*Journal of Entrepreneurship, Management and Innovation* (2026)
Volume 22 Issue 2: 119-145

DOI: https://doi.org/10.7341/20262225
JEL Codes: M10, M19, M29

# Causes and typology of crises in SMEs and differences based on sector and company size: Evidence from the Czech Republic

***Lukáš Klarner*[1], *Petr Řehoř*[2], *Jaroslav Vrchota*[3]**
***Petra Matoušková*[4], *Monika Maříková*[5]**

***Abstract***

***PURPOSE:*** *The main aim of this article is to identify differences in the causes and types of crises in SMEs across variations in size and sector in the Czech Republic. The research aims to enhance understanding of how organizational characteristics influence crisis occurrence and management within SMEs.* ***METHODOLOGY:*** *The aim was achieved through a questionnaire survey of SME representatives. Data reliability was assessed using Cronbach's alpha, and relationships were determined using the Kruskal-Wallis test followed by a post hoc test, as well as correlation analysis using Spearman's correlation coefficient. A total of 1008 companies in the Czech Republic were contacted, yielding a response rate of 10.9% and 110 respondents.* ***FINDINGS:*** *It was found that the most common symptoms of crises are production outages, material shortages, and personnel problems. Personnel, market, and technical-technological factors were identified as the most common causes of crises. The most frequent types of crises are personnel, operational, and organizational. The results show predominantly non-significant differences at the 95% confidence level, with only selective and dimension-specific effects. At the 95% significance level, company size was statistically significantly associated only with the perception that poor management decisions were the cause of the crisis. Other differences by size were not consistently confirmed at this level of significance. In the case of sectoral differences, the effects were not statistically significant at the 95% significance level, although indicative trends were observed, particularly in agriculture.* ***IMPLICATIONS:*** *The study suggests that the influence of company size and sector on the causes and types of crises is limited and specific to selected dimensions, with most expected effects not confirmed at the 95% significance level. It offers valuable insight into crisis preparedness and the management of SMEs. Specific recommendations are provided for business managers to increase resilience and preparedness for crises.* ***ORIGINALITY & VALUE:*** *This research contributes to the limited scientific discussion on crisis management in small and medium-sized enterprises in Central Europe. It links company characteristics to crisis typologies and provides a comprehensive view of individual crisis determinants.*

***Keywords:*** *SMEs, crisis management, crisis typology, crisis causes, organizational crisis, personnel crisis, operational crisis, company size, sectoral differences, Czech Republic, SME resilience, Kruskal-Wallis test*

1 Lukáš Klarner, Ph.D., University of South Bohemia in České Budějovice, Faculty of Economics, Department of Management, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: klarnl00@ef.jcu.cz (ORCID: https://orcid.org/0000-0002-9836-4130).
2 Petr Řehoř, Assoc. Prof., M.Sc., Ph.D., University of South Bohemia in České Budějovice, Faculty of Economics, Department of Management, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: rehor@ef.jcu.cz (ORCID: https://orcid.org/0000-0003-2438-3395).
3 Jaroslav Vrchota, Assoc. Prof., M.Sc., Ph.D., University of South Bohemia in České Budějovice, Faculty of Economics, Department of Management, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: vrchota@ef.jcu.cz (ORCID: https://orcid.org/0000-0002-8363-3131).
4 Petra Matoušková, M.Sc., University of South Bohemia in České Budějovice, Faculty of Economics, Department of Management, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: pmatouskova@jcu.cz (ORCID: https://orcid.org/0009-0006-5875-3066).
5 Monika Maříková, M.Sc., Ph.D., University of South Bohemia in České Budějovice, Faculty of Economics, Department of Management, Studentská 13, 370 05 České Budějovice, Czech Republic, e-mail: marikova@ef.jcu.cz (ORCID: https://orcid.org/0000-0002-9054-4559).

*Received 11 November 2025; Revised 17 February 2026, 22 March 2026; Accepted 12 March 2026.*
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## INTRODUCTION

Crises are an integral part of an organization's life. The speed at which environmental changes are currently occurring for businesses is increasing, and the issue of understanding crises is therefore becoming increasingly important (Kumari et al., 2025). Businesses must be able to cope with crises, and in many cases, this ability represents a significant competitive advantage, as not every business is capable of overcoming a crisis (Eichholz et al., 2024). Crisis issues naturally affect both large and small to medium-sized enterprises (SMEs), posing a significant threat across all size categories in several areas (Blazek et al., 2023; Eggers, 2020). However, the ability of SMEs to withstand crises is crucial, as they form the backbone of both the Czech economy (Hoke et al., 2022) and most global economies (Krajčík, 2022). Moreover, the number of these enterprises continues to grow on a global scale (Bhardwaj, 2022). The SME category can be defined according to several criteria and approaches (da Silva et al., 2022), with the European Union's classification being a commonly used one and the one used in this research. This classification is based on several criteria, including the number of employees, annual revenue, and asset size, with the dominant criterion being the number of employees. Specifically, a micro-enterprise is defined as having up to 9 employees, while a small enterprise has up to 49 employees. A medium-sized enterprise typically has between 50 and 249 employees (Erdoğan, 2022). Within the European Union, micro-enterprises account for the largest share (93.6%), while small enterprises account for 5.4% and medium-sized enterprises for 0.8%. Similarly, micro-enterprises have the largest share of employed people (30.1%), ahead of small enterprises (19.5%) and medium-sized enterprises (15.5%). However, large enterprises employ the most people, namely 34.9%. These facts only underscore that SMEs are an integral part of most economies (Schulze Brock et al., 2025).

Given the ever-increasing trend toward globalization and internationalization, companies must consider all types of crises, wherever they occur, as they can disrupt relationships and supply chains with international implications (Grzybowska & Stachowiak, 2022). Among the crises that have had a significant impact on entire regions, continents, or the whole world in this century, we can mention the events of September 11, Hurricane Katrina (Wolbers et al., 2021), the global financial crisis of 2008 (Cui, 2023), the nuclear accident at the Fukushima power plant (Hayashi & Hughes, 2013), and, of course, the global COVID-19 pandemic (Bricka et al., 2022), and, among the events of recent years, it is necessary to mention the Russian-Ukrainian conflict (Guan et al., 2023), as well as the currently much-discussed climate crisis associated with global warming (Abbass et al., 2022). Moreover, the frequency of crises is increasing, which highlights the importance of this research (Buhagiar & Anand, 2021).

It is essential to evaluate the topic of crises and crisis management in the context of small and medium-sized enterprises. These enterprises need to withstand crises, predict them, and respond to them effectively. The main aim of this article is to identify differences in the causes and types of crises in SMEs across variations in size and sector in the Czech Republic. It will also determine which crisis symptoms SMEs consider reliable. This will provide a high-quality overview of how companies of different sizes operating across sectors perceive crises and how they differ. It will also be possible to discuss the signs of an impending crisis in greater depth, thereby giving company managers the opportunity to predict them. Two research questions were set to achieve the main objective.

RQ1: Does the size of a company or its industry influence the perception of the causes of a crisis?
RQ2: Does the size of a company or its industry influence the occurrence of types of crises?

This study contributes to the current professional debate on three levels. First, it simultaneously examines the influence of company size and sector on the perception of causes and the occurrence of various types of crises, whereas previous research has usually focused on only one of these characteristics or on one dimension of crises (del Rio-Chanona et al., 2020; Gur et al., 2023; Yao & Liu, 2023). Current research highlights the need for a deeper, more nuanced understanding of crisis management in small and medium-sized enterprises that goes beyond single-factor analysis. For example, systematic reviews indicate insufficient exploration of how the influences of company size and sector on crisis outcomes intertwine and emphasize the need for multidimensional approaches (Adikaram & Surangi, 2020; Koporcic et al., 2026). Second, the work offers an integrated view of crisis symptoms, causes, and types of crises within a single empirical framework, enabling a more comprehensive understanding of the determinants of crises in small and medium-sized enterprises. Third, it provides empirical insights from Central Europe, which has been relatively underrepresented in crisis management research. Although there is a growing body of studies focusing on specific national or sectoral contexts (Graham & Matikonis, 2025; Klyver & Nielsen, 2024), research in the Central European context remains

limited, underscoring the empirical contribution of this study. The combination of these dimensions provides a more comprehensive and contextually grounded view of crisis dynamics in SMEs.

The article is logically structured as follows. The introduction is followed by a literature review that describes crises, crisis management, and the causes and types of crises discussed in the literature, including their symptoms. This section is followed by a detailed description of the methodology and research design, including the data and the selected statistical methods. Hypotheses are also formulated, based on the overview provided. The results and evaluation of the hypotheses are then presented. The article concludes with a discussion of its findings, limitations, and future research directions. Finally, a questionnaire is attached in the appendix.

## LITERATURE REVIEW

A crisis is a situation or condition that seriously disrupts the operation of a business, can cause significant damage to it, or threaten its future existence (Grgurević, 2024). Its occurrence slows down the business's growth, prevents the exploitation of opportunities, and often leads to increased fluctuations, which is a significant challenge for the business (Poór et al., 2024). Every crisis is unique and never repeats itself in the same form, and each can be viewed from two perspectives – as an event or as a process (Pedersen et al., 2020).

If a crisis is perceived as a process, then it can be divided into individual phases (Zuzák & Königová, 2009). Rolínek et al. (2016) compile overviews from various authors on the phases of a crisis, revealing that the first phase is the symptom phase, followed by the latent, acute, and chronic phases, with the final phase being the resolution phase. At the same time, they note that each phase has a distinct duration and requires a unique approach. Jahantigh et al. (2018) and Bhaduri (2019) define the first phase as signal detection, followed by preparation and prevention, then impact control and mitigation, restoration of the pre-crisis state, and finally reflection and learning. In general terms, we can simplify this into the pre-crisis state, the crisis itself, and the post-crisis state (Vu & Nguyen, 2022). It is essential that, at all phases of the crisis, the company considers its internal environment and interests while not neglecting external stakeholders who may be affected (Bundy et al., 2016). As Gabrielli et al. (2019) point out, these standard approaches to defining a crisis and overcoming it lack an important component: the organizational dimension itself, which plays an indispensable role in today's conditions.

The discipline that deals with crises within an organization is crisis management (Hazaa et al., 2021). It is a management approach that involves promptly detecting warning signs of a crisis and, of course, resolving crises while minimizing their impact on the organization (Coombs & Laufer, 2018; Vašíčková, 2020). It is a discipline that requires skills from a wide range of other areas of knowledge, such as leadership (Bhat & Saba, 2025), strategic management (Koronis & Ponis, 2018), knowledge management (Anand et al., 2022), communication (Marsen, 2019), project management (Iftikhar et al., 2024), risk management (Riepl et al., 2024), human resource management (Nyfoud et al., 2024), and planning (Martyniuk et al., 2025). The crisis manager himself should also possess a range of additional skills, including time management, the ability to work under stress, budgeting, teamwork, creative thinking, and flexibility (Pharaoh & Visser, 2023).

A crisis can manifest in various ways within a company. A prevalent symptom of a crisis is a disruption in the supply chain, which causes production downtime (Moosavi et al., 2022). The impact on the supply chain can be recognized by longer delivery times or changes in demand, with the duration of the crisis itself playing an important role (Ivanov, 2020). This leads to increased costs and reduced sales (Hendricks & Singhal, 2005). During a disruption of this chain, another symptom of a crisis often appears: a shortage of materials. Due to globalization, many organizations are dependent on supplies from a wide range of countries, which often serves as a significant limiting factor during a crisis (Chowdhury et al., 2021). Alternatively, a company may operate in an industry with a significantly limited number of suppliers who are unable to deliver in the event of a crisis, posing a threat to the company's continued existence (Xiong et al., 2024). Another symptom of a crisis is insolvency, i.e., the inability to pay one's debts (Kaya, 2022). This threat is particularly evident for small businesses, which are a stabilizing element of the economy (Dörr et al., 2021).

If the product name is damaged, a clear sign of crisis is the devaluation of the company's overall brand, leading to a dramatic decline in sales (Cleeren, 2015) and loss of market share (Cleeren et al., 2013). Organizations must then work to improve their brand again, for example, by participating in corporate social responsibility programs (Ouyang et al., 2024). The crisis also often manifests in the workplace, for example, through deteriorating working conditions (Győri & Ádám, 2025) or increased uncertainty, leading to higher employee turnover (Kim et al., 2023). Job insecurity is a significant work-related stressor during a crisis (Richter et al., 2020). Another symptom of an ongoing crisis may be a decline in business investment (Tut, 2022). This does not necessarily mean only investment in tangible assets, such as buildings or property, but also in employees, for example, through training (Graham et al., 2024).

The manifestations of a crisis are closely linked to its causes. Internal financial problems, including poor financial management, a lack of strategic planning, or failure to conduct financial analysis, are common causes of crises or the termination of a company's activities (Hariyani et al., 2024). The manifestation is the aforementioned insolvency of the company, which occurs when it is unable to pay fees, liabilities, interest, or dividends (Nteka, 2021). A company crisis can also result from management failure or poor decision-making (Bouncken et al., 2022; Liao et al., 2023). Top management must promptly detect crises, and if it makes the wrong decision or fails to detect them, it will exacerbate their course (Schaedler et al., 2022).

A common cause of crisis is often personnel problems within the organization, such as low employee productivity, a lack of proactivity, or workforce loss (George & Odubo, 2024). A crisis can also be triggered by poor relationships between employees in the workplace (Lee, 2021). In addition, responding to employee needs can significantly mitigate the impact of a crisis (Ruppel et al., 2022), as can establishing clear roles and responsibilities and maintaining effective communication (Sørensen et al., 2022). In general, human resource management during a crisis exhibits several distinct features (Newman et al., 2023).

Given the ever-increasing digitization and transition to the online environment, businesses are under pressure to modernize their technologies, and technical or technological shortcomings can also lead to crises (Gkeredakis et al., 2021). At the same time, the importance of technological infrastructure is paramount, as it is crucial in the context of the crisis, as modern technologies facilitate the monitoring, prediction, and evaluation of various aspects (Calp, 2020). Inadequate or insufficient information and communication technologies, together with insufficient data security, are often cited as failures and causes (Hariyani et al., 2024).

Various political and legislative risks are also frequent triggers of crises (Caldara & Iacoviello, 2022). It is precisely the environment of political uncertainty that can prompt companies to reduce their investments, ultimately leading to a crisis (Kong et al., 2022). It is precisely the political and, by extension, legislative consequences that cause various geopolitical complications, which also represent the greatest crises of our time (Seyd, 2025). Various market fluctuations are also often the cause of crises (Parnell & Crandall, 2021). It is necessary to consider not only the company's customers and products, but also, for example, the competition, which can pose a crisis for the organization (Yahaya & Nadarajah, 2023). Especially for SMEs, limited resources can pose a challenge in terms of maintaining a proactive and consistent customer focus (Wu et al., 2022). Crises in organizations can also be caused by various natural factors, such as earthquakes (Arin et al., 2024). These phenomena can cause significant losses to businesses, disrupt their operations, and increase their need for external capital, which, if not handled carefully, can lead to a crisis within the organization (Benincasa et al., 2024). Moreover, following various extreme natural disasters, approximately half of small businesses are unable to resume operations, which is a significant and non-negligible cause of crises (Liang et al., 2023).

Based on the causes and symptoms of a crisis, different types of crises can be distinguished terminologically. It is worth noting that each type of crisis necessitates a distinct approach to its management and resolution (Maghdid et al., 2022). It is therefore advisable to have several crisis scenarios prepared in accordance with the crisis profile (Mikušová & Horváthová, 2019). In terms of crisis typology, we often discuss financial, technological, or reputational crises (Gurdatta et al., 2023). We can also mention product, organizational, or strategic crises, as well as crises related to the company's expertise (Wang & Laufer, 2024). Personnel crises can also be mentioned (Taganova, 2024).

From a theoretical point of view, the issue under investigation can be anchored in particular in current applications of Contingency Theory. Contingency can be interpreted in many ways, for example, as events that may occur, unexpected disturbances, and also as an umbrella term for all types of crises, whether caused by technical, natural, or health reasons (Hollis & Ekengren, 2025) or as a set of factors influencing an organization's response to a crisis (Monehin & Diers-Lawson, 2022). This view can be further developed through the Resource-Based View in its modern interpretation, which emphasizes that resilience to crises is a function of the availability and quality of internal resources, dynamic capabilities, and managerial competencies, the structure of which systematically differs between micro, small, and medium-sized enterprises (Chatterjee et al., 2025; Davis & DeWitt, 2021; Duchek, 2020). At the same time, current institutional approaches point out that sectoral differences are significantly determined by the regulatory framework, political interventions, and pressure from stakeholders, which may explain the variability in the perception of legislative, financial, or market causes of crises across sectors (Chen et al., 2023; Kraus et al., 2020; Stephany et al., 2022; Zahra, 2021). Although recent research has intensively analyzed the impacts of specific exogenous shocks, less attention has been paid to systematically linking these theoretical perspectives with a general typology of causes and types of crises across size categories and sectors, particularly in the Central European context, which creates space for empirical verification of the relationships formulated in the hypotheses.

A review of the literature shows that crisis research spans a broad range of topics, including macroeconomic shocks (Tarighi et al., 2024), financial cycles (Schularick & Taylor, 2012), geopolitical events (Gupta, 2024), and natural disasters (Lai et al., 2022). For this study, however, it is necessary to define the analytical framework clearly. The article does not focus on macroeconomic or cyclical crises, but rather on crises at the level of individual companies and on factors influencing their occurrence in the environment of small and medium-sized enterprises. For this reason, the literature in this work is systematized into three interrelated categories. The first focuses on symptoms of crises at the company level, the second on their causes, and the last on their typologies. This division also corresponds to the structure of the research tool, in which the questionnaire's individual blocks are directly based on these three theoretical dimensions. While macroeconomic or global events represent contextual factors, the research itself focuses on the organizational level of crisis phenomena. This defines a clear strategy for the conducted literature review. Not a comprehensive analysis of all existing types of crises, but a targeted definition of corporate determinants of crises, which are operationalized in the questionnaire tool and subsequently tested empirically.

Current research on crisis management shows a high degree of thematic fragmentation (Widiantoro & Shahadan, 2024). Studies focus on a specific industry or a selected aspect of crisis management (Casal-Ribeiro et al., 2023; Nuortimo et al., 2024), with less attention paid to the systematic interconnection of individual dimensions of crisis phenomena (Buhagiar & Anand, 2021). This fragmentation leads to the implicit assumption that the structural characteristics of a company (e.g., size or industry) have a clear and universal influence on the emergence and course of crises. However, empirical verification of this assumption is not always consistent (Safón et al., 2024). This work takes a critical approach to the reference theoretical framework. Instead of assuming a universal influence of structural factors, it empirically tests their differentiated effect across symptoms, causes, and types of crises. The results thus not only confirm existing theoretical assumptions, but also refine their validity and point out their limitations. In this way, the study not only builds on existing literature but also subjects it to empirical testing and critical re-evaluation in the context of small and medium-sized enterprises.

Hypotheses were also formulated for the defined research questions. Two hypotheses were formulated to answer RQ1: "Does the size of a company or its industry influence the perception of the causes of the crisis?" The first hypothesis ($H_{1a}$): "The perception of the main causes of the crisis varies according to the size of the company," aims to determine whether the causes differ across company size categories. Different size categories perceive the causes of the crisis differently. Scientific discourse often focuses on a specific size category of companies and their perception of crises (Doern, 2021) or assesses a particular crisis and analyzes its manifestations within a company (Siuta-Tokarska, 2021). However, the search for differences in the causes of the crisis across size categories is a missing piece of research. The second hypothesis, $H_{1b}$: "The perception of the causes of the crisis varies by industry," then examines whether selected industries face specific causes of the crisis. The literature often discusses the effects of a specific crisis on selected industries (del Rio-Chanona et al., 2020; Lu et al., 2021), but the question remains how these effects apply more generally.

RQ2: "Does the size of the company or its industry influence the occurrence of crisis types?" is also based on two hypotheses. The first of these, $H_{2a}$: "The occurrence of individual types of crises varies according to the size of the company" is justified because the debate on this issue is also very dynamic and deals, for example, with the topic of one specific crisis and one type of crisis in relation to the size category of the company (Dörr et al., 2021; Kaya, 2022). The second hypothesis, $H_{2b}$: "The distribution of crisis types varies across industries," is also discussed in terms of a single crisis or a single type of crisis and its impact on the industry (Meier & Pinto, 2024; Shevchenko et al., 2023), but general conclusions regarding the relationship between crisis type and industry are still lacking.

## METHODOLOGY

The main aim of this article is to identify differences in the causes and types of crises in SMEs across variations in size and sector in the Czech Republic. It will also determine which crisis symptoms SMEs consider reliable. The Czech context does not only reflect selective data availability but also constitutes a theoretically relevant environment for testing structural contingency. An economy dominated by micro-enterprises, operating within the harmonized regulatory framework of the EU and at the same time strongly linked to global markets, makes it possible to verify whether differences between size categories and sectors persist even in an institutionally stable environment.

The questionnaire used is attached as an appendix to the article. The data processing procedure and analytical steps are described in detail in the methodological section. Before the survey began, respondents were informed of the research's

purpose, the voluntary nature of participation, and the anonymity of their responses. By completing the questionnaire, they provided informed consent for the processing of their data for research purposes. Data collection was anonymous, and no data enabling the identification of specific individuals or companies was collected. Due to the nature of the research, formal ethics committee approval was not required.

To achieve this goal, a questionnaire survey was conducted in the spring of 2025. A total of 1008 companies in the Czech Republic were contacted, yielding a response rate of 10.9% and 110 respondents. This is a probability sample obtained via stratified random sampling (Bhardwaj, 2019). However, obtaining a larger sample from SME management is more time-consuming and costly. This sample also provided relevant information on crises, including the vast majority of those who encounter them, as described in more detail in the Results. Furthermore, several studies in the field of SMEs or their employees provide relevant and generalizable conclusions even with a smaller or equal number of respondents in quantitative surveys (Dadem Kemgou et al., 2019; Febby & Lubinda, 2024; Hidayanti & Alhadar, 2021; Kamau & Kyalo, 2022; Toromo & Mungai, 2020).

Given the questionnaire response rate (10.9%), the existence of non-response bias cannot be completely ruled out (Singh et al., 2025). It is possible that companies that faced extreme crisis situations or ceased operations were not represented in the sample. The results, therefore, primarily reflect the experience of surviving businesses. At the same time, the sample size and uneven representation of size categories required the use of non-parametric statistical methods (Ma et al., 2021). These methods are robust to violations of the normality assumption, but may exhibit lower statistical power to detect weaker effects (Conzuelo Rodriguez et al., 2021).

Although the response rate does not invalidate the study, caution is required when generalizing the results. The structure of the sample corresponds to the dominant representation of micro-enterprises in the Czech economy, but some sectoral groups are underrepresented. Data weighting was not applied, as the aim of the analysis was not to estimate the population but to test relationships within the sample. The sample size, when divided into multiple size and sector categories, limits the statistical power of the sub-analyses. The failure to find statistical significance should therefore not be interpreted as evidence of the absence of an effect, but rather as the absence of a strong or stable relationship within the analyzed sample.

The respondents were always micro, small, and medium-sized enterprises, defined according to the EU methodology (Esubalew & Raghurama, 2017), originating from various sectors of the national economy, with the key criterion being the number of employees. To ensure greater questionnaire validity, a pilot survey was conducted to determine whether respondents understood all the questions, whether they were correctly formulated, whether the range of answers was sufficient, and whether the set of questions covered all necessary areas (Kunselman, 2024). A total of 15 representatives from SME management participated in this pilot survey. Based on their feedback and recommendations, two questions were replaced and two others modified, including the range of answers.

The final questionnaire consisted of 17 questions. Three questions were identification questions (respondent's gender, number of employees in the company, and its activities), while the remaining 14 questions focused on crisis management. This was a purely quantitative survey, so the questionnaire contained no open-ended questions, only one semi-closed question, and 16 closed questions. The advantages of this type of survey include the ability to test hypotheses, speed, objectivity, and the potential to reproduce or generalize the results (Lim, 2024). The closed questions included both dichotomous questions and those evaluated on a scale (Roopa & Rani, 2012). For the scale questions, a Likert scale with options 1-4 was used, where 1 always indicated disagreement or the least significance, and 4 indicated agreement or the most significant occurrence. The four-point scale was deliberately chosen, as a five-point scale with a middle value has disadvantages, such as the inability to decide or unwillingness to answer, which increase the time and cost of the research (Tanujaya et al., 2022).

Data from eight questions were used for this article. The key questions concerned the causes, symptoms, and types of crises. A literature review was used to construct the questions and provide answers, both in the area of crisis causes (Arin et al., 2024; Bouncken et al., 2022; Caldara & Iacoviello, 2022; George & Odubo, 2024; Gkeredakis et al., 2021; Hariyani et al., 2024; Liao et al., 2023; Parnell & Crandall, 2021), and types (Gurdatta et al., 2023; Maghdid et al., 2022; Mikušová & Horváthová, 2019; Taganova, 2024; Wang & Laufer, 2024), as well as symptoms (Chowdhury et al., 2021; Cleeren, 2015; Győri & Ádám, 2025; Kaya, 2022; Moosavi et al., 2022; Tut, 2022). Questions related to this issue were always evaluated on the aforementioned Likert scale, where respondents evaluated each offered answer.

Given that the domains of "symptoms," "causes," and "types of crises" may overlap in managerial self-assessments, a clear definition of constructs is necessary for interpretation. In this study, the three domains under consideration are

defined as distinct levels of crisis phenomena that may co-occur empirically but are not interchangeable. The first of these, crisis symptoms, is perceived as immediately observable manifestations of disruption to the functioning of the organization. The second area, causes of crisis, is managerially perceived triggers or sources of problems that precede manifestation. The third area is types of crises, which is the part of the organization where the crisis is primarily rooted. The study does not claim causality between these domains. They are used as separate sets of items to describe and test differences by company size and sector. The items were measured using questions in the questionnaire, see Appendix. The sets listed are not understood as one-dimensional reflective scales for which high internal consistency would be expected. On the contrary, they are formative indicators of multiple dimensions of the crisis phenomenon. Individual items capture different aspects that may occur independently. For this reason, the items are not aggregated into a single composite score. The analyses are conducted at the item level (tests of differences and correlations between items), while the averages listed serve only as descriptive indicators of frequency of occurrence.

Several statistical methods were applied. MS Excel and R Studio programs were used. In the first step, the normality of the data was tested using the Shapiro-Wilk test (Liang et al., 2009). The data were not found to be normally distributed, as the p-values for all variables were significantly below the standard reliability level of 0.05. This confidence level is most commonly used; however, a level of 0.10 can also be employed (Kim & Choi, 2019). However, a 95% confidence level will be used when evaluating hypotheses. Subsequently, reliability analysis was also performed using Cronbach's alpha, with a resulting value of 0.74 (increased to 0.82 after standardization), indicating good internal consistency of the data. According to the literature, the achieved value is acceptable (Hussey et al., 2025). Descriptive statistics in the form of graphs and frequency tables (Dong, 2023) were then used, followed by the Kruskal-Wallis test as a non-parametric alternative to ANOVA (Johnson, 2022), and then a post-hoc test, namely the Dunn test (Pereira et al., 2014). Spearman's correlation was also applied to determine the relationships between individual causes and types of crises. The strength of the correlation can be determined according to the value of the correlation coefficient, where values between 0.90 and 1.00 indicate a very strong correlation, between 0.70 and 0.89 a strong correlation, between 0.40 and 0.69 a moderately strong correlation, between 0.10 and 0.39 a weak correlation, and between 0.00 and 0.10 a negligible correlation (Schober et al., 2018). The Bonferroni correction was used for the correlation analysis and post hoc test (Menyhart et al., 2021).

To verify the measurement tool's dimensionality, an exploratory factor analysis (EFA) was performed on individual item blocks (symptoms, causes, and types of crises) using the least-squares method. The suitability of the data was assessed using the KMO criterion and Bartlett's test of sphericity (Watkins, 2018). The symptom block showed acceptable factorability (KMO = 0.60; $p < 0.001$). Parallel analysis did not reveal any significant cross-loading of items. The correlation between the factors was low ($r = 0.17$), supporting discriminant validity. A low KMO value (0.53) was found for the causes block, but Bartlett's test was significant ($p < 0.001$). Correlations between the identified factors were low ($r < 0.30$), indicating their conceptual distinctness. The crisis types block showed a high degree of factorability (KMO = 0.81; $p < 0.001$). A structure with predominantly clear loadings and only slight cross-linkages for some items was identified. The correlation between factors was moderate ($r = 0.46$) and did not exceed the threshold of problematic discriminant validity. The results thus confirm the multidimensionality of the measured phenomena and provide broader psychometric evidence beyond internal consistency alone.

Correlation analysis was not used in this study to test causal relationships or to validate the construct in terms of the factor structure of the measured variables, but primarily to identify patterns of co-occurrence of individual symptoms, causes, and types of crises in the respondents' perceptions. It aimed to determine whether certain crisis phenomena tend to co-occur in companies and whether systematic links exist among the individual dimensions of crisis management. Correlation thus serves as a supplementary exploratory tool for capturing the structural interconnectedness of phenomena within the respondents' perceptual framework, rather than as a means of confirming causal relationships (Antonakis et al., 2010).

However, it is necessary to emphasize that the data are based on the subjective assessment of respondents and are cross-sectional in nature. The correlation relationships found cannot, therefore, be interpreted as evidence of causality or as confirmation of hierarchical links between individual constructs (Rönkkö & Cho, 2020). At the same time, there may be a common method bias effect, which may overestimate the strength of some relationships (Podsakoff et al., 2003). The results of the correlation analysis should therefore be understood as indicative patterns of perceptual connections between crisis phenomena, which can be further tested in future longitudinal or multi-source research.

Although the sample size ($n = 110$) is consistent with the nature of exploratory quantitative research and comparable to the number of studies focused on the management of small and medium-sized enterprises (Febby & Lubinda, 2024;

Hidayanti & Alhadar, 2021), it is necessary to acknowledge its limitations in terms of statistical power. The unbalanced structure of the sample, which is a consequence of the actual representation of enterprises in the Czech Republic (dominance of micro-enterprises), reduces the sensitivity of the analyses when comparing size categories and may lead to an increased risk of type II error, i.e., failure to detect actual differences between groups (Lakens, 2022). This problem is particularly exacerbated when using non-parametric tests, which tend to have lower power to detect medium and small effects in smaller and unbalanced subgroups (Fagerland, 2012). Similar limitations also apply to sector comparisons, where some sectors have relatively few respondents, further limiting the robustness of inferential conclusions. For this reason, results that are only 90% significant should be interpreted as indicative trends rather than clearly confirmed relationships.

## RESULTS

This section aims to systematically evaluate the research questions (RQ1 and RQ2) and verify the hypotheses (H1a–H2b). The results are therefore structured into individual analytical blocks – crisis symptoms, crisis causes, and crisis types – with the roles of company size and sector of operation explicitly assessed in each case. The analysis serves not only to identify the frequency of occurrence of individual crisis phenomena, but also to empirically verify whether the structural characteristics of a company – specifically its size and sector – actually represent systematic determinants of crisis situations. The fundamental research problem is therefore whether crisis phenomena in the SME environment can be explained primarily by structural factors or rather are universal across categories. First, the research sample is briefly characterized. It consists of a total of 110 SME representatives. The size structure is shown in Figure 1.

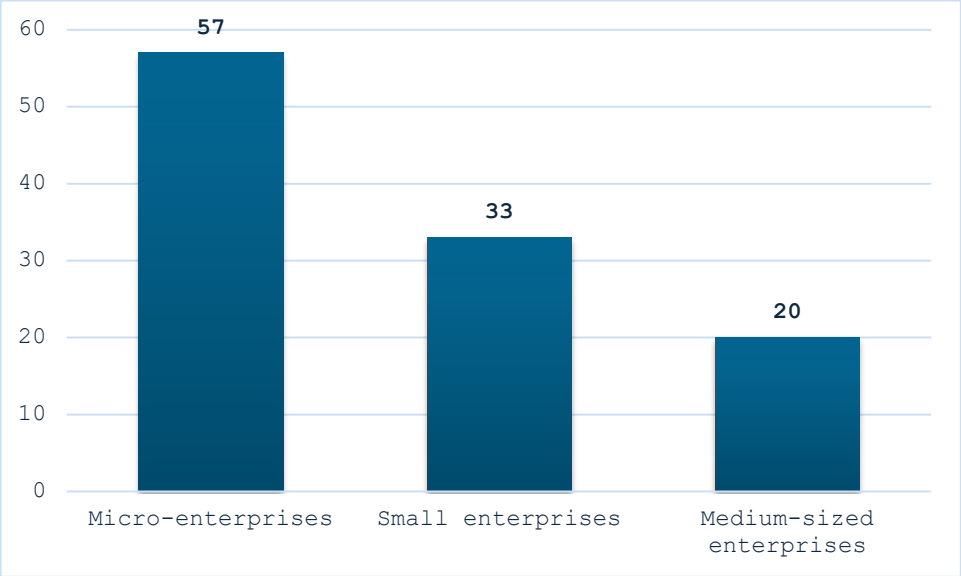


**Figure 1.** Structure of the sample according to the size

As shown, micro-enterprises account for the largest share of the sample, with 57 representatives, or approximately 52%. Small enterprises are represented by 33 organizations (30%), while medium-sized organizations are represented by 20 (18%). The composition corresponds to the fact that the Czech Republic also has the highest share of micro-enterprises, followed by small enterprises, with medium-sized organizations having an even lower representation (Czech Statistical Office, 2024).

It is also necessary to mention the sectoral structure of the sample. This is illustrated in more detail in Figure 2. The service sector, which does not fall into a specific category, is significantly represented, with a total of 24 companies (22%), followed by retail, represented by 19 companies (17%), and manufacturing, with 18 companies (16%). Construction is represented by a total of 10 companies, accounting for 9%. Generally, the composition of companies by sector is balanced, with both manufacturing and service companies represented.

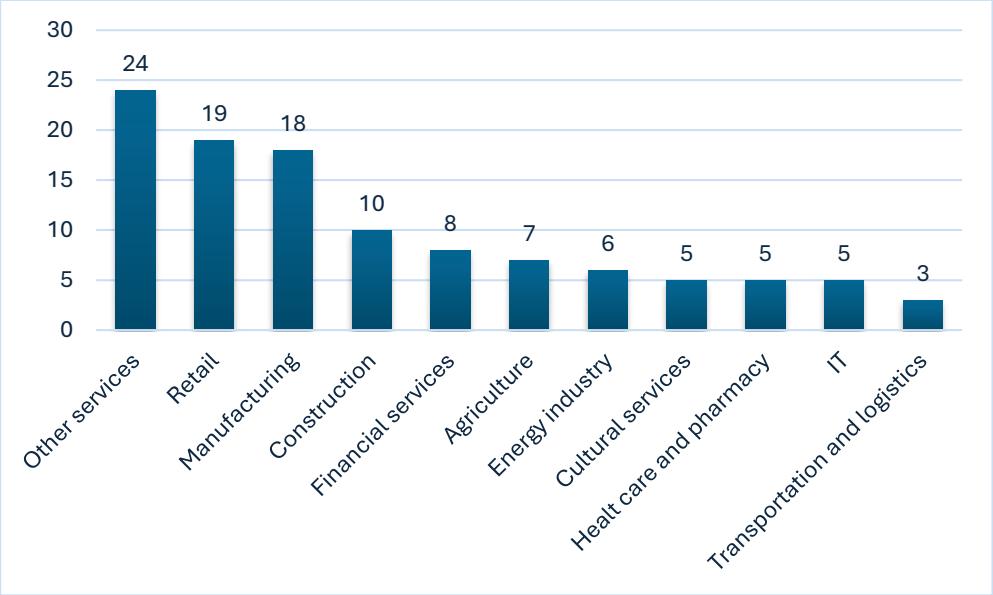


**Figure 2.** Structure of the sample according to the sector

Companies were also asked how often they can recognize an impending crisis. This information is crucial, as companies that fail to recognize crises may not be able to identify their symptoms or causes. The results are summarized in Table 1.

**Table 1.** How often are companies able to recognize an impending crisis in time

| Answer | Absolute frequency | Relative frequency |
|---|---|---|
| Always | 5 | 4.5% |
| Almost always | 86 | 78.2% |
| Almost never | 19 | 17.3% |
| Never | 0 | 0.0% |

As can be seen, the vast majority of companies have no problem correctly identifying an impending crisis in most cases. A marginal proportion of organizations always identify impending problems. Less than one-fifth of organizations report that, in most cases, they are unable to detect a crisis in time. None of the respondents stated that their company would never promptly recognize a crisis. These findings indicate that most respondents perceive themselves as capable of recognizing crisis signals, although this perception may reflect self-assessment bias.

An important question was to determine how often organizations face crises. The results are shown in Table 2. As can be seen, most companies encounter crises relatively rarely. In contrast, one-third of organizations encounter them frequently, and just under 5% encounter them very frequently. An almost negligible proportion of companies report that they hardly ever encounter crises. From this perspective, the sample is also very good, as it generally includes companies that have some experience with crises. However, the research did not investigate how companies subjectively perceive the timing of individual points on the scale.

**Table 2.** How often does an organization have to deal with a crisis

| Answer | Absolute frequency | Relative frequency |
|---|---|---|
| Very often | 5 | 4.5% |
| Often | 37 | 33.6% |
| Rarely | 64 | 58.2% |
| Very rarely | 4 | 3.6% |

The symptoms of crisis are the first major topic covered in this article. Companies were asked how frequently the selected crisis symptoms described in the literature occur. A summary is provided in Table 3. The data in the table are given in absolute numbers, followed by relative values in parentheses.

**Table 3.** Symptoms of crisis according to the frequency with which companies encounter them

| | | | Frequency | |
|---|---|---|---|---|
| **Sign of crisis** | **Never occurs** | **Rather rare** | **Sometimes** | **Always occurs** |
| Production downtime | 42 (38.2%) | 49 (44.5%) | 18 (16.4%) | 1 (0.9%) |
| Material shortages | 50 (45.5%) | 42 (38.2%) | 17 (15.5%) | 1 (0.9%) |
| Insolvency | 68 (61.8%) | 39 (35.5%) | 3 (2.7%) | 0 (0.0%) |
| Damage to the reputation | 55 (50.0%) | 50 (45.5%) | 5 (4.5%) | 0 (0.0)% |
| Employee turnover | 30 (27.3%) | 53 (48.2%) | 25 (22.7%) | 2 (1.8%) |
| Decline in investment | 47 (42.7%) | 52 (47.3%) | 10 (9.1%) | 1 (0.9%) |

The results show that none of the symptoms monitored occur systematically in all companies. The most common indicators are production downtime, material shortages, and employee turnover. On the other hand, insolvency and damage to reputation are reported relatively rarely. The structure of the responses suggests that the crisis symptoms are episodic rather than systematic in nature.

A correlation analysis was performed to examine the relationships between these crisis indicators in more detail. The results are shown in Table 4 and subsequently also in Figure 3. To ensure greater clarity of the table, the following abbreviations are used: Production downtime (PD), Material shortages (MS), Insolvency (IN), Damage to reputation (DR), Employee turnover (ET), Decline in investment (DI). Correlation coefficients marked with an asterisk (*) are statistically significant at a 95% confidence level after Bonferroni correction.

**Table 4.** Correlation matrix of symptoms of crisis

| | **PD** | **MS** | **IN** | **DR** | **ET** | **DI** |
|---|---|---|---|---|---|---|
| PD | 1.000 | 0.685* | 0.218 | 0.010 | 0.128 | 0.103 |
| MS | 0.685* | 1.000 | 0.290* | 0.115 | 0.218 | 0.073 |
| IN | 0.218 | 0.290* | 1.000 | 0.295* | 0.235 | 0.297* |
| DR | 0.010 | 0.115 | 0.295* | 1.000 | 0.403* | 0.353* |
| ET | 0.128 | 0.218 | 0.235 | 0.403* | 1.000 | 0.231 |
| DI | 0.103 | 0.073 | 0.297* | 0.353* | 0.231 | 1.000 |

The first noteworthy fact is that all correlations found always indicate a positive relationship, as all correlation coefficients are higher than zero. The highest recorded correlation coefficient (0.685) is between production downtime and material shortages, the most common reason for production delays. This relationship can be described as moderately strong. Companies facing material shortages will also experience production downtime as a symptom of the crisis. At the same time, this relationship can be considered statistically significant.

A moderately strong relationship was identified between employee turnover and reputational damage ($r = 0.403$), suggesting that internal instability may spill over into external perception. Insolvency, although rarely reported, showed multiple weak but significant associations, indicating that financial distress tends to co-occur with other crisis symptoms.

Correlation analysis confirms that crisis symptoms tend to accumulate. The most significant link between production outages and material shortages confirms the systemic interdependence of operational factors. At the same time, however, no negative correlations were identified, suggesting that the individual symptoms are not mutually exclusive. These results support the assumption that crisis phenomena in the SME environment are multiplicative rather than isolated in nature.

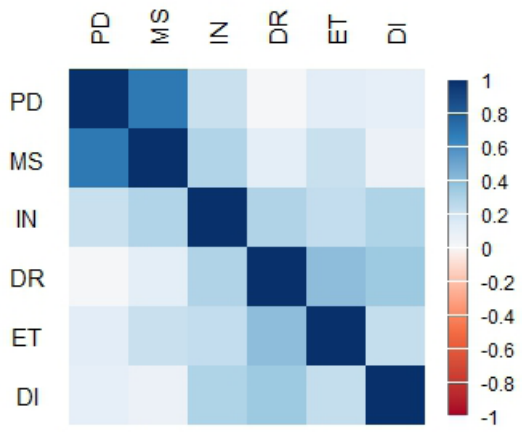


**Figure 3.** Heatmap of correlation matrix of symptoms of crisis

The results from the crisis causes area will now be characterized. At the same time, this involves examining RQ1. The most common causes of crises are personnel problems (average score: 2.373), followed by market factors (2.282) and technical or technological deficiencies (2.245). Conversely, the least frequently mentioned causes are natural factors (1.945) and financial problems (1.955). First, the results of the Kruskal-Wallis test are presented, which was used to determine whether the causes of crises differ across company size categories or the industry in which they operate. The resulting values are summarized in Tables 5 and 6. Values marked with two asterisks (**) are statistically significant at a 95% confidence level, while values marked with one asterisk (*) are significant at a 90% confidence level. Effect size reported as epsilon squared ($\varepsilon^2$). 95% confidence intervals estimated using percentile bootstrap (R = 2000). Kruskal–Wallis tests correspond to pre-specified hypotheses; therefore, no family-wise correction was applied.

**Table 5.** Kruskal–Wallis test of differences in crisis causes by company size

| Cause | p-value | Effect size $\varepsilon^2$ | 95% CI (lower) | 95% CI (upper) |
|---|---|---|---|---|
| Financial problems | 0.410 | 0.000 | 0.000 | 0.092 |
| Poor managerial decision-making | 0.044** | 0.040 | 0.000 | 0.161 |
| Personnel / HR problems | 0.398 | 0.000 | 0.000 | 0.088 |
| Technical or technological shortcomings | 0.091* | 0.026 | 0.000 | 0.149 |
| Legislative and political factors | 0.781 | 0.000 | 0.000 | 0.061 |
| Market factors | 0.787 | 0.000 | 0.000 | 0.071 |
| Natural factors | 0.069* | 0.031 | 0.000 | 0.142 |

As shown in Table 5, only one cause was found to be statistically significant at the 95% confidence level in terms of its influence on company size: poor management decision-making. Although statistically significant, the effect size was small and the confidence interval included values close to zero. Several other relationships were found, but only at a 90% confidence level. In this case, other causes influenced by company size include technical or technological deficiencies, as well as natural factors. In terms of sector influence (Table 6), only relationships with a significance level of 90% were recorded, namely for the cause of financial problems and legislative and political factors. Although several relationships were significant only at the 90% level, they indicate emerging patterns rather than robust structural effects. These tendencies should therefore be interpreted cautiously as indicative rather than conclusive. Likely, legislation and political factors will primarily affect specific industries, while larger companies will largely influence management decisions. Similarly, natural factors will not affect companies of all sizes, nor will technological shortcomings.

**Table 6.** Kruskal–Wallis test of sectoral differences in crisis causes

| Cause | p-value | Effect size $\varepsilon^2$ | 95% CI (lower) | 95% CI (upper) |
|---|---|---|---|---|
| Financial problems | 0.087* | 0.065 | 0.013 | 0.292 |
| Poor managerial decision-making | 0.234 | 0.028 | 0.000 | 0.244 |
| Personnel / HR problems | 0.102 | 0.060 | 0.023 | 0.268 |
| Technical or technological shortcomings | 0.337 | 0.013 | 0.000 | 0.224 |
| Legislative and political factors | 0.066* | 0.075 | 0.025 | 0.296 |
| Market factors | 0.131 | 0.051 | 0.009 | 0.297 |
| Natural factors | 0.181 | 0.039 | 0.005 | 0.235 |

Testing hypothesis $H_{1a}$ (the influence of company size on the perception of the causes of crises) did not demonstrate a systematic effect at the 95% significance level. A significant omnibus difference was identified only for "management decisions." However, pairwise differences did not remain significant after Bonferroni correction, indicating only a general size effect rather than robust pairwise contrasts. It can therefore be concluded that hypothesis $H_{1a}$ was not confirmed in its entirety, but only selectively. Hypothesis $H_{1b}$ (the influence of the sector) was also not confirmed consistently. Although agriculture is more sensitive to legislative and political factors, the sector as a whole does not constitute a universal explanatory variable for the causes of crises. These results suggest that the structural characteristics of the enterprise have limited explanatory power and do not represent the dominant determinants of the perception of crisis causes.

A post-hoc analysis using Dunn's test was performed as an exploratory supplement to the primary analysis. These pairwise contrasts are interpreted only as indicative patterns of differences between groups, not as confirmation of hypotheses, especially when the omnibus Kruskal–Wallis test is not statistically significant at the pre-specified 95% significance level.

The results of the test comparing size categories are presented in Table 7, which includes Z-statistics and p-values significant at the 95% confidence level (two asterisks) and the 90% confidence level (one asterisk). It is always indicated under which factor and in which size category the relationship was observed, where 1 represents micro-enterprises, 2 represents small enterprises, and 3 represents medium-sized enterprises.

In the exploratory Dunn post-hoc comparisons, several pairwise contrasts reached unadjusted significance. However, none of the pairwise differences remained statistically significant at 95% significance level after Bonferroni adjustment. These results, therefore, indicate only tentative patterns rather than robust pairwise differences by company size. In the sector-based post-hoc Dunn comparisons, several contrasts reached unadjusted significance across multiple sectors.

**Table 7.** Dunn test about causes of crisis according to company size

| | | | Impact of size | | | |
|---|---|---|---|---|---|---|
| **Comparsion** | **Z** | **p-value** | **adj. p-value** | **Effect size r** | **95% CI (lower)** | **95% CI (upper)** |
| Financial problems (1/2) | -0.486 | 0.627 | 1.000 | -0.051 | -0.252 | 0.135 |
| Financial problems (1/3) | -1.333 | 0.183 | 0.548 | -0.152 | -0.369 | 0.070 |
| Financial problems (2/3) | -0.847 | 0.397 | 1.000 | -0.116 | -0.368 | 0.148 |
| Poor managerial decision-making (1/2) | -2.169 | 0.030** | 0.090* | -0.229 | -0.415 | -0.028 |
| Poor managerial decision-making (1/3) | -1.846 | 0.065* | 0.195 | -0.210 | -0.420 | 0.012 |
| Poor managerial decision-making (2/3) | -0.019 | 0.985 | 1.000 | -0.003 | 0.253 | 0.258 |
| Personnel / HR problems (1/2) | -0.885 | 0.376 | 1.000 | -0.093 | -0.297 | 0.122 |
| Personnel / HR problems (1/3) | -1.251 | 0.211 | 0.632 | -0.143 | -0.344 | 0.075 |
| Personnel / HR problems (2/3) | -0.465 | 0.642 | 1.000 | -0.064 | -0.325 | 0.201 |
| Technical or technological shortcomings (1/2) | -1.489 | 0.136 | 0.409 | -0.157 | -0.357 | 0.034 |
| Technical or technological shortcomings (1/3) | -1.985 | 0.047** | 0.142 | -0.226 | -0.448 | -0.007 |
| Technical or technological shortcomings (2/3) | -0.671 | 0.503 | 1.000 | -0.092 | -0.343 | 0.183 |
| Legislative and political factors (1/2) | 0.387 | 0.699 | 1.000 | 0.041 | -0.155 | 0.232 |
| Legislative and political factors (1/3) | -0.438 | 0.661 | 1.000 | -0.050 | -0.281 | 0.188 |
| Legislative and political factors (2/3) | -0.700 | 0.484 | 1.000 | -0.096 | -0.357 | 0.174 |

| | | | Impact of size | | | |
|---|---|---|---|---|---|---|
| **Comparsion** | **Z** | **p-value** | **adj. p-value** | **Effect size r** | **95% CI (lower)** | **95% CI (upper)** |
| Market factors (1/2) | -0.671 | 0.502 | 1.000 | -0.071 | -0.287 | 0.133 |
| Market factors (1/3) | -0.042 | 0.966 | 1.000 | -0.005 | -0.201 | 0.199 |
| Market factors (2/3) | 0.479 | 0.632 | 1.000 | 0.066 | -0.185 | 0.342 |
| Natural factors (1/2) | 1.740 | 0.082* | 0.245 | 0.183 | -0.028 | 0.378 |
| Natural factors (1/3) | 1.989 | 0.047** | 0.140 | 0.227 | 0.024 | 0.415 |
| Natural factors (2/3) | 0.481 | 0.631 | 1.000 | 0.066 | -0.170 | 0.300 |

However, after Bonferroni correction for multiple testing, statistical significance remained only for a limited subset of contrasts (notably those involving personnel problems for services and legislative and political factors in agriculture). Therefore, sector-specific interpretations beyond these adjusted-significant contrasts should be treated as exploratory indications rather than confirmed differences.

A correlation analysis was performed to examine the relationships between the causes of the crisis in more detail. The results are shown in Table 8. To make the table more straightforward, the following abbreviations are used: Financial problems (FP), Poor managerial decision-making (MA), Personnel/HR problems (HR), Technical or technological shortcomings (TE), Legislative and political factors (LP), Market factors (MF), Natural factors (NF). Correlation coefficients marked with an asterisk (*) are statistically significant at a 95% confidence level after Bonferroni correction.

**Table 8.** Correlation matrix of causes of crisis

| | **FP** | **MA** | **HR** | **TE** | **LP** | **MF** | **NF** |
|---|---|---|---|---|---|---|---|
| FP | 1.000 | 0.346* | 0.092 | 0.012 | 0.076 | 0.266 | 0.143 |
| MA | 0.346* | 1.000 | 0.246 | 0.085 | 0.042 | 0.063 | -0.016 |
| HR | 0.092 | 0.246 | 1.000 | 0.091 | -0.095 | 0.006 | 0.051 |
| TE | 0.012 | 0.085 | 0.091 | 1.000 | 0.129 | 0.251 | -0.043 |
| LP | 0.076 | 0.042 | -0.095 | 0.129 | 1.000 | 0.419* | 0.250 |
| MF | 0.266 | 0.063 | 0.006 | 0.251 | 0.419* | 1.000 | 0.317* |
| NF | 0.143 | -0.016 | 0.051 | -0.043 | 0.250 | 0.317* | 1.000 |

As shown in Table 8, there are moderate to weak correlations between the causes of some factors. Most correlation coefficients are < 0.25, indicating a weak or negligible relationship between the variables. The most statistically significant relationships are observed in market factors (2 significant relationships), with the strongest being associated with legislative and political factors. There is a moderately strong relationship between these causes of the crisis. A relationship can also be observed between market and natural factors. Both of these relationships are positive, i.e., if the occurrence of one cause increases, the other can also be expected to increase. A significant relationship can also be seen between finance and management decision-making. This is to be expected, as management decisions can significantly impact a company's financial situation and thus cause problems. Figure 4 presents a graphical representation of the correlation coefficients between the individual causes of the crisis.

The results regarding the occurrence of individual types of crises in this area will now be characterized. At the same time, this involves an examination of RQ2. The most common types of crises are personnel (average score of 2.309), followed by operational and organizational (both with an average score of 2.200). On the other hand, the least common crises are reputational and know-how crises (1.745) and financial crises (1.891). First, the results of the Kruskal-Wallis test are presented, which was used to determine whether the occurrence of crisis types differs across company size categories or the industry in which they operate. Results are summarized in Table 9. Values marked with two asterisks (**) are statistically significant at a 95% confidence level, while values marked with one asterisk (*) are significant at a 90% confidence level.

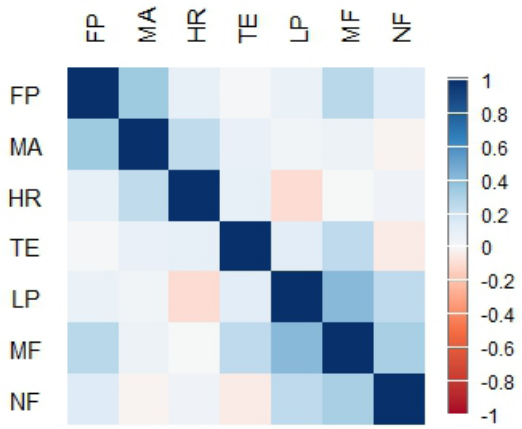


**Figure 4.** Heatmap of correlation matrix of causes of crisis

As shown in Tables 9 and 10, two types of crises were identified that are statistically significantly influenced by company size at a 95% confidence level. These are operational, reputational, or know-how crises. Several other relationships were found, but only at the 90% confidence level. In this case, other types of crises influenced by company size include organizational, technical (or technological), and strategic crises.

**Table 9.** Kruskal–Wallis test of differences in crisis types by company size

| Type | p-value | Effect size $\varepsilon^2$ | 95% CI (lower) | 95% CI (upper) |
|---|---|---|---|---|
| Financial | 0.973 | 0.000 | 0.000 | 0.058 |
| Organizational | 0.097* | 0.025 | 0.000 | 0.140 |
| Technical and technological | 0.097* | 0.025 | 0.000 | 0.149 |
| Strategic | 0.073* | 0.030 | 0.000 | 0.145 |
| Operational | 0.019** | 0.055 | 0.000 | 0.173 |
| Personnel | 0.183 | 0.013 | 0.000 | 0.123 |
| Reputation and know-how | 0.013** | 0.063 | 0.000 | 0.197 |

In terms of sector influence, only one significant type of crisis was found at the 95% level, namely personnel crises. However, the testing was primarily conducted at the 95% confidence level, so in most cases the null hypotheses were not rejected. No consistent statistically significant effect of company size or sector was identified across the majority of crisis types.

**Table 10.** Kruskal–Wallis test of sectoral differences in crisis types

| Type | p-value | Effect size $\varepsilon^2$ | 95% CI (lower) | 95% CI (upper) |
|---|---|---|---|---|
| Financial | 0.319 | 0.015 | 0.000 | 0.230 |
| Organizational | 0.389 | 0.006 | 0.000 | 0.218 |
| Technical and technological | 0.287 | 0.020 | 0.000 | 0.255 |
| Strategic | 0.187 | 0.037 | 0.007 | 0.252 |
| Operational | 0.297 | 0.018 | 0.000 | 0.249 |
| Personnel | 0.036** | 0.094 | 0.039 | 0.328 |
| Reputation and know-how | 0.556 | 0.000 | 0.000 | 0.219 |

Again, the Dunn test was used as an exploratory tool to identify potential differences between specific groups. The interpretation of these contrasts is limited to cases in which the omnibus test indicates at least a borderline effect, and the results are presented transparently, including all tested comparisons. The results of the test comparing size categories are presented in Table 11. P-values significant at the 95% confidence level (two asterisks) and the 90% confidence level

(one asterisk). It is always indicated under which factor and in which size category the relationship was observed, where 1 represents micro-enterprises, 2 represents small enterprises, and 3 represents medium-sized enterprises.

Pairwise Dunn comparisons indicate that medium-sized enterprises report higher levels of operational crises and reputation/know-how crises than micro-enterprises, and these differences remain statistically significant after Bonferroni adjustment. For other crisis types, several unadjusted contrasts suggested possible size-related patterns, but these did not remain significant after correction and are therefore interpreted as exploratory.

From sector-based pairwise contrasts, several unadjusted differences across crisis types emerged; however, after Bonferroni correction, robust sectoral differentiation remained only for personnel crises, which were reported significantly more often in the service sector.

**Table 11.** Dunn test about types of crisis

| | | | Impact of size | | | |
|---|---|---|---|---|---|---|
| **Comparsion** | **Z** | **p-value** | **adj. p-value** | **Effect size r** | **95% CI (lower)** | **95% CI (upper)** |
| Financial (1/2) | 0.123 | 0.902 | 1.000 | 0.013 | -0.189 | 0.206 |
| Financial (1/3) | -0.152 | 0.879 | 1.000 | -0.017 | -0.268 | 0.217 |
| Financial (2/3) | -0.235 | 0.814 | 1.000 | -0.032 | -0.319 | 0.258 |
| Organizational (1/2) | -1.349 | 0.177 | 0.532 | -0.142 | -0.338 | 0.058 |
| Organizational (1/3) | -2.023 | 0.043** | 0.129 | -0.231 | -0.434 | -0.015 |
| Organizational (2/3) | -0.814 | 0.416 | 1.000 | -0.112 | -0.371 | 0.157 |
| Technical and technological (1/2) | -1.964 | 0.049** | 0.149 | -0.207 | -0.410 | -0.003 |
| Technical and technological (1/3) | -1.456 | 0.145 | 0.436 | -0.166 | -0.385 | 0.087 |
| Technical and technological (2/3) | 0.180 | 0.857 | 1.000 | 0.025 | -0.256 | 0.305 |
| Strategic (1/2) | -1.883 | 0.059* | 0.179 | -0.199 | -0.390 | -0.008 |
| Strategic (1/3) | -1.816 | 0.069* | 0.208 | -0.207 | -0.413 | 0.029 |
| Strategic (2/3) | -0.211 | 0.833 | 1.000 | -0.029 | -0.266 | 0.222 |
| Operational (1/2) | -0.822 | 0.411 | 1.000 | -0.087 | -0.286 | 0.119 |
| Operational (1/3) | -2.808 | 0.005** | 0.015** | -0.320 | -0.506 | -0.123 |
| Operational (2/3) | -1.941 | 0.052* | 0.157 | -0.267 | -0.491 | -0.031 |
| Personnel (1/2) | -1.032 | 0.306 | 0.918 | -0.108 | -0.304 | 0.103 |
| Personnel (1/3) | -1.772 | 0.076* | 0.229 | -0.202 | -0.413 | 0.014 |
| Personnel (2/3) | -0.836 | 0.403 | 1.000 | -0.115 | -0.379 | 0.165 |
| Reputation and know-how (1/2) | -1.969 | 0.049** | 0.147 | -0.208 | -0.391 | -0.016 |
| Reputation and know-how (1/3) | -2.703 | 0.007** | 0.021** | -0.308 | -0.508 | -0.094 |
| Reputation and know-how (2/3) | -0.959 | 0.338 | 1.000 | -0.132 | -0.384 | 0.115 |

Hypothesis $H_{2a}$ was partially confirmed at the 95% confidence level. The size of the company has a statistically significant impact on the occurrence of operational and reputational crises, with medium-sized companies showing a higher incidence of these types of crises. For other types of crises, only indicative differences at the 90% significance level were recorded, which cannot be considered robust confirmation of the hypothesis. For hypothesis $H_{2b}$, in most cases, no statistically significant differences were detected at the 95% confidence level. The only difference was observed for personnel crises, which occur significantly more often in the service sector. In other cases, the sector was not identified as a systematic determinant variable. Overall, it can be said that even in the case of crisis typology, there is no universal influence of size or sector, but rather selective differences.

A correlation analysis was conducted to examine the relationships between individual types of crises in greater detail. The results are shown in Table 10. To make the table more straightforward, the following abbreviations are used: Financial (FI), Organizational (OR), Technical and technological (TE), Strategic (ST), Operational (OP), Personnel (PE), Reputation and know-how (RE). Correlation coefficients marked with an asterisk (*) are statistically significant at a 95% confidence level after Bonferroni correction.

As shown in Table 12, the vast majority of relationships within correlations are statistically significant. Figure 5 presents a graphical representation of the correlation coefficients between the various types of crises.

**Table 12.** Correlation matrix of types of crisis

| | FI | OR | TE | ST | OP | PE | RE |
|---|---|---|---|---|---|---|---|
| FI | 1.000 | 0.289* | 0.103 | 0.290* | 0.271 | 0.168 | 0.223 |
| OR | 0.289* | 1.000 | 0.252 | 0.470* | 0.396* | 0.279 | 0.435* |
| TE | 0.103 | 0.252 | 1.000 | 0.393* | 0.263 | 0.036 | 0.252 |
| ST | 0.290* | 0.470* | 0.393* | 1.000 | 0.475* | 0.157 | 0.511* |
| OP | 0.271 | 0.396* | 0.263 | 0.475* | 1.000 | 0.283 | 0.262 |
| PE | 0.168 | 0.279 | 0.036 | 0.157 | 0.283 | 1.000 | 0.285 |
| RE | 0.223 | 0.435* | 0.252 | 0.511* | 0.262 | 0.285 | 1.000 |

The highest correlation coefficient (0.511) is observed between strategic and reputational crises. This is not coincidental, as it is often a strategic goal of a company to improve its name and brand so that a reputational crisis can trigger a strategic crisis. A similarly moderately strong correlation is also evident between reputational and organizational crises (r = 0.435), and it can be concluded that the reasons are the same: when an organizational crisis occurs, the company's reputation may be damaged. A similar correlation coefficient (0.470) is also found between strategic and organizational crises, indicating that these two types of crises are highly similar. The relationship between strategic and operational crises (r = 0.475) is also worth mentioning, even though these are two completely different levels of the company. In general, however, it is clear that the risk of another type of crisis often accompanies the occurrence of individual types of crises; instead, these types do not occur separately in organizations, with one notable exception: personnel crises. In this case, almost no statistically significant relationships are observed, and the correlation coefficients are low, indicating very weak or no relationships. Interestingly, again, no negative correlation was observed; that is, one type of crisis did not exclude or reduce the likelihood of another.

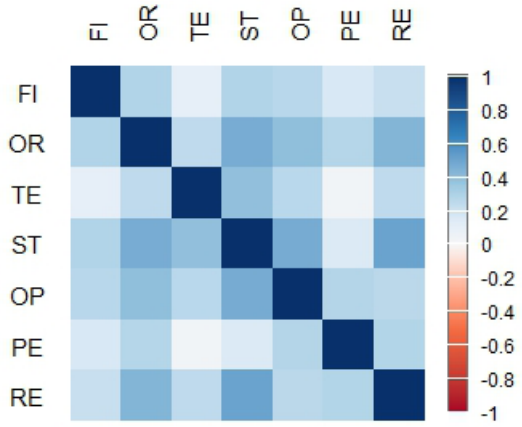


**Figure 5.** Heatmap of correlation matrix of types of crisis

The results indicate limited structural differentiation of crisis phenomena across size categories and sectors within the analyzed sample. Structural factors do play a role, but only in limited and specific dimensions (e.g., operational or personnel crises). This conclusion relativizes the assumption that size or sector alone is a key determinant of crisis vulnerability. On the contrary, crisis processes in the SME segment are broader and more complex.

The limited statistical support for size-related effects suggests that company size alone may not be a sufficient explanatory factor within this sample. The results suggest that company size alone may not be a sufficient explanatory factor without taking into account other internal variables. The findings of this study suggest that the structural characteristics of a company (size and sector) do not have universal explanatory power in the area of crisis phenomena. This conclusion relativizes part of the empirical literature, which assumes significant differentiation in crisis experience

across company size categories. The results rather support an interpretation based on a combination of Contingency Theory and Resource-Based View, where structural factors act as conditions rather than determining variables. The crisis vulnerability of SMEs appears to be a complex phenomenon dependent on the interaction of multiple factors, not just on the formal classification of the company. These findings suggest the need to move from size-based differentiation models toward multi-factor vulnerability frameworks. This shift implies that future research should model crisis vulnerability as a configurational phenomenon rather than a linear function of firm size or sector.

## DISCUSSION

The discussion of the results shows that empirical data do not support the assumption of significant structural differentiation in crisis phenomena across SME size categories or sectors. This conclusion partly contrasts with some of the literature, which emphasizes the significant role of company size in resource availability and crisis management (Clauss et al., 2021; Graham & Matikonis, 2025). Our results suggest that structural characteristics are moderating rather than determining in nature. This finding challenges simplified structural determinism and calls for more integrative models that incorporate managerial quality, organizational processes, and dynamic capabilities. Unlike many prior studies that implicitly assume structural differentiation. This study empirically tests this assumption and provides evidence that structural differentiation between companies by size and sector is more limited in the analyzed sample than would be theoretically expected.

Our finding that production problems, delays, or material shortages are indicators of an impending crisis is entirely consistent with the literature (Chowdhury et al., 2021). Companies report that this is also one of the most reliable indicators of an impending crisis. The reality is that many supply chains are currently interconnected internationally, and interference in one link can cause the entire network to collapse (Ivanov & Dolgui, 2020). Therefore, as a proactive measure to prevent this crisis symptom and its subsequent emergence, companies should, for example, diversify their suppliers or adopt various forms of adaptive planning (Malekpour & Newig, 2020). Moreover, it is precisely these soft interventions in the form of strengthening relationships with suppliers and employees (which is also a reported symptom of crisis), together with innovations, that contribute to greater resilience of the entire chain during a crisis (Ozdemir et al., 2022). Our research therefore extends these findings with evidence from Czech SMEs, while also quantifying that symptoms arising from the supply chain and employees often indicate an impending crisis.

The most robust sectoral differentiation was observed for personnel crises, which were reported more frequently in the service sector. For agriculture, higher ratings of legislative/political (and potentially natural) factors emerged mainly as indicative patterns in exploratory contrasts and should therefore be interpreted cautiously. Examining the conclusions drawn from the most recent major crisis, the COVID-19 pandemic, reveals the following findings. Agricultural businesses are generally more vulnerable to external interventions such as regulation, legislative conditions, or government support, not only during times of crisis (Apostolopoulos et al., 2021; Weersink et al., 2021; Zyryanov et al., 2021). Conversely, the service sector experiences higher or above-average turnover during a crisis. It is also characterized by uncertainty among employees, as working conditions change and psychological stress increases (Xiang et al., 2021; Yin et al., 2022). The comparison presented in this article thus confirms that a personnel crisis or personnel-related cause of a crisis is more likely to occur in the service sector. In contrast, in the agricultural sector, the causes are more likely to be legislative, political, or natural, even though the Kruskal-Wallis test did not identify many differences.

The strong links between different types of crises, such as strategic, organizational, and reputational crises, are entirely consistent with models of an integrated approach to crises. Crises, or crisis management, not only affect selected areas of a company, its components, or levels, but always escalate across the organization at all levels (Bundy et al., 2016). Reputational and strategic crises are closely linked, particularly through communication, as crisis communication serves as a tool to protect the company's name during a crisis; however, an adequate strategic response to the crisis is also necessary to safeguard the company's assets (Coombs, 2007). At the same time, it is worth noting that failure in the area of reputation crisis can also seriously harm other stakeholders and interested parties associated with the company, which only reinforces the fact that this is a crucial type of crisis that corresponds with all others (Bundy et al., 2021). The findings provide further empirical support for these claims, supplemented by quantitative data.

In contrast, the personnel crisis showed weaker links with other types of crises, as did the financial crisis, or rather, financial causes. However, as the literature indicates, SMEs are financially rigid, and larger crises affect them most in this regard (Bartik et al., 2020). The question, however, is how willing companies are to answer truthfully on this issue. The result is also interesting from the perspective of the personnel crisis, as the literature often emphasizes the central

role of HR within an organization, with the needs of employees spilling over into other areas. For example, employees demand modern equipment and ICT technologies that many companies cannot afford, and this should be presented as a technological crisis (Hamouche, 2021). Similarly, HR is inextricably linked to strategic business management, and employee issues can spill over into the strategic level (Minbaeva & Navrbjerg, 2023). The fact that the results differ likely stems from the fact that the personnel crisis in our research is interpreted as a shortage of workers or turnover, which is a limited aspect of the HR agenda. In contrast, the literature encompasses a broader scope of HR. There is also some evidence to suggest that, in specific contexts, personnel crises tend to become organizational or operational problems and crises (Lee et al., 2021).

However, the contribution of this study lies not only in confirming existing theoretical assumptions, but above all in systematically linking and testing them empirically within a single analytical framework. While previous research has often examined either individual causes of crises or selected types of crises separately (Ndone & Kyriakopoulos, 2024; Schwarz & Diers-Lawson, 2024; Tkalac Verčič & Špoljarić, 2023), this study integrates the symptoms, causes, and typology of crises into a single model and tracks their interrelationships. This allows us to capture the structure of crisis phenomena as an interconnected system rather than as isolated categories.

To reinforce the contribution of this study, it should be emphasized that its value lies not only in confirming previously formulated theoretical conclusions, but above all in their empirical refinement and partial revision. The results show that the influence of company size and industry is neither universal nor unambiguous. Although theories and empirical studies often assume significant structural differences between size categories or sectors (Belitski et al., 2021; Chatterjee et al., 2025; Kalemli-Ozcan et al., 2020), the differences found were only partial and selective. This suggests that some determinants of crises may be more homogeneous in the environment of small and medium-sized enterprises than is commonly assumed. The results suggest that the crisis vulnerability of small and medium-sized enterprises is complex and differentiated in nature and cannot be fully explained by size or sector alone. This conclusion expands current knowledge by highlighting the need to combine structural characteristics with other factors, such as managerial competencies or internal processes, when explaining the emergence and course of crises.

The generalizability of the results depends on the institutional context. Findings can be expected mainly in economies with a similar SME structure and a relatively stable regulatory framework. In environments with significantly higher institutional uncertainty or weaker business support infrastructure, the impact of size and sector may be more pronounced. The relationship between structural characteristics and crisis vulnerability cannot, therefore, be considered universal, but rather context-dependent.

Given that all variables were obtained from the same respondents in a single cross-sectional questionnaire, the influence of common-method variance cannot be ruled out. The risk was reduced both procedurally (thematic separation of item blocks, neutral wording of questions) and statistically, as factor analysis did not reveal the existence of a single dominant factor explaining most of the variance. Nevertheless, the results must be interpreted as associations between variables, not as evidence of causal relationships. The conclusions are therefore based on observed differences and correlations and do not imply deterministic or exclusive mechanisms.

The study has several implications for SME managers. The first is the timely setting of warning indicators that signal a crisis, particularly in the supply chain (monitoring delivery times and material stock levels) and HR (monitoring job satisfaction, turnover, and employee concerns about their work). The second recommendation is to ensure greater diversification and a broader portfolio of suppliers, while also investing in adaptive planning. These factors have been identified as the most common signs of a crisis, so it is essential to monitor specific indicators and strengthen supply chains.

## CONCLUSION

The main aim of this article was to identify differences in the causes and types of crises in SMEs across variations in size and sector in the Czech Republic. The following conclusions have been drawn from the research conducted. The most common symptoms are production outages, material shortages, and staff turnover; insolvency and damage to reputation are rare. The strongest correlation between symptoms is between production outages and material shortages. The most common causes are personnel, market, and technical/technological; the most common types of crises are personnel, operational, and organizational. Micro-enterprises tend to report fewer types of crises than medium-sized enterprises; however, statistically significant differences were identified only for selected crisis types. Personnel crises were statistically more frequent at a 95% significance level in the service sector. In agriculture, higher average values were recorded for

legislative, political, and natural causes of crises, but these differences were not consistently significant at the 95% level. At the type level, the interconnection of strategic, organizational, and reputational crises is confirmed.

It should be emphasized that this study does not focus on macroeconomic, systemic, or global crises as such (e.g., the collapse of the financial system, the global climate crisis, or geopolitical conflicts), but exclusively on crisis phenomena at the level of individual companies. The analytical field of research is limited to the organizational level of small and medium-sized enterprises, where crises are operationalized through symptoms, perceived causes, and crisis typologies. The contribution of this study lies not only in the empirical mapping of crisis phenomena in the Czech SME environment, but above all in testing the extent of structural differentiation of crisis determinants. The study shows that within the defined field of organizational crisis phenomena in the SME environment, company size and sector exert selective, dimensionally specific influences rather than serving as primary structural determinants of crisis vulnerability. The study thus contributes to a clearer definition of the boundary between the macro level of crisis events and the micro level of their organizational manifestations, focusing exclusively on the latter of these dimensions.

The answers to the research questions are as follows. The first research question examined whether perceptions of the crisis's causes vary by company size or sector. However, no consistent influence of either variable was found. The exception is poor management decision-making as a cause of the crisis, which medium-sized and small companies significantly more frequently mention than micro-enterprises. The omnibus test indicated a size-related difference for this cause; however, adjusted pairwise comparisons suggest that this effect should be interpreted cautiously. There are also differences between sectors in the perception of financial and legislative-political causes, with agriculture being more sensitive; however, these differences were not significant at the 95% confidence level. These differences were significant only at the 90% level and therefore interpreted as indicative. Two hypotheses were formulated for this research question; neither was supported in a universal and systematic manner, although selective and dimension-specific differences were identified. The second research question examined whether the occurrence of individual types of crises differs according to size or sector. Company size was statistically significantly associated only with selected crisis types, while other differences did not reach the 95% significance threshold. The sector mainly determines personnel crises, which are more evident in the service sector. Two hypotheses were also established for this question, but neither hypothesis was supported in a universal manner; however, selective and dimension-specific effects were identified.

It is necessary to mention some limitations of the research conducted. This was a quantitative study based on a questionnaire survey conducted only in the Czech Republic, exclusively in an online environment, among SMEs. Therefore, its generalizability outside the Czech Republic is limited, as is its applicability to large organizations. Furthermore, firms that ceased operations are not represented, leading to response and survivorship biases. The responses were evaluated subjectively by the respondents, and no complex financial data were obtained from the companies that could serve as control variables. The scales and number of items used were more economical for some constructs, yet remained consistent and aligned with the literature on which they are based. The study's limitations include its reliance solely on quantitative research and the absence of a qualitative component. For these reasons, it is advisable to interpret the findings with caution; however, they provide a solid, practically useful picture.

The absence of significant differences between size categories can be interpreted in two ways. Either structural factors do not play a dominant role, or their effects are masked by variables not included in this study (e.g., management quality, level of digitization, organizational culture). This fact points to the need for multi-layered models of crisis vulnerability. The relatively small and unbalanced subgroup sizes may have limited the ability to detect medium-sized effects, which should be considered when interpreting non-significant findings. Another limitation relates to the conceptualization of crises. The study covers multiple types and causes of crises, but all are examined at the level of individual companies' perceptions. The research does not distinguish between exogenous macro-crises (e.g., global financial crises, pandemics, or climate shocks) and endogenous organizational crises in terms of their causal origin. It focuses exclusively on how crisis phenomena manifest themselves within companies, rather than on the structural mechanisms of systemic crises.

Given the sample size (n = 110) and its division into multiple size and sector categories, partial subgroup analyses should be interpreted with caution. For smaller groups, statistical power may be limited, and the results should therefore be considered indicative. The lack of statistical significance cannot be interpreted as evidence of the absence of a relationship, but rather as the absence of a strong and stable effect within the analyzed sample. The differences found are formulated as associations rather than causal mechanisms.

There are several directions for future research. The first is to expand the sample size within this issue, both in terms of size and geography. It would also be appropriate to link the questionnaire data with objective metrics, such as the

company's financial indicators. Similarly, case studies could be added. Another option is to expand the research to include a qualitative component, such as in-depth interviews with company managers. Replicating the research during periods of exogenous shocks (e.g., energy crises) will also strengthen the robustness and practical applicability of the conclusions and recommendations. Another suitable direction for future research would be to compare samples to mitigate the problems of unbalanced subgroups. Similarly, it would be useful to compare the responses with available accounting and economic data to determine whether companies are effectively mitigating crises. It would also be appropriate to focus on other areas of crisis management, such as communication and planning. The role of AI in crisis management should not be overlooked.

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# Appendix

## **Appendix 1.** Questionnaire

| Number | Wording of the question | Question type | Possible answers |
|---|---|---|---|
| 1 | Please indicate your gender | Select one answer | Male, Female, I do not want to mention |
| 2 | What industry does your company operate in? | Select one answer | IT, Construction, Manufacturing, Healthcare, Financial services and banking, Retail, Transportation and logistics, Energy, Other (please specify) |
| 3 | How many employees does your company have? | Select one answer | We do not have employees, 1-9, 10-49, 50-249 |
| 4 | How often do you have to deal with crises within your organization? | Select one answer | Never, Very rarely, Often, Very often |
| 5 | Rate the following causes of crises according to their frequency of occurrence in your organization. | Select one rating for each answer (1-4, where 1 = does not occur at all) | Financial problems, Poor management decisions, Personnel problems, Technical or technological shortcomings, Legislative and political factors, Market factors, Natural factors |
| 6 | Rate the following types of crises according to their frequency of occurrence in your organization | Select one rating for each answer (1-4, where 1 = does not occur at all) | Financial, Organizational, Technical and technological, Strategic, Operational, Personnel, Reputation and know-how |
| 7 | Rate the following crisis symptoms according to the frequency with which you have encountered them in your organization. | Select one rating for each answer (1-4, where 1 = does not occur at all) | Production downtime, Material shortages, Insolvency, Damage to the reputation of the company and its products, Employee turnover, Decline in investment |
| 8 | How often can you recognize an impending crisis in time? | Select one answer | Always, Almost always, Almost never, Never |
| 9 | Assess the following consequences of crises in relation to your organization. | Select one rating for each answer (1-4, where 1 = Absolutely essential) | Financial, Organizational, Strategic, Impacts on human resources, Impacts on reputation, Impacts on the supply chain, Impacts on customers |
| 10 | Has your organization ever experienced a crisis that recurred regularly? | Select one answer | Yes, No |
| 11 | Does your organization have a designated crisis team or crisis management team? | Select one answer | Yes, No, It depends on the size and type of crisis |
| 12 | Does your organization have contingency plans and scenarios in place? | Select one answer | Yes, No, It depends on the size and type of crisis |
| 13 | Rate the following competencies in relation to successful crisis resolution | Select one rating for each answer (1-4, where 1 = Very important) | Time management, Stress management, Strategic thinking, Leadership, Communication, Teamwork, Planning, Flexibility, Financial management, Creativity |

| Number | Wording of the question | Question type | Possible answers |
|---|---|---|---|
| 14 | Rate the following crisis planning objectives according to their importance in your organization. | Select one rating for each answer (1-4, where 1 = Very important) | Damage minimization, Business continuity, Reputation protection, Protection of life and health, Compliance with laws or regulations |
| 15 | Rate the following crisis communication principles according to their importance from your organization's perspective. | Select one rating for each answer (1-4, where 1 = Very important) | Speed, Accuracy of information provided, Transparency, openness, Consistency of communication, Empathy, Ethics, Flexibility |
| 16 | Do you think artificial intelligence (AI) can help with crisis management? | Select one answer | Yes, No |
| 17 | Rate the following aspects of crisis management according to the extent of assistance that AI can offer in the future. | Select one rating for each answer (1-4, where 1 = Will help greatly) | Early detection of a crisis, Crisis planning, Crisis communication, Crisis resolution itself, Identification of the causes of a crisis, Quantification of the impacts of a crisis, Crisis prevention, Elimination of the impacts of a crisis |

## Biographical notes

**Lukáš Klarner** is an assistant professor in the Economics and Management study program at University of South Bohemia in České Budějovice. He focuses on operational, project, crisis, and change management in SMEs, highlighting Industry 4.0 impacts and generational motivation. He publishes on motivation and change implementation in SMEs, led a GAJU grant on change management, co-authored a study on Czech SMEs, and participates in a Visegrad project.

**Petr Řehoř** is head of department of management at University of South Bohemia in České Budějovice. He specializes in strategic and regional/municipal management, linking public administration with the corporate sector. His publications address strategic planning in municipalities and micro-regions, as well as HR readiness for Industry 4.0 and (post-) pandemic teleworking. He has long published in management and currently leads and coordinates departmental research activities.

**Jaroslav Vrchota** is an associate professor at University of South Bohemia in České Budějovice. He specializes in project management, innovation, and business strategies within the Industry 4.0 context. His research focuses on business strategies and HR readiness for Industry 4.0, as well as emerging teleworking trends in the Czech Republic. He has authored or co-authored several studies on production and innovation management.

**Petra Matoušková** is a Ph.D. student in the Economics and Management study program at University of South Bohemia in České Budějovice, in a part-time form. She focuses on human resource management, especially employee training, benefits, stress, and age management. She regularly contributes to conferences and academic publications on HR topics, further developing them in follow-up studies. At the university project department, she is involved in managing university projects.

**Monika Maříková** is an assistant professor at University of South Bohemia in České Budějovice. In her teaching, she focuses primarily on courses related to entrepreneurship, career development, and students' practical business projects. She actively organizes workshops, supports students' entrepreneurial activities, and collaborates with corporate partners. She also helps organize the Invest Day competition for students interested in entrepreneurship.

## Author contribution statement

**Lukáš Klarner:** Conceptualization, Validation, Writing – Original Draft, Writing – Review and Editing. **Petr Řehoř:** Data Curation, Formal Analysis. **Jaroslav Vrchota:** Methodology, Visualization. **Petra Matoušková:** Investigation, Writing – Original Draft. **Monika Maříková:** Supervision, Writing – Review and Editing.

## Conflict of interest

The authors declare no conflict of interest.

## Citation (APA style)

Klarner, L., Řehoř, P., Vrchota, J., Matoušková, P., & Maříková, M. (2026). Causes and typology of crises in SMEs and differences based on sector and company size: Evidence from the Czech Republic. *Journal of Entrepreneurship, Management and Innovation, 22*(2), 119-145. https://doi.org/10.7341/20262225