



Publisher

<http://jssidoi.org/esc/home>

THE ROLE OF SUPPLIER-CUSTOMER RELATIONSHIPS IN THE VALUE CHAIN IN TIMES OF CRISIS*

Ekaterina Chytilová ^{1*}, Jarmila Straková ², Milan Talíř ³

^{1,2} Institute of Technology and Business in Ceske Budejovice, Faculty of Corporate Strategy,
Okružní 517/10, 370 01 České Budějovice, Czech Republic

³ Brno University of Technology, Institute of Management, Faculty of Business and Management,
Kolejní 2906/4, Brno, 612 00, Czech Republic

E-mails:^{1*} chytilova@vste.cz (Corresponding author); ²strakova@mail.vstecb.cz; ³252620@vutbr.cz

Received 18 May 2024; accepted 14 July 2024; published 30 September 2024

Abstract. The main aim of this article is to identify the evolution of the importance of supplier-customer relations in the period of crisis and the factors influencing the change of this importance. The research question was answered by testing a total of 6 hypotheses, which focused on comparing the degree of influence of factors such as firm size, industry, and profitability on the growth in the importance of supplier-customer relationships in the COVID-19 period. Boxplot and histogram were used to ensure the normality of data. The results suggest that the significance of supplier-customer relationships increased during the crisis period (COVID-19). The firm's profitability influences the growth in the importance of supplier-customer relationships before the pandemic, industry (the growth in importance is more pronounced in industrial firms) and overall sector (the growth in importance is stronger in the secondary sector than in the tertiary sector). In contrast, the association between firm size and the growth in the importance of supplier-customer relationships is not confirmed. Limitations of the study: the research results apply only to enterprises in the Czech Republic, and it is of a short-term focus (i.e., it cannot be said with certainty whether the increase in the importance of supplier-customer relationships is permanent or a short-term fluctuation). Thus, the results of the impact of individual factors may vary over longer time horizons.

Keywords: supply chain; value management; crisis management

Reference to this paper should be made as follows: Chytilová E., Straková J., Talíř M. (2024). The role of supplier-customer relationships in the value chain in times of crisis. *Entrepreneurship and sustainability issues*. 12(1), 138-151. [http://doi.org/10.9770/jesi.2024.12.1\(10\)](http://doi.org/10.9770/jesi.2024.12.1(10))

JEL Classifications: M21, L14, L26

1. Introduction

Proper value chain management is necessary for business processes that create value in products or services. A company aims to optimize its value chain as much as possible, thus securing a competitive advantage over other competitors. The generation of competitive advantage is conditional on several measures within the company's control, but several unforeseeable events are beyond its control. A pandemic is an example of the external influence of unforeseen events that fall within the group of asymmetric risks. The impact of a pandemic in the corporate sphere in the context of behavioural changes can be classified, according to many studies, as the behaviour of actors in a crisis. An essential part of the value chain is the supplier-customer relationship, which can affect a wide range of processes in a company. Modern approaches focus on a higher degree of customer

* This paper has been prepared as a part of internal research competition at the department of management for 2022 entitled: "A new approach in the generation of corporate strategy based on the parameterization of business processes". PID: IVSUPS004.

integration in the development process, which allows for a more detailed product parameterization that conditions the increased value perceived by the customer. Given the societal demand in both the corporate and academic communities, research on supplier-customer relationship management can be expected to grow in the coming years. The main objective of this paper was defined as the identification of the trend of the importance of supplier-customer relationships in enterprises in the Czech Republic. Sub-objectives were set to reflect the article's structure to fulfil the objective properly. First, it is necessary to identify current scientific knowledge on the importance of buyer-supplier relationships (BSR). This is followed by establishing the baseline change in perceptions of the significance of BSR during the pandemic through a questionnaire survey. The final step will be to determine the underlying factors influencing the change in the importance of BSR in enterprises and to establish the association between the selected factors and the change in the significance of BSR.

2. Theoretical background

A company's value chain is a system composed of different sub-systems, each with processes, inputs and outputs that provide value (Simatupang, Ginardy and Handayati, 2018). Part of the value chain is properly setting up all the business processes to create value for a given product (Linkov et al., 2020). In their research, Fahimnia et al. (2018) describe the processes through which each product or service must go and where it gets its value. Research by McWilliam et al. (2019) shows that value is not tangible but results from stakeholder interaction and the system's overall functioning. Research most often analyzes the value chain to maximize competitive advantage (Choi, 2019), but we can also see approaches where shareholder value is maximized (Mukhtar and Azhar, 2020). Other studies link the value chain to the supply chain (SC) and describe how supply-demand determines operational relationships throughout the production cycle (Nauhria et al., 2018; Adobor, 2019). The supply chain concept is based on a resource-based business. Sivula, Shamsuzzoha and Helo (2021) describe how a business can achieve a sustainable advantage by using inimitable and irreplaceable resources. Resources are identified as tangible or intangible assets that help a firm gain and sustain market advantage (Gölgeci and Kuivalainen, 2020; Sodhi and Tang, 2021). Research by Nguyen et al. (2018) highlights capability development challenges within the supply chain. The authors further confirm that for a firm to survive in a market environment, differentiation in the handling of its resources is necessary. Other literature presents that sharing knowledge, information, and assets with partners positively affects supply chain capability development (Pettit, Croxton and Fiksel, 2019). Wieland and Durach (2021) state in their work that creating mutual trust is a prerequisite for establishing complex collaboration between partner firms.

For this reason, trust can be considered as one of the capabilities within the supply chain that can bring certain benefits to the involved companies (Del Giudice et al., 2021). Closely related to the supply chain is the research of Lizbetinova et al. (2017), where the authors discuss the motivation of logistics employees. In recent years, supplier-customer relationships have become a popular topic in both academic and corporate spheres (Santana, Moraes and Hermes, 2021). Research shows that the importance of buyer-supplier partnerships in the supply chain is continuously growing (Wieteska, 2020), but it can also be a source of serious risks that can result in significant financial losses (Kubickova et al., 2021). Supplier-customer relationships are also a hot topic in the global economy, where it is often very difficult to eliminate or manage the risks to which a company is exposed (Lehtimäki and Komulainen, 2021). The implementation of supplier-customer relationship management is being addressed by small, medium, and large enterprises (Monnagaaratwe and Mathu, 2022). However, research shows small businesses often do not realise the importance of supplier-customer relationships and generally lag in them (Moro et al., 2018; Grenzfurtnner and Gronalt, 2021). At the same time, it can be observed that enterprises often do not sufficiently appreciate how improving supplier-customer relationships affects business processes. Indeed, all of these can ultimately contribute to improved service quality, reduced costs, or higher business performance (Mathu, 2019). Other research points out that the development of technology and the growth of Internet commerce positively impact the management of supplier-customer relationships (Corallo et al., 2021; Ustyuzhanina, Dementiev and Evsukov, 2021). The global constraints brought about by the COVID-19 pandemic sharply reduced consumer demand, halted production, disrupted international supply chains and caused the global economy to fall into recession (Al-Hadi and Al-Abri, 2022). The biggest problem for the corporate sector was the demand reduction, which meant weaker businesses could not repay their obligations to

creditors (Sarkis, 2020). The research by Danielak (2021) also addressed supply chain issues, which focused on the risks associated with supply chains during pandemic times.

Research by Bertello, Bogers, and De Bernardi (2021) describes the COVID-19 pandemic as a significant challenge characterized by nonlinear dynamics, unpredictability, and the ability to cross jurisdictional boundaries. Other research has shown that the pandemic directly impacted business-to-business relationships (Greco et al., 2022; Konecny, Kostiuk and Ruschak, 2022). The COVID-19 pandemic marked a noticeable increase in the use of digital technologies; this fact resulted in partial dematerialization and greater personalization of products (Almeida, Duarte Santos and Augusto Monteiro, 2020; Sagapova, Dusek and Pártlová, 2022). Businesses in global markets increasingly include co-innovation processes where suppliers are involved in the development of products or services (Oinonen et al., 2018; Chu, Tian, and Wang, 2019). Another phenomenon nowadays is the involvement of customers in different stages of the production process or innovation (Qiu and Yang, 2018; Mishra, Singh and Subramanian, 2022). Researchers agree that looking for partners with sufficient resources and capabilities is necessary to improve innovation outcomes (Vahlne and Bhatti, 2019). In a relationship with a company, the customer is often seen as a partner because the collaboration of these two parties allows the identification and determination of the customer's specific problem or need (Lehtimäki and Komulainen, 2021). This assertion is supported by the research of Bhatti, Larimo, and Servais (2020), who put forward that understanding customer needs is key to the right direction of innovation. This implies that the future direction should focus even more on supplier-customer co-development, where the customer participates in the development of new products or services that better capture customer needs (Kim, 2022; Yuki and Takashima, 2020).

Several studies on the importance of BSR and SCM can be found in the literature. For example, (Scarpin et al., 2022) see the impact of pandemics on the emergence of the bullwhip effect (BWE) and the ripple effect (RE) in supply chains. The study identifies which financial and non-financial variables (factors) influenced the emergence of BWE and RE. The empirical research was conducted in a supply chain setting. The data collection process involved two steps: analysis of BWE and RE between individual buyers, suppliers, and global airlines, and subsequent measurement of the impact of BWE and RE in the BSR.

The study (Owusu Kwateng et al., 2022) aims to investigate the relationship between the level of communication and knowledge management on supply chain performance. The research was conducted through a questionnaire survey with employees. The following methods were used for data analysis: descriptive and inferential statistics, structural equation modelling (SEM), Cronbach's alpha.

Supply chain agility is considered one of the critical characteristics of potential SC success (Khan et al., 2022). Meanwhile, empirical research focuses on the impact of agility on export performance. It looks for export-oriented factors (e.g., competition, international business orientation, export strategy) that encourage the development of agility. For this study, primary data was collected through a five-point Likert scale questionnaire. For example, PLS-SEM (Partial least square-structural equation modelling) was used for data analysis.

One of the topical issues is sustainability in the context of BSR and SCM. For example, research by (Pereira et al., 2020) addresses how sustainability initiatives are affected by the COVID-19 pandemic in export-oriented suppliers from emerging economies. Data collection took the form of three rounds of semi-structured interviews. A "snowball" technique was used to define the research sample to access the participants. In doing so, sustainability initiatives emerged from the empirical findings and were selected only when mentioned at least three times among the cases. Each initiative examined was highlighted by respondents as central to SC sustainability.

The study (Bag et al., 2022) focuses on social sustainability in SC during a pandemic. The survey had 2 parts. The first survey captured buyers' perspectives using a questionnaire survey. The second survey focused on capturing suppliers' perspectives using a questionnaire survey. This study applied descriptive statistics and a t-test using SPSS 21.0 software and regression analysis.

Sustainable resource management in micro and small industrial enterprises is the object of research (Czainska et al., 2021). The research questions include, for example, which activities in the "sustainable resource management" field are carried out by micro and small enterprises in the rubber products industry in Poland. The empirical (qualitative and quantitative) research was conducted between March and May 2021 using computer-assisted telephone interviewing (CATI).

Sharma et al. (2022) focused on analyzing the factors for improving a sustainable supply chain (SSC) during the pandemic and factors important for SSC management. This study used the Multi-Criteria Decision-Making (MCDM) - Stepwise Weight Assessment Ratio Analysis (SWARA) method. Data was collected from SC experts from different organizations of FMCG industry. The data was collected through a structured questionnaire with the experts.

The potential impact of cognitive capital on SCRES (Supply Chain Resilience) capabilities is discussed in (Daghar et al., 2022). The study was mainly based on 40 semi-structured interviews in a multinational manufacturing company. The data analysis was based on an open coding procedure followed by axial and selective coding processes that revealed various key elements of cognitive capital. The result of empirical research is the case studies.

An interesting question is the relationship between internal and collaborative supplier complexity and the number of disruptions experienced by the buyer, which is addressed in (Wissuwa et al., 2022). The research was conducted as a questionnaire survey in the German manufacturing industry. A Likert scale was used to generate responses to each questionnaire question; the research was conducted in dyads in a triadic context. Three variables that could influence the independent and dependent variables were controlled: age of the supplier firm, position of the supply chain and size of the supplier firm. Data processing in the form of count regression was performed using robust standard errors.

Another important trend related to the topic of this paper is the quality of information within the DOV and its impact on supply chain performance. For example, (Hu, 2022) explores the impact of digital technology on DOV during a pandemic among PPE manufacturers. The research was conducted through 14 semi-structured interviews with company managers. Primary data from the interviews were supplemented with secondary data (expert reports and news articles), and company reports from the survey. Based on the interviews, case studies were compiled within each company.

A similar focus is provided by (Shahbaz et al., 2018), which focuses on determining whether certain factors (e.g., information sharing, collaborative decision-making, electronic data exchange) positively impact the operational performance of SOEs. Information sharing, shared decision-making, and electronic data exchange are the independent variables, and operational performance is the dependent variable. The samples of this study are members of manufacturing companies, including production, assembly, distributors, retailers, and suppliers. The data was collected using questionnaires. The data was analyzed using SPSS version 23. In addition, the reliability of the data was verified using Cronbach's alpha.

Armayah et al. (2019) analyse the impact of supply chain collaboration (information quality, information sharing, alignment of incentives and joint decision-making) on the competitiveness of SMEs. Data were collected using questionnaires, interviews, and observation techniques. Validity testing was conducted through item analysis using the Pearson Product Moment Correlation method. Reliability testing was conducted using the Alpha Cronbach (α) value. The methods of analysis used in this study are (1) Descriptive analysis and (2) SEM analysis (structural equation model). The research data were processed using SPSS and AMOS software.

This paper (Bani Hani, 2022) focuses on different supply chain management practices (SCMP) (Information Technology or IT, CRM, Information Quality), Information Quality (IQ) and their impact on supply chain performance (SCP). The empirical research was conducted through a questionnaire survey of companies in

Saudi Arabia. The methods and tools used for data processing were Cronbach's Alpha with an acceptance level of 0.60, CR-composite reliability Shapiro-Wilk test and others.

Based on the research conducted, several factors affect the performance of the supply chain. Furthermore, it can be summarized that the COVID period as one of the consequences had an increase in the importance of SCM. From the available literature sources, research in SCM is a topical issue, and it is necessary to investigate the factors leading to the change in their importance.

From the developed literature search reflecting the current social demand for the issue of the influence and impact of COVID-19 on companies, the authors set the following research questions:

- RQ1: Has the COVID-19 pandemic caused the rise in importance of BSR?
- RQ2: What factors influenced the change in the significance of BSR?

3. Research objective and methodology

A double analysis using the VoS Viewer program will examine the topicality of the issue. First, a two-parameter search on Web of Science will be performed to obtain the basis for creating a bibliographic map. The result of the bibliographic analysis will be a bubble map where the size of the bubbles indicates the number of occurrences, and the distance between each bubble indicates the degree of co-occurrence. All bubbles are divided into relevant clusters that are related to the keyword theme (van Eck and Waltman, 2010). After completing the bibliographic analysis, a double analysis of the 3 keywords will be performed. A regression analysis based on a 3-degree polynomial will be used to determine the transcription of the function, which will be enriched with a measure of the accuracy of this transcription using the correlation coefficient r (Likens et al., 2019; Zhang et al., 2022). The correlation coefficient will be determined using Excel following the following formula, where: the x and y values represent the average of matrices 1 and 2:

$$r = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sqrt{\sum(x - \bar{x})^2 \sum(y - \bar{y})^2}}$$

Methods of data collection

To achieve the objectives of the paper, two research questions were set and primary quantitative research was conducted in Czech companies to answer them. A total of 395 enterprises participated in the study; however, after cleaning, the research was conducted on a set of 351 enterprises. The respondents held a managerial position in the enterprise. The questionnaire survey was carried out in the period 2021-2022. The parameters related to the RQ were selected as the size of the enterprise (micro, small, medium, large), HV before and during the COVID-19 pandemic (loss, stagnation, profit) and the business sector (NACE sector - industry, mining, services, other). Other parameters observed were the importance of supplier-customer relationships before and during the pandemic (ranging from 0-1.00). The following hypotheses were defined to answer the set research questions:

- H0: The pandemic has not caused an increase in the importance of supplier-customer relationships in the value chain,
- H1: The pandemic has caused an increase in the importance of supplier-customer relationships in the value chain,
- H2: The change in the importance of supplier-customer relationships is related to selected factors (size of the enterprise, profitability of the enterprise, scale (scope), industry (differentiation by NACE), and business sector.

The second hypothesis was divided into five sub-hypotheses:

- H21: The size of the enterprise influenced the change in the importance of the BSR,
- H22: The profitability of the firm (HV before the pandemic) influenced the change in the importance of BSR,
- H23: The scale/size of the enterprise influenced the change (growth) in the importance of BSR,
- H24: The business sector (according to NACE differentiation) had an impact on the change in the importance of the BSR,

- H25: The business sector (primary, secondary, tertiary) impacted the change in the importance of the BSR.

Data processing methods

The data processing will take place in two stages. During the first stage, H0 and H1 testing will be carried out. The testing will compare the growth in the importance of purchasing (supplier-customer relationships) before and during the COVID-19 pandemic. To test these hypotheses, 3 sets (A1, A2, A3) will be randomly created, and it can be argued that all firms in the sets had less than 100% importance in supplier-customer relationships before COVID-19. The A1 sample comprises firms where a positive change (growth) in the importance of supplier relationships has been defined. For the A2 sample, enterprises for which a negative change (decrease) in the importance of supplier-customer relationships was observed were randomly selected. The last sample is A3, which consists of enterprises where no change in the importance of supplier-customer relationships was defined. The evaluations of the results of the H0 and H1 tests are presented in the following Table 1.

Testing results	H0	H1
A1 > A2, A1 > A3:	Rejected	Confirmed
A1 < A2, A1 > A3:	Not confirmed/partially rejected	Not confirmed/partially rejected
A1 > A2, A1 < A3:	Not confirmed/partially rejected	Not confirmed/partially rejected
A1 < A2, A1 < A3:	Confirmed	Rejected

Table 1. Dataset of tests performed

Source: own processing

In the second stage, hypothesis H2 will be tested. The growth in the importance of supplier-customer relationships will be examined from several perspectives: size, profitability, scale (scope), differentiation by NACE, and sector. Method of testing: we compare the importance of supplier-customer relationships before and during the pandemic according to selected factors. The description of the files and instruments in testing each hypothesis were presented in the following methodological diagram Research Structure (Figure 1).

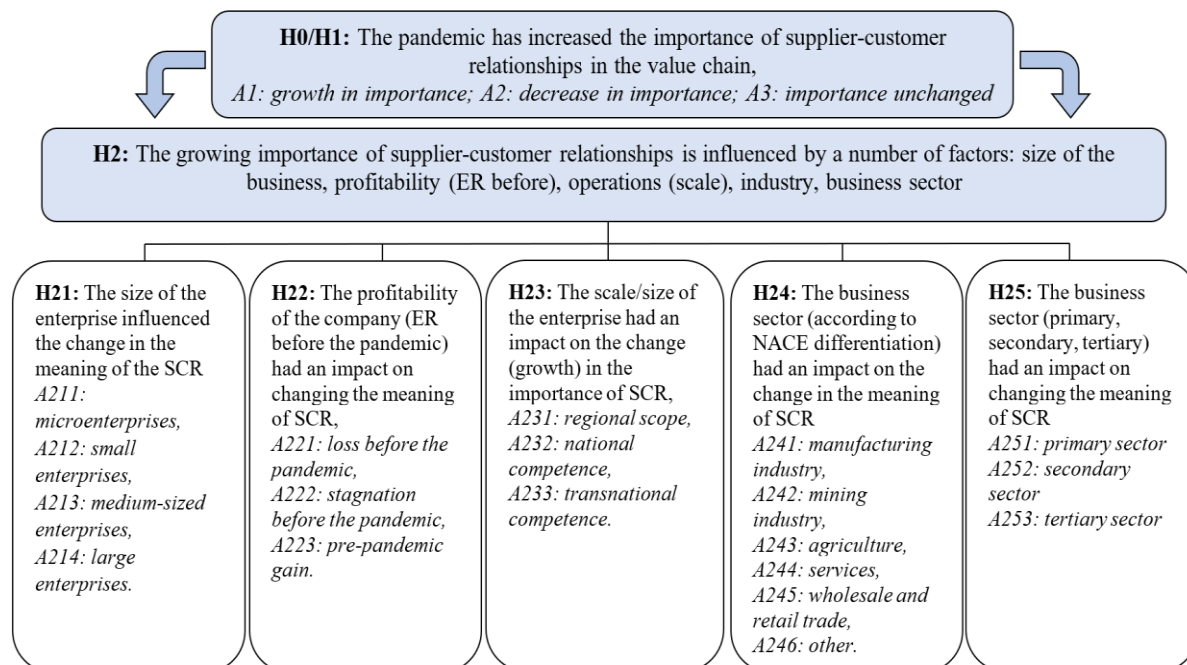


Figure 1. Structure of the research methodology

Source: own processing

4. Results and discussion

A dual analysis using VoS Viewer was used to identify the current state of supply and value chain research. First, a search for Supply Chain and Covid-19 and Value Chain and Covid-19 (Management, Business or Economics category) was conducted on Web of Science. For the first search, the result was 1008 publications; for the second search, it was 610 publications. The search was followed by an export of information on all articles, which was used to create two bibliographic maps. The Supply Chain and COVID-19 map contained 303 keywords and was sorted into 7 clusters according to the relevant category. The Value Chain and COVID-19 bibliographic analysis contains 209 keywords in 8 clusters. This paper will use the top 5 clusters from each search. The keyword analysis yielded that both search topics are highly relevant and need further research (Figure 2, Table 2).

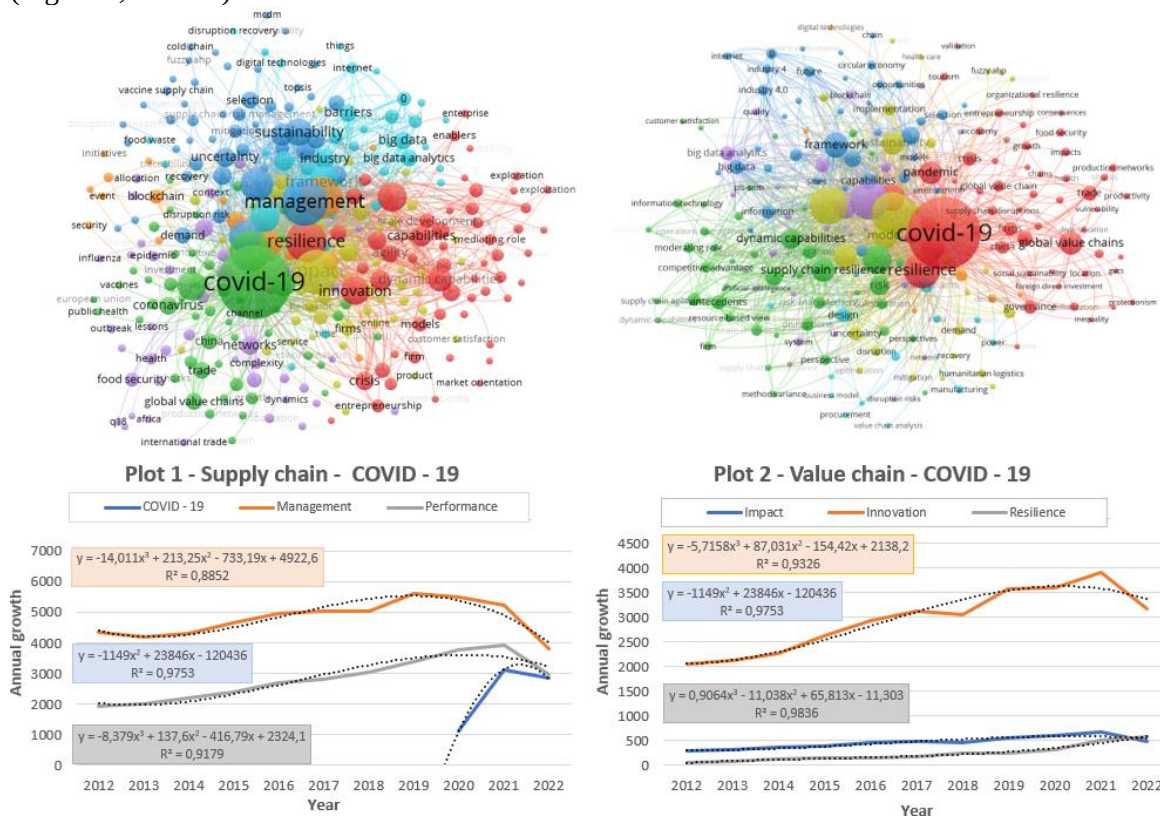


Figure 2. Graphic visualization from bibliographic analysis
Source: own processing

PICTURE 1	COLOUR	ITEMS	CLUSTER STRENGHT	FIELD
CLUSTER 1	Red	58	19,14 %	Resilience
CLUSTER 2	Green	53	17,49 %	Covid 19
CLUSTER 3	Blue	50	16,50 %	Management
CLUSTER 4	Yellow	48	15,84 %	Impact
CLUSTER 5	Purple	42	13,86 %	Framework
PICTURE 2	COLOUR	ITEMS	CLUSTER STRENGHT	FIELD
CLUSTER 1	Red	55	26,31 %	Covid 19
CLUSTER 2	Green	44	21,05 %	Supply chain
CLUSTER 3	Blue	38	18,18 %	Framework
CLUSTER 4	Yellow	27	12,91 %	Implementation
CLUSTER 5	Purple	23	11 %	Data

Table 2. Cluster table
Source: own processing

After completing the bibliographic analysis, 3 keywords were identified from each search that were closely related to the article's topic. If a keyword was repeated in both studies, the following keyword was used. The words identified from the first search were Covid 19 (518 occurrences), Management (205 occurrences) and Performance (164 occurrences). The second search yielded the words Impact (112 occurrences), Resilience (100 occurrences) and Innovation (64 occurrences). Once all keywords were identified, a second analysis was created to track the annual growth of publications with the keywords. This analysis is enriched with a transcription function and a measure of the accuracy of future trends. The analysis shows that the most used keyword is **Management**, and the least used is **Resilience** (Table 3).

Table 3. Search table

Author Keywords	WoS Categories	Results
Management	Management or Business or Economics	72 121
Innovation	Management or Business or Economics	44 618
Performance	Management or Business or Economics	42 350
Covid - 19	Management or Business or Economics	7 111
Impact	Management or Business or Economics	6 611
Resilience	Management or Business or Economics	2 815

Source: own processing

Hypothesis testing yielded several results. The first stage tested H0 and H1 and investigated changes in the importance of BSR over the course of COVID-19, across size and sectoral differentials. We observe micro enterprises, SME enterprises and finally, large enterprises according to size differentiation. We further visualize the sectoral differentiation where we differentiate the enterprises into primary, secondary and tertiary sectors (Figure 3).

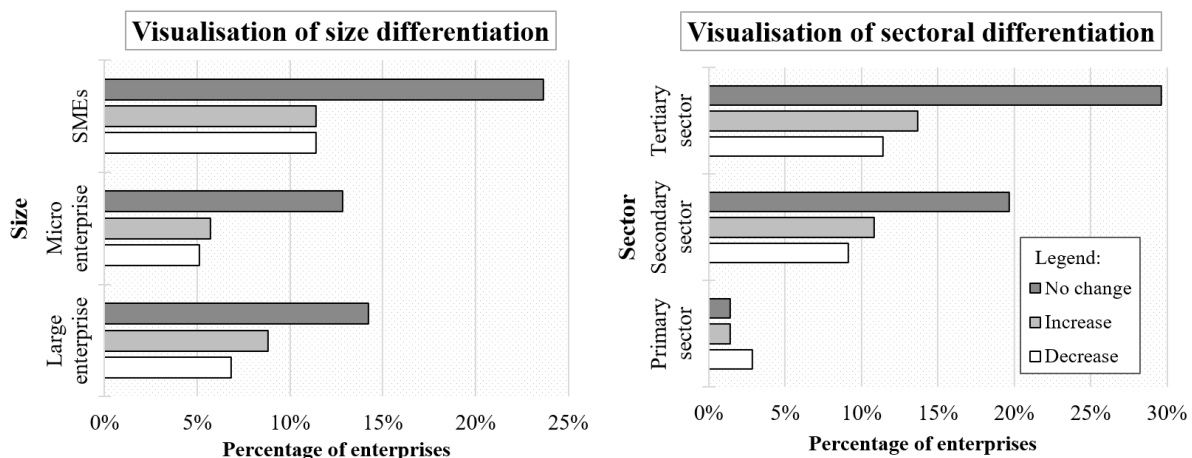


Figure 3. Result of sectoral and size differentiation of enterprises of the tested sample

Source: authors

The results show that the most dominant enterprises were those for which we identified a neutral importance of BSR during the COVID-19 pandemic. Regarding size differentiation, most enterprises were SMEs, followed by large enterprises and closely followed by micro-enterprises. Then, enterprises with an increase in the index of change in the importance of BSR dominated, again SMEs, followed by large enterprises and finally, micro-enterprises. Similarly, there was a decrease in the indicator of change in the importance of the BSR; we measured in SMEs, then large enterprises and micro enterprises. The indicator with no change in sectoral differentiation has its most frequent representation of the tertiary and then the secondary sector. We identified an increase in the importance of BSR again in the tertiary and secondary sectors. The decrease in change in importance was again greatest in the tertiary, then secondary and finally primary sector. Following this finding, our research was conducted to directly identify the mathematical and statistical differences between the

meanings of BSR change across the observed differentiations, specifically, the sectoral differentiation focusing on the service and industrial sectors (Figure 4).

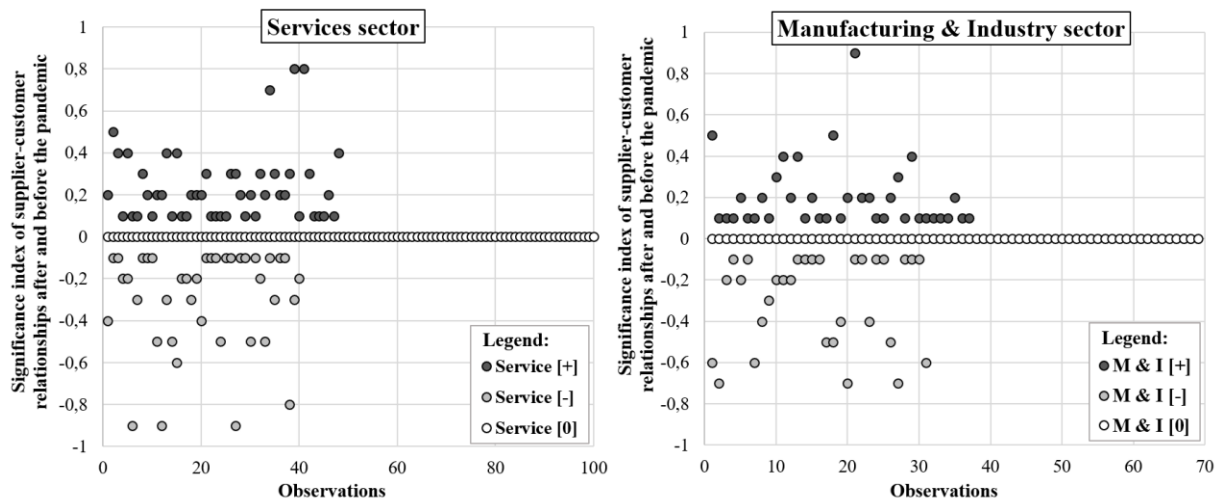


Figure 4. Manufacturing & industry and services sectors compared to the change significance index

Source: own processing

The results show that the unchanged change in BSR is strongly dominant across sectoral differentiation. In comparing the sectors we have studied, the manufacturing and industry sectors fare much better than the trade sector, as the measured nuances of change during the services pandemic resonated. We also indicated a larger standard deviation of the data here and, most importantly, we calculated a more significant proportion of outliers. In the positive vein of change in the BSR, the manufacturing and industry sector had a mean value of 0.27, whereas the service sector had a mean value of 0.25. In the negation of perceived importance, the service sector takes -0.37 while the manufacturing and industry sector takes -0.35. Hypothesis 1 was confirmed, and therefore, H0 was rejected. Thus, it can be concluded that due to the pandemic, there was an increase in the perceived importance of BSR in Czech enterprises. The implemented normality test confirms the validity of this conclusion. The second stage of the research focused on determining the factors that contributed to the growth in the perceived importance of BSRs during the COVID-19 pandemic. The results of testing hypotheses H21, H22, H23, H24, H25 are presented in the following Table 4.

Table 4. Result from ANOVA test

One-criteria ANOVA test					
Model I.	Impact of a change in BSR significance				
	Df	Sum Sq	Mean Sq	F value	Pr (>F)
H21: Size differentiation	4	0,96	0,2389	0,351	0,843
H22: Profitability	5	2,7	0,5397	0,796	0,553
H23: Territorial scope	3	2,05	0,6850	1,013	0,387
H24: NACE differentiation	9	8,84	0,9826	1,468	0,018.
H25: Sectors	3	6,18	2,0586	3,092	0,027.
Residuals	390	265,52	0,6808		

[Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1]

Source: own processing

Using one-factor ANOVA testing, hypotheses H24 and H25 were confirmed. On the other hand, hypotheses H21, H22, H23 were rejected. The association between NACE differentiation and change in BSR significance was confirmed. The results suggest that in industrial enterprises, the increase in the importance of the BSR due to the crisis is more noticeable than in service enterprises or retail and wholesale trade. Another confirmed

relationship is the link between the business sector and the change in the importance of SMEs during the crisis. Secondary sector enterprises were more likely to increase the importance of BSRs than primary and tertiary sector enterprises. The relationship between the size of the enterprise and the change in the importance of BSRs was not confirmed. Thus, the growing importance of SMEs is a recent trend for enterprises of all sizes. There is no link between the size of the enterprise and the change in the importance of SMEs during the crisis. The enterprises' scale (scope) did not influence the evolution (growth) of the significance of BSR. Based on the data examined, another relationship that was not confirmed was the association between profitability (HV before the COVID-19 pandemic) and the evolution of the importance of BSRs. That is, growth in the importance of BSRs is not related to the short-term economic efficiency of a particular enterprise.

The results of the literature search indicate a growing interest in supplier-supplier relationships. Research conducted by Bertello, Bogers, and De Bernardi (2021) finds a link between crisis periods and the increasing importance of supply chain and supply chain linkages.

The results of the primary research can be summarized as follows: there is a direct link between the outbreak of a pandemic and the growth of the importance of BSRs in the companies studied. Therefore, during other crises, the importance of BSR will also grow. This result is consistent with the research results of Chu, Tian and Wang (2019). The overall increase in importance is evident for the entire set of firms without sectoral differentiation. The profitability of the enterprise (HV before) did not affect the growth of the importance of BSRs during the pandemic; regardless of HV, enterprises perceived the growth of BSRs during the crisis period. Thus, based on the existing data, BSR belongs to the set of essential aspects of a successful business and, according to the evidence from practice, is one of the areas of achieving resilience in turbulent periods. Industry and sector impact the growing importance of supplier-customer relationships during pandemics. For industrial enterprises, the increase in the importance of SSCs during a pandemic is more evident than for service enterprises. Similar findings can be applied to sectors, i.e., the secondary sector shows a more remarkable growth in the importance of BSR than the tertiary sector. Thus, in the case of negative externalities (e.g. pandemics), BSR becomes more critical in material-oriented flows. In the research carried out, the relationship between the size of the enterprise and the change in the importance of the BSR was not confirmed. Therefore, the size of the enterprise did not affect the importance of the BSR. The growth of the importance of BSR during the crisis period is equally evident in micro, small, medium, and large enterprises. Scale (operation) did not affect the growth of the importance of CSR in the crisis period. This finding can be interpreted by saying that national, local (regional) and multinational companies took the same approach to assessing the importance of BSR during the crisis. Overall, the results of this thesis suggest that BSR, as part of the meso-environment, is perceived by companies as one of the key areas for achieving sustainable resilience in times of external turbulent negative influences. The literature search results provided a contrarian view of the research question related to the importance of BSR in the context of a pandemic. The primary research results confirm the study's findings (Bani Hani, 2022) regarding the growing importance of BSR and SCM. The results of the empirical research provide a comprehensive view of specific firm characteristics and their impact on the changing importance of SCMs. Thus, the research builds on the results of, for example, the research on the link between the analysis of the factors of SSC (sustainable supply chain) improvement during a pandemic and the factors necessary for SCM (Sharma et al., 2022) or the impact of digitalization on SCM performance (Hu, 2022). Overall, the paper provides a comprehensive view of the potential areas/characteristics that make an enterprise more responsive to external influences by changing the importance of SSC.

Conclusions

The growing interest in BSRs as part of the GHR concept is evident in academia and business. The main objective of this paper was to identify the trend of the importance of supplier-customer relationships in enterprises in the Czech Republic. This objective was fulfilled through primary quantitative research in Czech enterprises. The growing interest in BSR during the pandemic period was confirmed. Based on the study, factors that have contributed to more significant growth in the importance of BSR include the industry and business sectors. Recommendations for the target segment are linked to analysing individual BSRs and using tools to consolidate them, especially in times of crisis. A first-level BSR is essential in building a flexible and

robust supply chain. Industrial and secondary sector enterprises should continue to work hard to strengthen the BSR to achieve resilience in times of crisis. The findings have some limitations, primarily since our research focuses on short-term changes, so it is still being determined if the context will hold in the long term. The paper's own results set out several directions for future research. One interesting question is the effect of the growth in the importance of the BSR on the growth of the profitability of the firm (economic resilience in times of crisis). Another exciting direction is to establish the link between the digitalisation of BSRs and value chain efficiency.

References

- Adobor, H. (2019). Supply Chain Resilience: A multi-level Framework. *International Journal of Logistics Research and Applications*, 22(6), 533-556. <https://doi.org/10.1080/13675567.2018.1551483>
- Almeida, F., Duarte Santos, J., & Augusto Monteiro, J. (2020). The challenges and opportunities in the digitalization of companies in a post-covid-19 world. *IEEE Engineering Management Review*, 48(3), 97-103. <https://doi.org/10.1109/emr.2020.301320>
- Al-Hadi, A., & Al-Abri, A. (2022). Firm-level trade credit responses to covid-19-induced monetary and fiscal policies: International evidence. *Research in International Business and Finance*, 60, 101568. <https://doi.org/10.1016/j.ribaf.2021.101568>
- Armayah, Sumardi, Damang, K., & Munizu, M. (2019). *Supply chain collaboration and its effect on SMEs' competitiveness of seaweed business sector in Takalar Regency*. IOP Conference Series: Earth and Environmental Science, 235(1). <https://doi.org/10.1088/1755-1315/235/1/012015>
- Bag, S., Choi, T. M., Rahman, M. S., Srivastava, G., & Singh, R. K. (2022). Examining collaborative buyer-supplier relationships and social sustainability in the "new normal" era: the moderating effects of justice and Big Data analytical intelligence. *Annals of Operations Research*. <https://doi.org/10.1007/s10479-022-04875-1>
- Bani Hani, J. (2022). The influence of supply chain management practices on supply chain performance: the moderating role of information quality. *Business, Management and Economics Engineering*, 20(1), 152-171. <https://doi.org/10.3846/bmee.2022.16597>
- Bertello, A., Bogers, M. L. A. M., & De Bernardi, P. (2021). Open innovation in the face of the COVID-19 Grand Challenge: Insights from the Pan-European Hackathon 'Euvsvirus'. *R&D Management*, 52(2), 178-192. <https://doi.org/10.1111/radm.12456>
- Bhatti, W. A., Larimo, J., & Servais, P. (2020). Relationship learning: A conduit for internationalization. *International Business Review*, 29(3), 101694. <https://doi.org/10.1016/j.ibusrev.2020.101694>
- Corallo, A., et al. (2021). Cybersecurity challenges for Manufacturing Systems 4.0: Assessment of the business impact level. *IEEE Transactions on Engineering Management*, 1-21. <https://doi.org/10.1109/tem.2021.3084687>
- Czainska, K., Sus, A., & Thalassinou, E. I. (2021). Sustainable survival: resource management strategy in Micro and Small Enterprises in the rubber products market in Poland during the Covid-19 pandemic. *Resources*, 10(8). <https://doi.org/10.3390/resources10080085>
- Daghar, A., Alinaghian, L., & Turner, N. (2022). The role of cognitive capital in supply chain resilience: an investigation during the Covid-19 pandemic. *Supply Chain Management*. <https://doi.org/10.1108/SCM-09-2021-0457>
- Danielak, W. (2021). The impact of the COVID-19 pandemic on the activities of small enterprises on the example of business customers of a manufacturing company. *Management*, 25(1), 155-171. <https://doi.org/10.2478/manment-2019-0064>
- Del Giudice, M., et al. (2020). Supply Chain Management in the era of circular economy: The moderating effect of Big Data. *The International Journal of Logistics Management*, 32(2), 337-356. <https://doi.org/10.1108/ijlm-03-2020-0119>
- Hu, L. (2022). The PPE industry in Italy during Covid-19: supply chain disruption and the adoption of digital and social media in B2B firms. *Journal of Business and Industrial Marketing*, 37(10), 2050-2063. <https://doi.org/10.1108/JBIM-01-2021-0005>
- Fahimnia, B., Jabbarzadeh, A., & Sarkis, J. (2018). Greening versus resilience: A supply chain design perspective. *Transportation Research Part E: Logistics and Transportation Review*, 119, 129-148. <https://doi.org/10.1016/j.tre.2018.09.005>
- Greco, M., et al. (2022). Covid-19-related innovations: A study on underlying motivations and inter-organizational collaboration. *Industrial Marketing Management*, 106, 58-70. <https://doi.org/10.1016/j.indmarman.2022.07.014>

Grenzfurter, W., & Gronalt, M. (2020). Developing a continuous improvement perspective for subcontractor involvement in the industrialized housebuilding supply chain. *Supply Chain Management: An International Journal*, 26(2), 174-191. <https://doi.org/10.1108/scm-12-2019-0435>

Gölgeci, I., & Kuivalainen, O. (2020). Does Social Capital matter for supply chain resilience? the role of absorptive capacity and Marketing-Supply Chain Management Alignment. *Industrial Marketing Management*, 84, 63-74. <https://doi.org/10.1016/j.indmarman.2019.05.006>

Choi, N. (2019). Deeper regional integration and global value chains. *SSRN Electronic Journal* [Preprint]. <https://doi.org/10.2139/ssrn.3700722>

Chu, Y., Tian, X., & Wang, W. (2019). Corporate innovation along the supply chain. *Management Science*, 65(6), 2445-2466. <https://doi.org/10.1287/mnsc.2017.2924>

Khan, N. A., Ahmed, W., & Waseem, M. (2022). Factors influencing supply chain agility to enhance export performance: case of export-oriented textile sector. *Review of International Business and Strategy*. <https://doi.org/10.1108/RIBS-05-2021-0068>

Kim, J. (2022). Relationship between protecting innovation and R&D partners: Focusing on moderation effect. *Applied Economics Letters*, pp. 1-6. <https://doi.org/10.1080/13504851.2021.2019181>

Konečný, M., Kostiuk, Y., & Ruschak, M. (2022). Online reputation of business entities from the field of supply chain: an empirical study on the czech market. In IDIMT 2022 - Digitalization of Society, Business and Management in a Pandemic: 30th *Interdisciplinary Information Management Talks*, pp. 251-256.

Kubickova, L., et al. (2021). The implementation of industry 4.0 elements as a tool stimulating the competitiveness of engineering enterprises. *Journal of Competitiveness*, 13(1), 76-94. <https://doi.org/10.7441/joc.2021.01.05>

Lehtimäki, T., & Komulainen, H. (2021). Matching co-innovation project types to diverse customer relationships: Perspective of an industrial technology supplier. *International Journal of Innovation and Technology Management*, 18(1). <https://doi.org/10.1142/s0219877020500480>

Likens, A.D., et al. (2019). Statistical properties of Multiscale Regression Analysis: Simulation and application to human postural control. *Physica A: Statistical Mechanics and its Applications*, 532. <https://doi.org/10.1016/j.physa.2019.121580>

Linkov, I., et al. (2020). The case for value chain resilience. *Management Research Review*, 43(12). <https://doi.org/10.1108/mrr-08-2019-0353>

Lizbetinová, L., Hitka, M., Chenguang, Li., & Caha, Z. (2017). *Motivation of employees of transport and logistics companies in the Czech Republic and in a Selected Region of the PRC*. In O. Stopka (Ed.), MATEC Web of Conferences, Volume 134, 18th International Scientific Conference, LOGI 2017 (pp. 1-6). České Budějovice: EDP Sciences. ISSN 2261-236X. <https://doi.org/10.1051/mateconf/201713400032>

Mathu, K.M. (2019). The information technology role in supplier-customer information-sharing in the supply chain management of South African small and medium-sized enterprises. *South African Journal of Economic and Management Sciences*, 22(1). <https://doi.org/10.4102/sajems.v22i1.2256>

Mcwilliam, S.E., et al. (2020). Global value chain governance: Intersections with international business. *Journal of World Business*, 55(4), 101067. <https://doi.org/10.1016/j.jwb.2019.101067>

Mishra, R., Singh, R.K., & Subramanian, N. (2022). Exploring the relationship between environmental collaboration and business performance with mediating effect of responsible consumption and production. *Business Strategy and the Environment* [Preprint]. <https://doi.org/10.1002/bse.3240>

Monnagaaratwe, K.F., & Mathu, K. (2022). Supply Chain Management as a competitive advantage for grocery small and medium-sized enterprises in Mahikeng, South Africa. *Journal of Transport and Supply Chain Management*, 16. <https://doi.org/10.4102/jtscm.v16i0.791>

Moro, A., et al. (2018). Control in the era of surveillance capitalism: An empirical investigation of Italian industry 4.0 factories. *Journal of Industrial and Business Economics*, 46(3), 347-360. <https://doi.org/10.1007/s40812-019-00120-2>

Mukhtar, U., & Azhar, T.M. (2020). Inter-functional coordination to co-create value within integrated value chains for competitive supply chain. *Operations and Supply Chain Management: An International Journal*, 11-22. <https://doi.org/10.31387/oscm0400249>

Nauhria, Y., Kulkarni, M.S., & Pandey, S. (2018). Development of strategic value chain framework for Indian car manufacturing industry. *Global Journal of Flexible Systems Management*, 19(S1), 21-40. <https://doi.org/10.1007/s40171-017-0179-z>

- Nguyen, T., et al. (2018). Big Data Analytics in Supply Chain Management: A state-of-the-art literature review. *Computers & Operations Research*, 98, 254-264. <https://doi.org/10.1016/j.cor.2017.07.004>
- Oinonen, M., et al. (2018). In search of Paradox Management Capability in supplier–Customer Co-development. *Industrial Marketing Management*, 74, 102–114. <https://doi.org/10.1016/j.indmarman.2017.09.021>
- Owusu Kwateng, K., Kwakye, A., Tetteh, F.K., & Opoku-Mensah, S. (2022). Supply chain performance in the power distribution sector. *International Journal of Energy Sector Management*, 16(4), 659-679. <https://doi.org/10.1108/IJESM-11-2020-0012>
- Pereira, M.M.O., Silva, M.E., & Hendry, L.C. (2020). Supply chain sustainability learning: the COVID-19 impact on emerging economy suppliers. *Supply Chain Management*, 26(6), 715-736. <https://doi.org/10.1108/SCM-08-2020-0407>
- Pettit, T.J., Croxton, K.L., & Fiksel, J. (2019). The evolution of resilience in Supply Chain Management: A retrospective on ensuring supply chain resilience. *Journal of Business Logistics*, 40(1), 56-65. <https://doi.org/10.1111/jbl.12202>
- Qiu, T., & Yang, Y. (2018). Knowledge spillovers through quality control requirements on innovation development of global suppliers: The Firm Size effects. *Industrial Marketing Management*, 73, 171-180. <https://doi.org/10.1016/j.indmarman.2018.02.008>
- Sagapova, N., Dušek, R., & Pártlová, P. (2022). Marketing Communication and Reputation Building of Leading European Oil and Gas Companies on Instagram. *Energies*, 15(22). <https://doi.org/10.3390/en15228683>
- Santana, R., Moraes, G. H., & Hermes, S. (2021). Relational attractiveness between supplier-customer in a supply chain. *RAUSP Management Journal*. <https://doi.org/10.1108/RAUSP-09-2019-0202>
- Sarkis, J. (2020). Supply chain sustainability: learning from the COVID-19 pandemic. *International Journal of Operations & Production Management*. <https://doi.org/10.1108/IJOPM-08-2020-0568>
- Simatupang, T.M., Ginardy, R., & Handayati, Y. (2018). New Framework for value chain thinking. *International Journal of Value Chain Management*, 9(3), 289. <https://doi.org/10.1504/ijvcm.2018.093892>
- Sivula, A., Shamsuzzoha, A., & Helo, P. (2020). Requirements for blockchain technology in Supply Chain Management: An exploratory case study. *Operations and Supply Chain Management: An International Journal*, 39–50. <https://doi.org/10.31387/oscm0440284>
- Scarpin, M.R.S., Scarpin, J.E., Krespi Musial, N.T., & Nakamura, W.T. (2022). The implications of COVID-19: Bullwhip and ripple effects in global supply chains. *International Journal of Production Economics*, 251. <https://doi.org/10.1016/j.ijpe.2022.108523>
- Shahbaz, M.S., Rasi, R.Z.R., Ahmad, M.F.B., & Sohu, S. (2018). The impact of supply chain collaboration on operational performance: Empirical evidence from manufacturing of Malaysia. *International Journal of advanced and applied sciences*, 5(8), 64-71. <https://doi.org/10.21833/ijaas.2018.08.009>
- Sharma, M., Luthra, S., Joshi, S., & Kumar, A. (2022). Developing a framework for enhancing survivability of sustainable supply chains during and post-COVID-19 pandemic. *International Journal of Logistics Research and Applications*, 25(4-5), 433-453. <https://doi.org/10.1080/13675567.2020.1810213>
- Sodhi, M.M.S., & Tang, C.S. (2021). Supply Chain Management for extreme conditions: Research opportunities. *Journal of Supply Chain Management*, 57(1), 7-16. <https://doi.org/10.1111/jscm.12255>
- Ustyuzhanina, E. (2021). Digital Transaction Platforms: Ensuring their efficiency. *Economics and the Mathematical Methods*, 57(1), 5. <https://doi.org/10.31857/s042473880013023-4>
- Vahlne, J.-E., & Bhatti, W.A. (2019). Relationship development: A micro-foundation for the internationalization process of the multinational business enterprise. *Management International Review*, 59(2), 203-228. <https://doi.org/10.1007/s11575-018-0373-z>
- Van Eck, N.J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84, 523-538. <https://doi.org/10.1007/s11192-009-0146-3>
- Wieland, A., & Durach, C.F. (2021). Two Perspectives on Supply Chain Resilience. *Journal of Business Logistics*, 42(3), 315-322. <https://doi.org/10.1111/jbl.12271>
- Wieteska, G. (2020). The impact of supplier involvement in product development on supply chain risks and Supply Chain Resilience. *Operations and Supply Chain Management: An International Journal*, 359-374. <https://doi.org/10.31387/oscm0430276>

Wissuwa, F., Durach, C.F., & Choi, T.Y. (2022). Selecting resilient suppliers: Supplier complexity and buyer disruption. *International Journal of Production Economics*, 253. <https://doi.org/10.1016/j.iipe.2022.108601>

Yuki, S., & Takashima, K. (2020). The trickle-down effect of trust in business-to-business relationships: How can a supplier ensure cooperation from multiple customers? *Journal of Marketing Channels*, 26(3), 208-226. <https://doi.org/10.1080/1046669x.2020.1782800>

Zhang, G., et al. (2022). PolychoricRM: A Computationally Efficient R Function for Estimating Polychoric Correlations and their Asymptotic Covariance Matrix. *Structural Equation Modeling: A Multidisciplinary Journal*, 29(2), 310-320. <https://doi.org/10.1080/10705511.2021.1929996>

Funding: This paper has been prepared as a part of internal research competition at the department of management for 2022 entitled: “A new approach in the generation of corporate strategy based on the parameterization of business processes“. PID: IVSUPS004.

Data Availability Statement: Data available on request from the authors.

Author Contributions: Conceptualization: *Chytilová, Ekaterina*; methodology: *Chytilová Ekaterina*; data analysis: *Taliř, Milan, Jarmila Straková*, writing—original draft preparation: *Chytilová, Ekaterina, Straková, Jarmila*, writing; review and editing: *Chytilová, Ekaterina*, visualization: *Taliř, Milan*. All authors have read and agreed to the published version of the manuscript.

Ekaterina CHYTILOVÁ, Ph.D. is the Assistant Professor in Institute of Technology and Business in Ceske Budejovice. Research interests: Value Chain, Supply Chain, efficiency measurement.

ORCID ID: <https://orcid.org/0000-0002-8559-5669>

doc. Ing. Jarmila STRAKOVÁ, Ph.D. is the Vice-Rector for Strategy and Development, Associate Professor, Deputy Head of the Department of Management of the Institute of Technology and Business in České Budějovice, Czech Republic, Research interests: Strategic Management.

ORCID ID: <https://orcid.org/0000-0002-3048-3467>

Ing. Milan TALÍŘ is the Ph.D. student in Institute of Management, Faculty of Business and Management, Brno University of Technology. Research interests: Process management, Data analytics, Statistical modeling.

ORCID ID: <https://orcid.org/0000-0002-6510-1297>

Copyright © 2024 by author(s) and VSI Entrepreneurship and Sustainability Center

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>



Open Access