory“ OR „International Journal of Human Resource Management“ OR „International Journal of Industrial Organization“ OR „International Journal of Physical Distribution and Logistics Management “ OR „International Journal of Production Economics“ OR „International Journal of Production Research“ OR „International Journal of Research in Marketing“ OR „International Journal of Theoretical and Applied Finance“ OR „International Labour Review“ OR „International Review of Law and Economics“ OR „International Tax and Public Finance“ OR „Journal of Economics and Statistics“ OR „Journal of Accounting and Economics“ OR „Journal of Accounting and Public Policy“ OR „Journal of Accounting Auditing and Finance“ OR „Journal of Accounting Literature“ OR „Journal of Accounting Management Research“ OR „Journal of Accounting Research“ OR „Journal of Advertising Research JAR“ OR „Journal of Applied Behavioral Science“ OR „Journal of Applied Econometrics“ OR „Journal of Applied Economics“ OR „Journal of Applied Psychology“ OR „Journal of Applied Social Psychology“ OR „Journal of Banking and Finance“ OR „Journal of Behavioral Decision Making“ OR „Journal of Business“ OR „Journal of Business and Economic Statistics“ OR „Journal of Business Ethics“ OR „Journal of Business Finance and Accounting“ OR „Journal of Business Logistics“ OR „Journal of Business Research“ OR „Journal of Business Venturing“ OR „Journal of Combinatorial Optimization“ OR „Journal of Comparative Economics“ OR „Journal of Computational Finance“ OR „Journal of Consumer Psychology“ OR „Journal of Consumer Research“ OR „Journal of Corporate Finance“ OR „Journal of Credit Risk“ OR „Journal of Cultural Economics“ OR „Journal of Derivatives“ OR „Journal of Development Economics“ OR „Journal of Econometrics“ OR „Journal of Economic Behavior and Organization“ OR „Journal of Economic Dynamics & Control“ OR „Journal of Economic Education“ OR „Journal of Economic Growth“ OR „Journal of Economic History“ OR „Journal of Economic Issues“ OR „Journal of Economic Literature“ OR „Journal of Economic Perspectives“ OR „Journal of Economic Psychology“ OR „Journal of Economic Surveys“ OR „Journal of Economic Theory“ OR „Journal of Economics and Management Strategy“ OR „Journal of Economics“ OR „Journal of Empirical Finance“ OR „Journal of Environmental Economics & Management“ OR „Journal of Evolutionary Economics“ OR „Journal of Experimental Psychology Applied“ OR „Journal of Finance“ OR „Journal of Financial and Quantitative Analysis“ OR „Journal of Financial Economics“ OR „Journal of Financial Intermediation“ OR „Journal of Financial Markets“ OR „Journal of Financial Research“ OR „Journal of Fixed Income“ OR „Journal of Forecasting“ OR „Journal of Futures Markets“ OR „Journal of Health Economics“ OR „Journal of Heuristics“ OR „Journal of Human Resources“ OR „Journal of Industrial Ecology“ OR „Journal of Industrial Economics“ OR „Journal of Information Systems“ OR „Journal of Information Technology“ OR „Journal of Institutional and Theoretical Economics“ OR „Journal of Interactive Marketing“ OR „Journal of International Accounting Research“ OR „Journal of International Business Studies JIBS“ OR „Journal of International Economics“ OR „Journal of International Management“ OR

„Journal of International Marketing“ OR „Journal of International Money and Finance“ OR
 „Journal of Labor Economics“ OR „Journal of Law and Economics“ OR „Journal of Law
 Economics and Organization“ OR „Journal of Macroeconomics“ OR „Journal of Management“
 OR „Journal of Management Accounting Research“ OR „Journal of Management Information
 Systems“ OR „Journal of Management Inquiry“ OR „Journal of Management Studies“ OR
 „Journal of Managerial Psychology“ OR „Journal of Marketing“ OR „Journal of Marketing
 Research JMR“ OR „Journal of Mathematical Economics“ OR „Journal of Media Economics“
 OR „Journal of Monetary Economics“ OR „Journal of Money Credit and Banking“ OR „Journal
 of Multivariate Analysis“ OR „Journal of Non Profit and Public Sector Marketing“ OR „Journal
 of Occupational and Organizational Psychology“ OR „Journal of Operations Management“ OR
 „Journal of Optimization Theory & Applications“ OR „Journal of Organizational Behavior“ OR
 „Journal of Personal and Social Psychology“ OR „Journal of Personality“ OR „Journal of
 Personality and Social Psychology“ OR „Journal of Policy Modelling“ OR „Journal of Political
 Economy“ OR „Journal of Post Keynesian Economics“ OR „Journal of Product Innovation
 Management“ OR „Journal of Public Economic Theory“ OR „Journal of Public Economics“ OR
 „Journal of Public Policy Marketing“ OR „Journal of Regional Science“ OR „Journal of Retailing“
 OR „Journal of Risk“ OR „Journal of Risk and Insurance JRI“ OR „Journal of Risk and
 Uncertainty JRU“ OR „Journal of Scheduling“ OR „Journal of Service Research“ OR „Journal
 of Small Business Management JSBM“ OR „Journal of Social Psychology“ OR „Journal of
 Supply Chain Management“ OR „Journal of Systems and Software“ OR „Journal of the
 Academy of Marketing Science“ OR „Journal of the ACM“ OR „Journal of the AIS“ OR „Journal
 of the American Society for Information Science and Technology“ OR „Journal of the American
 Statistical Association“ OR „Journal of the American Taxation Association“ OR „Journal of the
 European Economic Association“ OR „Journal of the Operational Research Society JORS“ OR
 „Journal of the Royal Statistical Society, Series“ OR „A Journal of the Royal Statistical Society.
 Series B Statistical Methodology“ OR „Journal of Transport Economics and Policy“ OR
 „Journal of Urban Economics“ OR „Journal of Vocational Behavior“ OR „Journal of World
 Business, ehemals: Columbia Journal of World Business“ OR „Kölner Zeitschrift für Soziologie
 und Sozialpsychologie“ OR „Kyklos“ OR „Labour Economics“ OR „Labour. Review of Labour
 Economics and Industrial Relations“ OR „Leadership Quarterly“ OR „Linear & Multilinear
 Algebra“ OR „Linear Algebra and its Applications“ OR „Long Range Planning“ OR
 „Management Accounting Research“ OR „Management International Review“ OR
 „Management Learning“ OR „Management Science MS“ OR „Manufacturing and Service
 Operations Management“ OR „Marketing Letters“ OR „Marketing Science“ OR „Mathematical
 Finance“ OR „Mathematical Programming“ OR „Mathematics of Operations Research“ OR
 „MIS Quarterly“ OR „Multiple Criteria Decision Analysis“ OR „Multivariate Behavioral
 Research“ OR „National Tax Journal“ OR „Nature“ OR „Naval Research Logistics“ OR
 „Nonprofit and Voluntary Sector Quarterly“ OR „Nonprofit Management and Leadership“ OR
 „Omega“ OR „Operations Research“ OR „Operations Research Letters“ OR „OR Spectrum“
 OR „Organization“ OR „Organization Science“ OR „Organization Studies“ OR „Organizational
 Behavior and Human Decision Processes“ OR „Organizational Behaviour and Human
 Performance“ OR „Organizational Dynamics“ OR „Organizational Research Methods“ OR
 „Oxford Bulletin of Economics and Statistics“ OR „Oxford Economic Papers“ OR „Oxford
 Review of Economic Policy“ OR „Personnel Psychology“ OR „Philosophy of Science“ OR

„Production and Operations Management“ OR „Progress in Human Geography“ OR „Psychological Bulletin“ OR „Psychological Review“ OR „Psychology and Marketing“ OR „Psychometrika“ OR „Public Administration“ OR „Public Administration Quarterly“ OR „Public Administration Review“ OR „Public Choice“ OR „Public Finance“ OR „Public Finance Review“ OR „Quantitative Marketing and Economics“ OR „Quarterly Journal of Economics“ OR „Quarterly Review of Economics and Finance“ OR „RAND Journal of Economics“ OR „Regional Science & Urban Economics“ OR „Regional Studies“ OR „Research in Organizational Behavior“ OR „Research in Sociology of Organizations“ OR „Research Policy.“ OR „Journal Devoted to Research Policy Research Management and Planning“ OR „Review of Accounting Studies“ OR „Review of Derivatives Research“ OR „Review of Economic Studies“ OR „Review of Economics & Statistics“ OR „Review of Finance (ehem. European Finance Review)“ OR „Review of Financial Economics“ OR „Review of Financial Studies“ OR „Review of Income & Wealth“ OR „Review of Industrial Organization“ OR „Review of International Economics“ OR „Review of Managerial Science“ OR „Review of Quantitative Finance and Accounting“ OR „Scandinavian Journal of Economics“ OR „Schmalenbach Business Review“ OR „Science“ OR „Scottish Journal of Political Economy“ OR „SIAM Journal of Computing“ OR „SIAM Journal of Control & Optimization“ OR „SIAM Journal on Applied Mathematics“ OR „SIAM Journal on Mathematical Analysis“ OR „SIAM Journal on Matrix Analysis & Applications“ OR „SIAM review“ OR „Sloan Management Review MIT“ OR „Social Choice & Welfare“ OR „Southern Economic Journal“ OR „Steuer und Wirtschaft. Zeitschrift für die gesamten Steuerwissenschaften“ OR „Strategic Entrepreneurship Journal“ OR „Strategic Management Journal“ OR „Strategic Organization“ OR „Structural Equation Modeling“ OR „System Dynamics Review“ OR „Systems & Control Letters“ OR „Technological Forecasting and Social Change“ OR „Technometrics“ OR „The Journal of Strategic Information Systems“ OR „Theory and Decision“ OR „Transportation Research Part E: Logistics“ OR „Transportation Research. Part“ OR „Policy and Practice“ OR „Transportation Research. Part B Methodological“ OR „Transportation Science“ OR „Urban Studies“ OR „Voluntas. International Journal of Voluntary and Nonprofit Organizations“ OR „Weltwirtschaftliches Archiv Review of World Economics“ OR „Wirtschaftsinformatik, ehemals: Angewandte Informatik“ OR „World Bank Economic Review“ OR „World Development“ OR „Zeitschrift für Betriebswirtschaft ZfB“ OR „Zeitschrift für Umweltpolitik und Umweltrecht“ OR „ZfbF Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung“)