



# 2021 International Days of Science

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## Conference Proceedings

22nd and 23rd April 2021  
Moravian Business College Olomouc  
Olomouc, Czech Republic

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## FOREWORD



**assoc. prof. Jarmila Zimmermannová, Ph.D.**  
Rector of Moravian Business College Olomouc

„The IDS conference gives us the opportunity to discuss socio-economic issues related to COVID-19 as well as innovations in health care. Through multidisciplinarity, we can form new ideas and solutions to serious problems.“

### **What will this year's IDS conference be about?**

This year — the fifth year of the International Day of Science (IDS) conference — the focus will be on burning issues in the world today. Particular emphasis will be placed on the socio-economic impacts of COVID-19, spatial economics — spationomy, and innovation & sustainability in health care. However, it is not only the economic view that is essential, but rather multiple perspectives, or multidisciplinarity that can provide innovative solutions to individual issues.

### **What are your expectations and what will the conference offer?**

We expect the IDS to be an inspiration for further research and that it will open up the possibility of international discussion on innovative solutions. The online format can help us attract conference participants from around the world to ensure international diversity. Undoubtedly, the main benefit for the school as well a message for its partners is that MVSO accepts the current challenges of the digital and COVID-19 era and responds to them.

### **What progress has MVSO achieved in the field of science? What are its current / recent successes?**

MVSO is part of international scientific networks, and many members of the academic staff have developed active long-term partnerships with foreign universities. At the moment, MVSO is preparing to launch the Czech-Israeli Innovation and Partnership Centre, which will focus on innovation processes.

### **Has scientific research been affected in any way by the coronavirus pandemic?**

From the point of view of research and communication, the research work conducted by academic staff members has been affected minimally — digitalisation is now the new normal and, at MVSO, we see it this way as well. On the other hand, the pandemic significantly affected the perception of society and its needs. In this respect, the IDS conference organized by MVSO will also contribute to social discussion.

### **What does MVSO plan to achieve in the field of R&D in the future?**

First of all, we would like to focus on institutionalization of R&D at MVSO and stimulating the activities of international research teams. This corresponds with the main focus of R&D activities on innovation for sustainable development and health care. With respect to the business focus of MVSO, we will connect the R&D projects with practice.

## KEYNOTE SPEAKERS



**assoc. prof. Judit Sági, Ph.D.**

Budapest Business School, Hungary

Associate professor at Budapest Business School – University of Applied Sciences in Hungary, in the fields of private wealth planning, and project finance; with a teaching scope of Finance and Banking, Corporate Finance, Wealth and Tax Planning, and Management Accounting courses, mostly in English, in B.A and M.A levels. Leader of the Financial Services specialisation. Contributing member and leader of international academic projects.

Visiting professor, with track record in several European universities, mainly for full courses in Banking and Finance. Auditor and consultant with project management background.



**Dr. Lucia Morales**

Technological University Dublin, Ireland

Lucía is an academic that has worked at different Higher Education Institutions in Ireland, the UK and Spain gaining and in depth understanding of the main challenges faced by Third Level Institutions in the fields of Economics, Finance, Education and Online Education at undergraduate and postgraduate level. Lucía has made significant research contributions published in International Journals in the field of Economics, Finance and Education with more than 40 peer reviewed publications and more than 150 papers presented and International Research Conferences.

Lucía has developed modules at master and doctoral level and contributed to the design and development of programmes and authored course material at undergraduate, postgraduate and doctoral level. Engagement with Virtual environments and traditional learning and teaching. Lucía has supervised doctoral thesis with outstanding outcomes (successful supervised thesis – PhD (2) and DBA (2) thesis. Currently Lucía is supervising a team of 6 PhD and 7 DBA students at TU Dublin and University of Liverpool respectively.

Areas of expertise International Economics and Finance, Financial Economics, Time Series, Asian Studies, Emerging Markets, Economic and Financial Crises, Financial Markets Integration, Economic and Financial Contagion, Energy Economics and Commodity Markets, Economic Development, International Capital Markets, Education, Distance Learning, Critical Thinking and Self-regulated Learning. The outlined areas are just a general guideline.



**Ing. Petr Novák**

Koyo Bearings, Czech Republic

Petr Novak works in company Koyo Bearings Czech Republic s.r.o. since 2001. First three years he held a position as Finance Manager, afterwards he took positions of Logistics Manager, Production Manager and he became Plant Manager at 2008. In 2014 he became President of the company. In 2019 he joined the General Management of the Global Acceleration Team at JTEKT headquarters in Nagoya, Japan. Petr Novak is member of Board of Directors of Czech Republic Automotive

Association (AutoSAP), he is a Board member of Olomouc Chamber of Commerce, he is a member of Olomouc region committee for education and innovations. He teaches at Palacky University.

He graduated from university in Pennsylvania with two degrees in International Business and Finance and then he studied Master of Business Administration (MBA) in International Management at DePaul University in Chicago.

He is married and has three children. In his free time he travels and is active in sports – originally it was competitive swimming and now long distance running.

## OTHER RENOWN SPEAKERS



**assoc. prof. Jarmila Zimmermannová, Ph.D.**

Moravian Business College Olomouc, Czech Republic

Jarmila Zimmermannová is the rector of Moravian Business College Olomouc (MVSО) and an expert guarantor at the Department of Economics at the same institution. From 2003 to 2009, she held various positions at the Ministry of the Environment of the Czech Republic (MoE), most recently as the Deputy Director of the Department of Sustainable Energy and Transport, and the Head of the Department of Environmental Tax Reform and Transport. She represented the MoE in the OECD working group — Joint Meetings of Tax and Environment Experts. In terms of her professional activities, she focuses primarily on the issue of financial and economic tools for environmental protection, above all on ex-ante and ex-post analyses of economic tools for air and climate protection, such as environmental taxes and tradable emission allowances. She is the author of a number of scientific and professional articles as well as the *Ekologické zdanění a modelování jeho dopadů* (Environmental Taxation and Modelling its Impacts) monograph. Within the ERASMUS programme, she has lectured at foreign universities in Hungary (Budapest Business School), Germany (Hochshule Nordhausen, Duale Hochshule Villingen Schwenningen, Ruhr Universität Bochum) and Slovenia (University of Maribor).



### **Ing. Martina Tauberová**

Deputy Minister of Industry and Trade, Czech Republic

After graduating in 2000, she obtained international parliamentary internship in the German Bundestag and a scholarship from the University of Humboldt in Berlin. In 2001, she joined the Ministry of Foreign Affairs of the Czech Republic, where she worked on different diplomatic positions until 2019. Between 2002 and 2006, she served as political officer at the Czech Embassy in Washington. In 2006, she returned to the MFA and acted as Deputy Director for Southeastern and Eastern Europe until 2008. Between 2010 and 2014, she was special assistant to the 1st Deputy Foreign Minister, where she focused on European and transatlantic agenda. Between 2014 and 2019 she worked as a Head of the Economic and trade section at the Czech Embassy in Vienna. After returning in summer 2019, she joined the Ministry of Industry and Trade and since November 1, 2019 has been appointed Deputy Minister for EU affairs and Foreign Trade.



### **Dr. Ron Sabar, MD**

Founder & Chief Medical Officer at Sabar Health Israel, Israel

Dr. Ron Sabar founded Sabar Health, a Hospital at Home service, which provides care for approximately 1000 patients in several distinct home-hospital wards: Internal, Rehabilitation, Hospice and Psychiatry. All services are covered by national health insurance. His approach is reflected in a 2014 TedMed Talk „The right to die healed, if not cured.“ Dr. Sabar holds an MD from Ben-Gurion University and an MBA from INSEAD. He is a specialist in Family and Palliative Medicine.



### **assoc. prof. Lucie Sedmihradská, Ph.D.**

Prague University of Economics and Business, Czech Republic

Lucie Sedmihradská is an Associate Professor at the Department of Public Finance, University of Economics in Prague. She teaches public finance and local government financial management courses. Her research focuses on budgeting and budget transparency at both central and local government levels, local government finance and inter-municipal cooperation. She participated at numerous domestic and international research projects in these areas as both the primary researcher and a research team member. She is the primary researcher in the Czech part of the Open Budget Survey since 2005. She has published approximately two dozen journal articles and book chapters and a monograph on municipal budgetary process. She is actively involved in civic activities and frequently lectures on local government budgets for both the civil society and political parties. She serves as local government council member since 2016.



### **assoc. prof. Barbora Bühnová, Ph.D.**

Vice-dean for Industrial Relations, Faculty of Informatics,  
Masaryk University, Brno, Czech Republic

After receiving my PhD in computer science at Masaryk University in Brno, Czech Republic, in 2008, and spending the following year as a postdoc researcher at University of Karlsruhe and Research Center for Information Technology (FZI) in Karlsruhe, Germany, and later at Swinburne University of Technology in Melbourne, Australia, I now work as an associate professor at Masaryk University, Brno.

Next to my academic activities, I am a Co-Founding and Governing Board member of Czechitas, a non-profit organisation aiming at making IT skills more accessible to youth and women of any age. Besides, I am a member of multiple initiatives engaging more women in tech (e.g. Informatics Europe working group Women in Informatics Research and Education (WIRE), EU COST Action: European Network for Gender Balance in Informatics), devoted speaker and author of multiple research studies on the topic.



### **Linda Štucbartová, DES, MBA**

DIVERSIO s.r.o., Czech-Israeli Mutual Chamber of Commerce

Linda Štucbartová, DES, MBA, is an entrepreneur and the founder of the Czech-Israeli Women Accelerator project. In 2018 and 2019, she organized business missions to Israel for women. She is a member of the Executive Board of the Czech-Israeli Mutual Chamber of Commerce and she also heads the Research, Development and Innovations section. Moreover, she is a member of the Board for the Commercialisation at Charles University and an evaluator at the Technology Agency of the Czech Republic. She has been supporting women and interconnecting academia and business for more than 10 years now. In 2018, she launched her own company—Diversio. Her latest hobby concerns Empowered Self-Defense.

Currently, she works as an HR consultant, coach, mentor as well as the Director of the mentoring section at Business & Professional Women CR. She has been occupied with human resources and education for more than 10 years. In the past, she was employed at the Diplomatic Academy of the Ministry of Foreign Affairs of the Czech Republic, and, for instance, at ŠKODA AUTO.



### **Dr. Nicolai Moos**

Ruhr-Universität Bochum, Germany

Nicolai Moos holds his PhD from the Geomatics Group, Geography Department, Ruhr-University Bochum (RUB), Germany. He teaches GIS and Geovisualisation for bachelor students of various departments as well as object-based classification and processing with Google Earth Engine for master students.

His main research is focused on the field of Socio-Geomatics and environmental justice. In the spationomy project he is responsible for all topics around GIS.

# Conference Programme



## DAY 1 – 22. 4. 2021

8.30-8.45	<b>Opening</b>	Mgr. Jitka Lidaříková, dr. Tomáš Jelinek
8.45-8.50	<b>Opening Address</b>	Ing. Martina Tauberová, Deputy Minister of Industry and Trade
	<b>Socio-economic Impacts of COVID-19</b>	Chair: dr. Tomáš Jelinek
8.50-9.05	Home Hospital: The New Frontier	dr. Ron Sabar
9.05-9.20	COVID-19 as a Challenge for Multidisciplinary Approach in Socio-Economic Research	assoc. prof. Jarmila Zimmermannová
9.20-9.35	Case Study on Soft-Diplomacy. The Role of Czech-Israeli Chamber During the COVID-19 Crises	Linda Štucbartová, DES, MBA
9.35-10.05	The Reality of Global Imbalances and COVID-19	dr. Lucía Morales
10.05-10.20	Fiscal Federalism in the Czech Republic – What Did the COVID-19 Pandemic Change?	assoc. prof. Lucie Sedmihradská
10.20-10.50	ESG Approach and COVID-19 Era: Current Necessity and Future Opportunities	assoc. prof. Judit sógi
10.50-11.05	Why is useful for endocrinologists to master sonography of the thyroid gland? Challenges for multidisciplinary approach	doc. MUDr. Milan Halenka, Ph.D.
11.05-11.15	<b>COFFEE BREAK</b>	
	<b>Spatonomy Session</b>	Chair: dr. Vít Pászto
11.15-11.30	Towards Simulation Gaming in Spatial Economy	dr. Vít Pászto
11.30-11.45	Geo-Spatial Analysis of Population Density and Annual Income to Identify Regional Socio-Demographic Disparities	dr. Nicolai Moos
11.45-12.00	Introduction to Geomarketing	assoc. prof. Jaroslav Burian
12.00-12.15	Geomarketing – Increase the Performance of Sales Team with Analytical Maps	Ing. Jaroslav Poláček
	<b>12.20-13.00   Workshop on the same topic</b>	
12.15-12.30	The Role of Digital Technologies in Transforming Modern Societies (Directions, Risks and Protection Mechanisms)	assoc. prof. Barbora Bühnová
12.30-13.00	<b>LUNCH BREAK</b>	
13.00-13.15	<b>The Best Paper Awards</b>	assoc. prof. Jarmila Zimmermannová, dr. Michal Menšík
	<b>Business &amp; IT Session</b>	Chair: dr. Michal Menšík
13.15-13.45	Impact of COVID-19 on the Car Industry in the EU, CR, and on Koyo Bearings CR	Ing. Petr Novák
13.45-14.00	Circular Economy in Corporate Social Responsibility Strategies: Evidence from Non-Financial Reports of Russian Companies	dr. Yana Shokola, dr. Lyubov Khoreva
14.00-14.15	Influence of COVID-19 on Financing Business Activities: Lessons Learned from Self-Employed Persons	assoc. prof. Jarmila Duháček Šebestová, Ing. Pavla Pokorná, Ing. Petra Krejčí
14.15-14.30	Comparison the Anchoring Effect Application in Employee Management in Vysočina Region With Prague and Moravian-Silesian Region	dr. Omar Ameir, Ing. Mgr. Renáta Pavličková MBA
14.30-14.45	Optimized Production Technology (OPT) – Case Study of Implementation S-DBR Method	dr. Štefan Kolumber, dr. Michal Menšík
14.45-15.00	<b>COFFEE BREAK</b>	
15.00-15.15	Research of Cost Behavior and cost Behavior Models Design for More Efficient Cost Management	assoc. prof. Petr Novák
15.15-15.30	Business Schools and COVID-19 Challenges: Evidence from Selected European Countries	dr. Emil Velinov, assoc. prof. Pavel Štrach
15.30-15.45	Evaluation of Economic Impacts of Cyber Threats on Key Areas of the Information Environment	dr. Lukáš Pavlik, dr. Jiří Blahuta
15.45-16.00	Current Ransomware Trends	dr. Vladimír Šulc
16.00-16.10	<b>Closing remarks of the 1st Day</b>	dr. Michal Menšík

# Conference Programme



**DAY 2 – 23. 4. 2021**

**9.00-10.00 Maps in Business & Economy | Workshop** assoc. prof. Jaroslav Burian

**10.00-10.15 COFFEE BREAK**

## Ph.D. Session

**10.15-10.30** Socio-Economic Impact of COVID-19 and Hotel Security:  
A Research in Budapest Chair: Ing. Richard Šmilňák, MBA  
Bulcsú Remenyik, Bagdadi Ali

**10.30-10.45** The Reoccurring New Normal in Europe: An Early Comparison of  
the Last Two Crises Seen Through the Public Finance Perspective Richard Šmilňák, MBA

**10.45-11.00** Did Stay-at-Home-Orders Produced a Significant Effect on  
Consumer Spending and Employment in the US? Alexander Shemetev, Martin Pelucha

**11.00-11.15** Financial Instruments to Support the Bioeconomy in the EU Michaela Perunová, Jarmila  
Zimmermannová

**11.15-11.30** Managerial Decision-Making in Industrial Companies with  
Application of Queuing Theory for Management of Automatization  
and Industry 4.0 Projects Pavel Kološ, Jakub Závorka

**11.30-11.40 Closing remarks** Richard Šmilňák, MBA

## BUSINESS SCHOOLS AND COVID CHALLENGES: EVIDENCE FROM SELECTED EUROPEAN COUNTRIES

***Emil Velinov, Pavel Štrach***

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### **Abstract:**

COVID has impeded global education and triggered numerous challenges for private and public business schools worldwide. The paper sheds light on how selected business schools in Europe are tackling the COVID challenges to stay sustainable and keep the education process running. By investigating selected public and private business schools through quantitative analysis, the results indicate that the selected universities were significantly affected by COVID. However, at the same time, some opportunities have arisen for new avenues in terms of curriculum development, the introduction of new majors, and the development of virtual cooperation platforms connecting to different stakeholders in education and business. The paper draws on the fact that COVID forced the schools to internationalize abroad, but at home as well. Paper results show that regardless COVID crisis in education, students' perception is rather high and the business schools score high on implementation and enhancing digital platforms and tools.

### **Keywords:**

Business schools, COVID, challenges, European countries

JEL: I21, I25

### **Introduction**

As Bryant (2020) called it in his December reflection on BBC, the year 2020 will be remembered as a time when everything changed. The way of life we knew it before has changed. Merriam-Webster, an online dictionary and thesaurus service, proclaimed "pandemic" to be the word of the year. The dictionary users looked up the word quite frequently throughout 2020, with the most notable spike in dictionary traffic recorded on March 11, 2020, when the World Health Organization officially declared Covid-19 a global pandemic. Covid-19 outbreak beyond Chinese borders began as early as January 2020, with news starting to come from (Northern) Italy. Soon, the first wave hit hard countries such as Italy, Spain, UK or Belgium. The situation cooled off a little in the summer months in anticipation of the second wave in the fall, which brought an increase in death rates to countries in the entire region of Central and Eastern Europe (Holder et al., 2020), with Czechia and the Balkans reporting the highest toll rates (de Best, 2021). Just about any country in the world has been affected; regardless of proliferation rates, everybody has to adjust to the new reality.

The pandemic changed just about everything, and higher education is no exception. Academic literature has already presented several reports in fast-review (primarily open) journals about pandemic instructional strategies of higher education institutions from China (Bao, 2020), Greece (Karakis and Raikou, 2020), Russia (Almazova et al., 2020), Nigeria (Jacob et al., 2020), Saudi Arabia (Abdulrahim and Mabrouk, 2020), the Philippines (Abel Jr., 2020), UK (Mulrooney and Kelly, 2020) or India (Dutta, 2020) to name a few. Multi-

country and international comparative studies of higher education response to the pandemic have started to become available as well (e.g. Doghonadze et al., 2020; Aristovnik et al., 2020).

With the best intention to curb the spread of the infection, the initial reaction to the disease made universities close down campuses and move instruction quickly to a virtual space either by the decision of respective authorities or the university leadership's foresight. Traditionally, conservative higher education institutions were forced to rapidly rethink curricula for fully online offerings (Crawford et al., 2020). Programmatic leaders had to review the curriculum goals cautiously and make sure newly adopted teaching strategies were aligned with desired learning outcomes (Cahapay, 2020). Curriculum content was suggested to be either reduced or integrated, both approaches leading to a lower number of interaction hours spent per curricular unit (subject, course, module). The new set of (online) teaching skills needed to be quickly passed onto educators (Aristovnik et al., 2020), whether ICT or pedagogical skills (Espino-Diaz et al., 2020). Coursework assessment must have been adapted to suit the online modality (Cahapay, 2020). Everybody adopted and learned from various effective strategies for remote social interaction. Any human being is a social animal, and online communication speaks only to some (not all) human nature elements.

Teaching effectiveness (Mae-Toquero, 2021) and efficiency (Tang et al., 2020) have again become a focal point for educators and institutional management. Integrity and accountability are vital for online delivery (Blankenberger and Williams, 2020) as the educational sector caters to students, faculty, staff, businesses, and other stakeholder groups. The more significant societal impact of tertiary education has to be maintained regardless of the pandemic. As Burns (2020, p. 3) puts forward, the primary role of Covid-disrupted online education shall remain to be the greater responsibility for overall healthy (democratic) societal and social development "cultivating an ethos of guidance and support rather than punishment by grading, integrating learning between students to foster personal and intellectual community, or centring empowerment as a key learning outcome".

By no means, the disruption has required new research strategies and approaches, making it challenging for some currently running research projects to be executed as planned originally. Not only delivering to the promises made to (at that time) prospective students when stepping on their degree pathways but delivering to the expectations of all relevant stakeholder groups has been more challenging than before. Greater onboarding of stakeholders for both teaching and research has been one of the vital wake-up calls for business scholars published as a recent manifesto in the British Journal of Management (Beech and Anseel, 2020)

Depending on the institutional setup and infrastructure, higher education institutions have been using popular social media tools like Skype, WhatsApp, Google Meet, Telegram, YouTube Live or even Facebook (Jena, 2020) or somewhat more systematic educational platforms such as Blackboard, Moodle, Zoom, MS Teams or Google Classroom (Crawford et al., 2020) to run classes virtually. Some institutions initially allowed multiple platforms to be used at the instructor's discretion, whereas with the second wave of Covid-19, increasing institutions integrated their educational processes systematically and reduced the number of supported platforms.

The impact of the pandemic has been especially seismic (Fischer, 2020) for internationalization. International mobility has been dramatically disrupted (Bilecen, 2020), and an international study might be the long-term pandemic victim. Knight (2012) pledges for the ever more significant distinction between two interdependent pillars of internationalization: Internationalization Abroad and Internationalization at Home. Internationalization Abroad's actual vehicle is academic mobility consisting of students, educators, researchers, scholars, institutions, programs, curricula, courses, and course activities. Internationalization at home refers to introducing more systematic use of foreign language education and area studies, including comparative global, international, and/or intercultural perspectives. Whereas Internationalization Abroad has been suddenly put to a halt, the importance of Internationalization at Home increased (de Wit and Altbach, 2020).

## Methodology and data

Paper aim is to investigate how selected business schools are overcoming the challenges caused by the pandemic. Therefore, the paper measures business school performance through students' perceptions on them. For the study, we have conducted an online survey through Google Forms from September till December 2020 in four European countries by identifying five business schools. We have examined how selected business schools tackled the COVID challenge by collecting data from 134 students on the use of online platforms for teaching and learning. We have used the panel data to investigate how these business schools enhanced asynchronous and synchronous online teaching and learning platforms to overcome the harsh impact of COVID on the education process. The paper also explores how teachers and students' perception of business schools' internationalization and competitiveness has changed and how the institutions have used the pandemic as a challenge to boost and strengthen their readiness to provide high-quality education during the crisis.

The sample consisted of 134 students (80 females and 54 males) from Germany, the UK, the Czech Republic and Estonia.

The sample included 51 German students, 25 British students, 40 students from the Czech Republic and 18 students from Estonia. The average age of all participants was 22.7 years. The sample included bachelor (71 %) and master students (29 %). Most of them were enrolled in business-related study programs (92,5 %) and currently between their 1st (27,6 %) and 3rd semester (35,8 %). For the online study, we have used Likert scale from 1 to 7, where 1 means completely low perception and 7 is completely high perception among the students. The 7-Likert scale is a rigorous and precise tool for measuring and quantifying online surveying.

## Results and discussion

Based on the statistical operationalization, the results showed that all four business schools had adopted the latest online technology such as Microsoft Teams, ZOOM, CANVAS, and others swiftly to maintain high-quality teaching and learning process. Furthermore, the results show that the student's perception of their school is solid in terms of usage and innovativeness of enhanced teaching and learning technology. In addition, the paper results suggest that the overall international orientation is high across the selected business schools (see Table 1 below). Moreover, the paper results explicitly show that the selected business schools are positioned and perceived very well in students' eyes thanks to the relevant and corresponding quality-price ratio, overall students' evaluations, level of internationalization and level of innovativeness. These factors are very important for the sustainable development of the researched business schools, especially in the COVID era.

**Table 1: Students' perception of the business schools**

Evaluation Criteria	Mean	St.Dev.
Stable and reliable study conditions	5.179	1.516
Good tuition/learning/working climate	5.410	1.533
Friendliness and competent lectures	5.179	1.546
International orientation of the university	5.291	1.607
Innovativeness of the university	5.000	1.618

N=134, Likert scale 1-7, where 1 is completely dissatisfied and 7 is very satisfied

Source: own elaboration in SPSS, 2020

In terms of iCloud services usage and applicability, most of the students pinpointed that social platforms such as WeChat and YouTube are highly used in learning (see Table 2 below). Another positive perception across the selected institutions is that their curricula are constantly internationalizing due to different accreditations and local authorities' requirements for adopting international best practices and tools for increasing the impact of teaching and research overall quality.

Paper findings state that the utilization of technologies and tools such as Skype, ZOOM, Microsoft Teams, and others are emerging platforms across the selected European countries as it conforms to the educator providers and the learners.

**Table 2: Utilization of technology and tools for online teaching and learning**

Evaluation Criteria	Mean	St.Dev.
Utilization intensity of technologies & tools- online libraries from the university	3.784	1.916
Use of Internet search engines	5.993	1.229
Social media Portals	3.037	1.925
Video Channels	3.619	1.720
Community/Conference technologies	5.336	1.764
Cloud-based groupware for working together on tasks	4.418	2.255
Use of Whats App, WeChat,etc	5.560	1.809
Learning portals from the university	4.470	1.934

N=134, Likert scale 1-7, where 1 is completely dissatisfied and 7 is very satisfied

Source: own elaboration in SPSS, 2020

## Conclusion

The pandemic period has changed the entire perception of how learners and educators are enhancing technologies and tools for effective and efficient work. Furthermore, the paper confirmed that in the current and near future, the intensity of curriculum internationalization would only increase as more and more business schools across the world will be sustaining their efforts and resources to online and hybrid functioning by satisfying the diversified and demanding needs of the students. The paper withdraws on the fact that in the contemporary world of education, business schools are pushed and forced by the external turbulent environment to roll out strategies on digitalization, which involves high utilization of technologies and tools. Thus, it leads to increasing the competitiveness and adaptivity towards the constantly changing global education market. Another breakthrough in the positive students' perceptions on the selected business schools is the fact that the latter ones intensively have adapted in all lessons and seminars iCloud services and ad hoc appsy, which significantly helped to engage the educators and learners. is the fact that Concurrently, the business schools are building crisis management teams of IT specialists, administrators, and pedagogical staff, who can deliver high-quality work in a challenging period, which will only foster the schools and make them more competitive and attractive to different stakeholders.

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# CIRCULAR ECONOMY IN CORPORATE SOCIAL RESPONSIBILITY STRATEGIES: EVIDENCE FROM NON - FINANCIAL REPORTS OF RUSSIAN COMPANIES

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## **Abstract:**

Russian companies are involved in corporate social responsibility and sustainability for almost 20 years, being in trend with developed economies. However, the questions of Circular Economy have arisen in the corporate segment rather rare. The investigation of appearances the concept of Circular Economy in Russian business agenda is lacking. To contribute to filling this gap, the research of 96 non-financial reports of Russian companies was conducted. We investigate if companies incorporate the Circular Economy concept in their corporate social responsibility and sustainability agenda. If there any notification of using the term Circular Economy. The results show Circular Economy is not integrated into the corporate social responsibility agenda of Russian business, despite the existence of some Circular Economy practices in certain sectors of the Russian economy.

## **Keywords:**

Circular economy, corporate social responsibility, Russian business

## **JEL: Q1.**

### **1. Introduction.**

The question of equilibrium between environmental conservation and the deep focus of most countries on economic growth has risen for a long period now. The global debate on environmental conservation is being conducted both at the level of individual experts and at the level of national and international institutions (Martínez-Alier & Muradian, 2015), (COM 2019/190), (Pirgmaier, 2020). As a result of the discussion, the concept of sustainable development was created and it has been developed over several decades (De Jong & Vijge, 2020). Today, the question of sustainable development is not removed from the agenda of the world community, but rather is exacerbated in the new socio-economic conditions and is being implemented by many companies within the framework of corporate social responsibility (CSR) programs (Singh & Misra, 2021). The CSR concept, among other things, has already become an obligatory element in the practice of large Russian companies (Pletnev & Barkhatov, 2016). Among different attempts to deal with the growing problem are concepts of the functional economy (Stahel, 1984), industrial ecology (Lifset & Anex, 2009), the concept of industrial symbiosis, when waste from one enterprise is a resource for another (Chertow & Ehrenfeld, 2012), and many others. The circular economy (CE) model began to develop also as a possible response to environmental and social challenges.

The concept of the circular economy is based on the idea of maximum efficient use of the resources available to society and the minimum (at the level of necessary) removal from the natural environment (Calisto Friant, Vermeulen & Salomone, 2021). For many decades, landfills of solid household waste, dumps

of industrial enterprises, tailing dumps served as the main way of utilizing residual products of production and consumption. It is now clear that reusing, recycling, and recovering these resources can significantly reduce the burden on the environment (Sandin & Peters, 2018). In particular, in the context of the development of the concept of Sustainable Development in the UN, documents have been developed and adopted that are directly related to the development of "closed cycle" mechanisms in production and consumption.

We especially note the UN document declaring the transition to the circular economy. This document is aimed to create mechanisms to ensure a balance of environmental, social, and economic aspects of sustainable development of the world community (Resolution adopted by the General Assembly, 2015).

Russian researchers of the circular economy focus on the analysis of foreign experience (Ali, 2015); approaches to assessing the contribution of the circular economy to sustainable development (Wegner-Kozlova & Guman, 2020), as well as on the possibilities of using circular economy business models in practice (Valko, 2020). There are also some specific issues in the area of attention of scientists, however, our analysis showed that in the modern research field theoretical aspects of the circular economy are more in the focus of interest, this is typical both for the world practice of analysis and for the Russian research space. In general, the circular economy is understood today as a sustainable development initiative aimed at reducing the linearity of systems in the sphere of production and consumption. At the same time, there are different views on the circular economy as a new paradigm of social development. In recent years, a large number of publications have appeared on the theoretical aspects of the circular economy, which are generally grouped in several main aspects: consumption reduction and the integrated use of natural resources (Blomsma & Tennant, 2020), (Tunn, Bocken & Schoormans, 2018); reuse and recycling of the generated waste (Kuzmina, Prendeville & Charnley, 2018); ecological product design (Hartmann & Germain, 2015), zero-waste production and recycling of waste for further production (Zhou, Jiang & Liu, 2021).

The analysis allows us to assert that if in the foreign tradition, conceptual approaches to the circular economy are introduced into the practice of companies and are stimulated by the state, then in Russian practice we noticed that not all large companies that are already involved in the implementation of the CSR concept realize the need for a more active entry into a circular economy.

There are few researchers which investigate the presence of CE in business, also by studying CSR reports. Fortunati S., Martiniello L., Morea D. investigated the presence of CE in the cosmetic industry (Fortunati, Martiniello & Morea, 2018), Stewart R., Niero, M. concentrated on the fast-moving consumer goods sector (Stewart & Niero, 2018). The studies were also conducted in countries. Marco-Fondevila M., Llena-Macarulla F., Calla-Gaston S., Jarne-Jarne L.I. answered the question if circular economy policies are reaching organizations on the example of largest Spanish companies (Marco-Fondevila, Llena-Macarulla, Calla-Gaston & Jarne-Jarne, 2021).

In one of the few articles devoted to the analysis of the practical aspects of the application of the basic provisions of the circular economy, the results of the analysis of the real practices of European companies in the FMCG sector (fast moving consumer goods) are presented. The authors analyzed open reports on CS companies. The results show that most reports do not contain a clear definition of the circular economy, however, many companies implement principles of the circular economy in their activities. In reports, this activity is mainly associated with the idea of recycling and reusing resources, waste, packaging. The results obtained by R. Stewart & M. Niero indicate that the European business has not yet developed a stable practice of implementing this concept (Stewart & Niero, 2018).

The concept of a circular economy in the activities of large Russian companies, in contrast to the concept of social responsibility, has not yet found wide practical application. Meanwhile, it was suggested that several companies use this concept in their practical business practice with different levels of awareness. To understand the involvement of Russian companies in the circular economy two research questions were formulated:

Research question 1. Is there any notification of using the term circular economy in corporate social responsibility reports of Russian companies?

Research question 2. Is there any sectoral prepossession to be involved in the circular economy by Russian companies?

## 2. Methods

### 2.1. Sample definition

The sample of the companies is build using the Russian Union of Industrialists and Entrepreneurs database. It accumulates corporate social responsibility reports of Russian companies (RUIE, 2021). The database includes any type of sustainability reports in the Russian language, for example, integrated reports, social and environmental reports. The research was conducted in January 2021. We identified all CSR reports presented by the companies and industries released for the 2019 reporting year (the latest year presented). To select all possible mentioning of the circular economy concept we have searched also for synonyms for the circular economy in the Russian language. The term “circular economy” has four main ways of translations into the Russian language: «циклическая экономика» - tsiklicheskaya ekonomika, «циркулярная экономика» - tsirkulyarnaya ekonomika, «круговая экономика» - krugovaya ekonomika, «экономика замкнутого цикла» - ekonomika zamknutogo tsikla, all of them were searched in documents. We also aimed to explore which definitions do Russian companies use for the CE concept.

A total of 96 reports were retrieved. However, one report was removed from the sample – the downloaded document was empty, another was saved in the format which makes a search through document impossible. Some companies provided several reports, for example, social and environmental reports, or presented an independent report for every branch of the company.

The final sample includes 94 reports from 85 companies, presenting 16 sectors.

### 2.2. Analysis methodology

To answer the research questions, we analyzed the content of corporate social responsibility reports of Russian companies using content analysis approach. The exploring reports are in Russian language, so we used four synonymous of circular economy used in the Russian language. Occurrences were checked for relevance with circular economy, for example, for a reference to “recirculating water”, “life cycle” or “production loop”, which have similar roots in Russian, the occurrence was ignored for the purpose to understand do Russian companies use studied terminology.

The citations with mentioning of CE were aggregated. They were separated into categories: general statement and concrete activities as by (Steward and Niero, 2018). General statement should be understood as aspiration about CE or reference to regulatory act. Concrete activities are the actions undertaken to be companies in relation to CE.

The sectoral distribution is based on the final table, presenting the results of the sample analysis. In this case, we more concentrated on the number of companies that used CE than on the number of reports and checked its affiliation to the sector.

## 3. Paper results

### 3.1. Do companies mention CE in their non-financial reports?

The first outcome from the analyses refers to the presence of circular economy in some of the report. In 11 reports (out of 94) circular economy was mentioned in one of the possible translations. It means that at least 11 out of 85 companies already familiar with the concept (the total number of companies differs from the total number of reports, as it was explained in section 2 Methodology). It represents 13% of studied

Russian companies. The company which had at least one mention of CE in CSR report are Coca-Cola HBC Russia, Fillip Morris International, State Research centre – The research institute of nuclear reactors, Sistema, Leroy Merlin Russia, Nestlé Russia, M.Video, NLMK, Polimetall, Sibur-Group, Enel Russia.

Not all of the four offered translations of the term ‘circular economy’ were used proportionally in the reports. An interesting finding for the future CE research in Russian literature: the most used collocations standing for CE in the reports were «экономика замкнутого цикла» - ekonomika zamknutogo tsikla and «циклическая экономика» - tsiklicheskaya ekonomika, meanwhile the term «круговая экономика» - krugovaya ekonomika was not mentioned even once.

To understand better the business involvement in CE we analyzed not only the fact of mentioning the concept but also the frequency of its usage. An interesting case was found in the report of State Research centre – The research institute of nuclear reactors from the energetic sector: there were 4 mentionings of the concept, but all of them linked to the Ministry of ecology and circular economy of the region, the company participated in events and used regulatory acts, but there was no evidence from showing interest from the side of the company.

Mostly the CE was mentioned from 1 up to 4 times in 9 cases. In one company (Enel Russia) we have found 6 mentions. And only one company (Sibur-group) provides a totally dedicated report to CE, it has more than 50 mentions of the circular economy concept.

The preliminary analysis shows that mainly Russian companies do not explicitly state their CE strategies, showing a more traditional business model, which corresponds with international practice (Marco-Fondevila and others, Steward and Niero).

Company division based on the general and concrete activities shows that mostly companies state themselves as active participants of CE implementing:

- “We invest heavily in innovative technologies for the development of waste-free areas to bring the circular economy closer. Elena Kovaleva, Manager for Sustainable Development and Community Relations, Coca-Cola Soft Drink Consulting LLC” - Coca-Cola, p. 98;
- “The Sistema JSFC Group of Companies is actively introducing bioenergy and circular economy technologies... the basic principles of this approach are based on the processing of secondary raw materials, the transition from fossil fuels to the use of renewable energy sources - Sistema report, p. 80;
- “Nestlé joins forces with other companies and authorities to fight environmental pollution. The company signed The New Plastics Economy Global Commitment (“Global Commitment”) at the Ocean Conference in Bali, Indonesia. Its goal is to reimagine the future of plastics in a circular economy that does not waste plastics” - Nestlé Russia, p. 27;
- “100% of the products of the Group's enterprises can be recycled and returned for processing. About 25% of the smelted steel is provided through the use of ferrous scrap. Thus, the production of NLMK Group enterprises is part of a circular economy” - NLMK report, p. 96;
- “Our goal is to move to the 3R cyclical economy model: “reduce - reuse - recycle”. First, we reduce the number of materials used in technological processes (drilling, mining, grinding) without losing quality. Secondly, we strive to maximize the use of overburden for backfilling of underground workings or as building materials at our own production sites” - Polimetall report, p. 22;
- “In shaping the “sustainability” of our portfolio, we focus on circular economy principles, striving for efficient use of resources at every stage of the value chain” - Sibur-Group, p. 51;
- “We are introducing circular economy principles. They aim to close the resource cycle by implementing measures that cover the entire life cycle of products and materials, from consumption to waste management and reuse as secondary raw materials” - Enel Russia, p.68.

Three companies out of eleven had the general statement of CE: showed a link to the regional state government, world trends and questions of international policy, results of the questionnaires.

### 3.2. Sectoral differences in using the circular economy concept

Our research shows that 87% of the companies had no specific reference to CE in their reports (see Figure 1), although the low number of companies in some sectors limits the statistical value of the result. Especially relevant appears to be the manufacture of food and other consumer goods (75% of reports consist mentioning of CE), retail (40%), energy (18%), chemical, petrochemical, perfumery (14%), finance, and insurance (13%) and metallurgical and mining (13%). However, we should notice that the results obtained up to this stage are not statistically representative due to the small size of the sample.

In the following sectors, the most amount of CSR reports were introduced (see Figure 1) metallurgical and mining (16 reports), energy (11), and oil and gas industries (9).

**Figure 1: Sectoral distribution of the sample, mentioning of CE**

Industry	Companies	Reports	Companies with mention of CE	% companies with mentions to total
Manufacture of food and other consumer goods	4	4	3	75%
Retail	5	6	2	40%
Energy	11	16	2	18%
Chemical, petrochemical, perfumery	7	8	1	14%
Finance and insurance	8	8	1	13%
Metallurgical and mining	16	17	2	13%
Woodworking, pulp-and-paper	1	1	0	0%
Housing and utilities	2	2	0	0%
Non-profit organization	4	4	0	0%
Oil and gas	9	10	0	0%
Industry reports	1	1	0	0%
Manufacture of machinery and equipment	3	3	0	0%
Construction	1	1	0	0%
Telecommunication	7	7	0	0%
Transport and road	3	3	0	0%
Other types of services	3	3	0	0%
Total	85	94	11	13%

We have noticed that there is no correlation between the total number of the reports on the sector and the number of references to the circular economy, this may state that there are some dependence of involvement in CE and sector.

### 4. Discussion

The previous analysis is used to answer the research questions: do companies mention circular economy in their non-financial reports, and what is the sectoral differences in using the circular economy concept.

The conducted research of using circular economy by Russian companies has shown that more than every 10<sup>th</sup> Russian company which provides non-financial report considers itself as a part of the circular economy or has an intention to become it. The article from international colleagues shows similar results – not every company is involved in the circular economy, but the percentage of these companies is higher in

their reports. If we look closely at Russian companies which are involved in CE we could notice, that almost half of them (Coca-Cola HBC Russia, Fillip Morris International, Leroy Merlin Russia, Nestlé Russia, Enel Russia) represents international companies.

Figure 1 represents the state of art of attitude of companies in Russia to the circular economy with division into industries. As we see manufacture of food and other consumer goods is leading in the list by the absolute and relative measures. The leading of mentioning CE in the report of manufacture of food and other consumer goods and retail provide an idea that consumers are the drivers for companies to look deeper in sustainability challenges and rebuild their business models to fulfill consumer requests.

## 5. Conclusion

The main aim of this paper was to investigate if Russian companies incorporate circular economy in their business agenda and reflect it in non-financial reports. Our analysis shows that Russian companies are familiar with concept of circular economy, however only few of them mention the concept in the reports, and in most cases, those mentions are presented as a single reference. Nevertheless, in two cases we observed deep understanding of the concept, which means that companies which operate in Russia might have started its transformation into circular economy representatives.

These analyses might be extended to foreign companies to observe and compare attitude to circular economy in international level. Also including in sample reports of previous years will show the dynamic patterns. Further research might show of other companies are involved in international business, which might give us an understanding of motives and possible mechanisms of diffusion CE concept among Russian companies.

The interpretation of results must consider the limit of a research methodology based only of secondary sources (non-financial reports). Also, semi-structured interviews or questionnaires might be used to deepen our knowledge of the business approaches to circular economy.

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# COMPARISON THE ANCHORING EFFECT APPLICATION IN EMPLOYEE MANAGEMENT IN VYSOČINA REGION WITH PRAGUE AND MORAVIAN-SILESIAN REGION

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## **Abstract:**

The paper deals with behavioural economics and the enterprises with 100+ employees. More precisely, the paper focuses on the degree of the anchoring effect, i.e. the degree of the use of the instruments for influencing and persuasion that managers apply to manage their employees. This paper builds on the results of previous research and further develops these results. The authors used the questionnaire to identify how much the anchoring effect is applied in enterprises with 100+ employees. The main goal of the paper is to compare the anchoring effect application in employee management in Vysočina region with two regions which are Prague and Moravian-Silesian region. The comparison applies to enterprises with 100+ employees. The second goal of the paper is to find out how often the anchoring effect is used in the Vysočina region. The authors set one hypothesis and the results of the paper rejected it.

The basic assumption led the authors of this paper to this research. The authors predicted that managers of Vysočina region companies use anchoring methods less often than both the managers of Prague companies and the managers of Moravian-Silesian region companies. Confirmation or rejection of the above mentioned assumption is discussed in more detail.

## **Key words:**

Consumer's behaviour, behavioural economics, anchoring effect, enterprises with 100+ employees, nescience of the anchoring.

**JEL: D01, D19, D91**

## **1. Introduction: The previous research, behavioural economics and behavioural management**

This paper builds on the results of previous research and further develops these results. About two years ago, research in the field of behavioural management was conducted. This research had two basic goals. The first goal of the paper was to find out how much the managers of enterprises with 100+ employees use the anchoring effect to anchor their employees. The second goal of the paper was to determine whether managers of Prague companies with 100+ employees use anchoring effect more often than managers of Moravian-Silesian region companies with 100+ employees.

The authors predicted that anchoring effect for influencing employees are used much more often than is assumed. The authors also predicted that managers of Prague companies use anchoring methods more often than managers of Moravian-Silesian region companies.

The results of this research showed that:

- the managers in Czech Republic still do not use the anchoring effect too often;
- that if managers know and use the anchoring effect, they use it relatively often;
- that the level of the application of the anchoring effect is higher in Prague than in Moravian-Silesian region;
- the difference in the use of anchoring effect between Prague and Moravian-Silesian region is not very significant.

More detailed values from previous research will be seen in the third chapter of this paper.

The authors also stated that it is possible to carry out similar research in other cities. In their conclusions, the authors literally stated: "The results of the research provide further support for the understanding the anchoring effect, in particular in the awareness of the anchoring effect and its intensity of use. In the future, it is possible to carry out similar research in other cities of the Czech Republic or abroad. Authors believe that this simple research will help initiate further research in this interesting field of behaviour economics."

As mentioned, the paper deals with the issue of behavioral economics. It is therefore necessary to define this scientific discipline theoretically.

The discipline of behavioral economics challenges much conventional economic thought – which works on the basis that, overall, humans make rational decisions – by focusing instead on the ‘irrational’ cognitive biases that affect our decision making. These seemingly inbuilt biases mean that certain kinds of economic decision-making are predictably irrational. (Egan, 2017). Behavioral economics incorporates ideas from psychology, sociology, and neuroscience to better predict how individuals make long-term decisions. Often the ideas adopted include present or inattention bias, both potentially leading to suboptimal outcomes. (French and Oreopoulos, 2017). Principles of behavioral economics are implemented in researches in praxis, e.g. home dinner vegetable (Leak et al., 2017).

We learn of all-too-common issues of self-control and overconfidence vis-a-vis money, and how these irrationalities influence financial markets where rational choices are supposed to reign. Thaler (Thaler, 2016) builds on Nobel-prizewinning psychologist Daniel Kahneman’s prospect theory, the idea that people make decisions on the basis of quick judgments rather than a thorough assessment of the probable outcome. (Contestabile, 2015)

Some authors (Oliver, 2015) attempt to bring a degree of intellectual clarity to the potentially important contribution that behavioural economics can make to public policy.

Knowledge of behavioural economics is widely used in marketing, authors (Parsons, Maclaran, and Chatzidakis, 2018) successfully link marketing theory with practice, locating marketing ideas and applications within wider global, social and economic contexts. Tversky and Kahneman did experiments and found out that people do not act only by logic thinking. Their behavior and decisions are influenced intuitive reaction and mental state (Tversky and Kahneman, 2016). These authors together with Thaler contributed to an establishment of two new fields of study, experimental economics, and behavioural economics. Both of them are on the border of psychology and economics. There are many new hypotheses in the science of behavioural economics and at the same time, the behavioural economics evaluates, how the results of the decision are influenced by decision process and external influences. The current research in this field of study is focused on two areas. In the first one, the research identifies and segments deviations from the rational choice theory. We can call them systematic failures in individual behaviour based on various mistakes in the decision-making process. The second area then deals with this distortion in practice and in the market environment (Wright and Ginsburg, 2012).

We use knowledge from above-mentioned fields for a small questionnaire to find out and verify an anchoring effect. The anchoring is called also focalism and means a form of cognitive bias for an individual to rely too heavily on an initial piece of information offered when making decisions.

The reason why the authors deal with this issue, it means whether the respondent must not know that he is anchored, is based on the basic conditions of behavior economics. In general, two conditions of anchoring effect are listed in specialized publications. They are the demand of comparison the judgment with the anchor and the nescience of the solved problem. The third condition, it means the nescience of the anchor, is not mentioned in specialized publications.

## 2. Methods: Fundamentals for the next chapter

The main goal of the paper is to compare the anchoring effect application in employee management in Vysočina region with two regions which are Prague and Moravian-Silesian region. The comparison applies to enterprises with 100+ employees. Authors set the following hypothesis:

H1: Managers of Vysočina region enterprises with 100+ employees use anchoring effect 20 % less often than both the managers of Prague enterprises with 100+ employees and the managers of Moravian-Silesian region enterprises with 100+ employees.

As it is visible, first, the main goal and the hypothesis of the research was presented. The individual methods applied in this paper will be now described, ie the questionnaire survey and the anchoring effect.

### 2.1. Questionnaire

The paper is based on quantitative research using a questionnaire survey. Data for the research was obtained through an online anonymous questionnaire survey that was realized since the 27th of October till the 18th of December, 2020. The original deadline for the collection of responses was set on the 4<sup>th</sup> of December. Due to the relative small number of responses, the duration of the questionnaire survey was extended till the 18<sup>th</sup> of December.

The questionnaire was sent to 91 enterprises with 100+ employees in Vysočina region and its surroundings. The questionnaire was sent to the responsible management of the selected enterprises. The authors wanted to achieve a high rate of return, so the questionnaire was created to take only about three minutes to complete.

### 2.2. Knowledge of sophisticated management methods

An important parameter for fulfilment of the goal of the paper is the assumption that knowledge of sophisticated management methods will be higher in an economically more advanced region than in a less developed region. That's what the authors (Isard, Aziz, Drennan, Miller, Saltzman & Thorbecke, 2017) talk about. They describe the expectations of a higher level of managerial skills and knowledge in regions depending on the growth of two factors. The two factors are the size of the gross domestic product (GDP) by region and the number of enterprises with 100+ employees with the registered office in the region.

According to the CZSO, the gross domestic product in Prague in 2019 was approximately CZK 1,577,000 million CZK. In Moravian-Silesian Region, this value was about CZK 516,000 million CZK. In Vysočina region, this value was only about CZK 221,268 million CZK.

Table 1: GDP development in selected years

GDP development in selected years in mil CZK	2015	2016	2017	2018	2019
Prague	1 235 668	1 292 589	1 374 988	1 487 999	1 576 699
Moravian-Silesian region	434 859	449 737	470 767	499 986	516 237
Vysočina region	180 763	187 295	200 238	205 678	221 268

Based on the study of the same source (CZSO), it can be stated that in 2019 the number of Enterprises with 100+ employees was about 248 in Prague and about 253 in Moravian-Silesian region. There were about 146 such enterprises in the whole Vysočina Region in 2019.

The above connections are the reason why the hypothesis assumes the lowest level of use of the anchoring effect in the Vysočina region. The Vysočina region therefore has the smallest parameters, both GDP and the number of enterprises with 100+ employees. Thus, there are prerequisites for the least knowledge and use of complex management methods.

The reasons why the above values are taken only until 2019 are the following:

- hypotheses from this research and from previous research were drawn up at the beginning of 2020;
- in 2020, all economic data were affected by the pandemic;
- the time period is not important at all (a long-term view for creating the hypothesis is essential).

### 2.3. How does the anchoring effect work?

By definition, the anchoring effect is a heuristic where initial exposure to a number serves as a reference point. This number then influences later judgments about value. Simply stated, once an anchor is set, other judgments are made in reference to the anchor. Once the anchor has been established, we evaluate whether it's high or low and then we adjust our estimate to that amount. This mental process finishes early because we are not sure of the real amount. Therefore, our estimation is not usually far from the anchor. We have a huge tendency to use small pieces of information that we are offered to trigger decisions and estimates. The authors (Strack and Mussweiler, 1997) showed that the strength of the anchor effect depends on the applicability of activated information. Other authors (Furnham and Boo, 2011) review 40 years research on this very robust finding which occurs with many different judgments.

Basic anchoring occurs if people pay sufficient attention to the anchor value. Knowledgeable people are less susceptible to basic anchoring effects. Anchoring appears to operate unintentionally and nonconsciously in that it is difficult to avoid.

Anchoring effect has widespread influence, including on professionals who are well-educated on the related topic.

## 3. Paper results

As mentioned above, the questionnaire was sent to 91 enterprises with 100+ employees in Vysočina region. The 36 managers from Vysočina region sent back the completed questionnaire. Thus, the rate of return was approximately 39.6 %. The questionnaire survey also included a brief explanation of the anchoring effect.

It is evident that the authors of the paper achieved a relatively high rate of return on completed questionnaires. The authors assume that the reasons for this high rate of return are in particular fact that:

- the duration of the questionnaire survey was extended till the 18th of December;
- the questionnaire was created to take only about three minutes to complete.

Both of these reasons have been mentioned in the research methodology. These reasons are given here only for the presumed explanation of the high rate of return on the completed questionnaires.

### 3.1. The description of the required research data

The established hypothesis is: "Managers of Vysočina region enterprises with 100+ employees use anchoring effect 20 % less often than both the managers of Prague enterprises with 100+ employees and the managers of Moravian-Silesian region enterprises with 100+ employees". The values of the use of the

anchoring effect from Prague and the Moravian-Silesian region are determined from previous research and are as follows.

**Table 2: The application of the anchoring effect in Prague and in the Moravian-Silesian region**

The application of the anchoring effect	Values			
	Did not use	Rarely and irregularly	On average once a month	on average at least twice a month
Prague	37,2 %	27,9 %	20,9 %	14 %
Moravian-Silesian region	42,9 %	31,4 %	14,3 %	11,4 %
<b>Total (arithmetic average)</b>	<b>40,05 %</b>	<b>29,65 %</b>	<b>17,60 %</b>	<b>12,70 %</b>
<b>Total (weighted average)</b>	<b>39,75 %</b>	<b>29,47 %</b>	<b>17,93 %</b>	<b>12,83 %</b>

Therefore, data from the Vysočina region are needed to verify the established hypothesis.

The most important results, which confirmed or refuted the established hypothesis, related to the knowledge of the anchoring effect and to the intensity of use of the anchoring effect. Managers who knew the anchoring effect had four choices. The first was that they did not use the anchoring effect to influence their employees. The second option was that they used an anchoring effect sometimes, but they used it very rarely and irregularly. The third option was that they use the anchoring effect on average once a month. The fourth option was that they use the anchoring effect on average at least twice a month.

It was offered to give respondents more options for answering. Finally, the authors decided to give respondents only four options for answering because:

- the solved problem is still relatively unknown;
- the authors wanted to achieve a high rate of return.

### 3.2. The results of the enterprises with 100+ employees from Vysočina region

1. The knowledge of the anchoring effect:
- the 32 managers know the anchoring effect (out of 36 managers).

This question was not important to verify the hypothesis. The significance of this question was only to slightly manipulate the respondents and thus achieve credible answers in other questions. Nevertheless, let's show a comparison of the Vysočina region with Prague and Moravian-Silesian region.

**Table 3: The knowledge of the anchoring effect**

The knowledge of the anchoring effect	Values	
	Yes	No
Prague	89,6 %	10,4 %
Moravian-Silesian region	89,7 %	10,3 %
Vysočina region	88,8 %	11,2 %
<b>Arithmetics average</b>	<b>89,36 %</b>	<b>10,64 %</b>
<b>Weighted average</b>	<b>89,43 %</b>	<b>10,57 %</b>

It can be assumed that the values in table 3 are influenced by the effort of managers to show that they know sophisticated management methods. Real results would be probably worse. However, this fact is not the subject and purpose of this paper.

## 2. The application of the anchoring effect:

- the first option (did not use the anchoring effect to influence their employees) = the 14 managers;
- the second option (used an anchoring effect sometimes, but they used it very rarely and irregularly) = the 12 managers;
- the third choice (use the anchoring effect on average once a month) = the 3 managers;
- the fourth option (use the anchoring effect on average at least twice a month) = the 3 managers.

### 3.3. The evaluation of the results

The authors evaluated a lot of context. Only those contexts that are decisive in relation to research hypothesis will be presented.

- Approximately 88,8 % of managers of the enterprises with 100+ employees in Vysočina region know the concept of anchoring effect (32 out of 36).
- Approximately 56,25 % of the managers of the enterprises with 100+ employees in Vysočina region have ever tried the anchoring effect or use it regularly (18 out of 32).
- Approximately 37,5 % of the managers of the enterprises with 100+ employees in Vysočina region used an anchoring effect sometimes, but they used it very rarely and irregularly (12 out of 32)
- Approximately 9,38 % of the managers of the enterprises with 100+ employees in Vysočina region use the anchoring effect on average at least once a month (3 out of 32).
- Approximately 9,38 % of the managers of the enterprises with 100+ employees in Vysočina region use the anchoring effect on average at least twice a month (3 out of 32)

**Table 4: Comparison the anchoring effect application in Vysočina region with Prague and Moravian-Silesian region**

The application of the anchoring effect	Values	
	Use anchoring effect (companies that know this effect)	Use anchoring effect (all incoming responses)
Prague and Moravian-Silesian region (weighted average)	60,25 %	54,02 % (another result from the previous research)
Vysočina region	56,25 %	50 %
Percentage difference (converted to percentages from percentages)	6,63 %	7,44 %

We can find the result for verifying the hypothesis and thus the result for fulfilling the main goal from table 4. Both values of the percentage difference are less than 20%. **The hypothesis is therefore rejected.**

**Table 5: The rate of using the anchoring effect in the Vysočina region**

The application of the anchoring effect	Values			
	Did not use	Rarely and irregularly	On average once a month	on average at least twice a month
Prague and Moravian-Silesian region (weighted average)	39,75 %	29,47 %	17,93 %	12,83 %
Vysočina region	43,75 %	37,5 %	9,38 %	9,38 %
<b>Total (arithmetic average)</b>	<b>41,75 %</b>	<b>33,49 %</b>	<b>13,66 %</b>	<b>11,11 %</b>
<b>Total (weighted average)</b>	<b>40,91 %</b>	<b>31,81 %</b>	<b>15,44 %</b>	<b>11,83 %</b>

Table 5 shows the rate of using the anchoring effect in the Vysočina region. This fulfills the second goal of the paper.

#### 4. Discussions

The main goal of the paper was to compare the anchoring effect application in enterprises with 100+ employees in Vysočina region with enterprises with 100+ employees in two regions which are Prague and Moravian-Silesian region. The authors predicted that managers of Vysočina region companies use anchoring methods less often than both the managers of Prague companies and the managers of Moravian-Silesian region companies. Authors set one hypothesis in the beginning and the results say that this hypothesis was rejected.

The second goal of the paper was to find out how often the anchoring effect is used in the Vysočina region. The results showed that the anchoring effect is used less in the Vysočina region than in other regions of the Czech Republic. The fact that the hypothesis was rejected shows that the difference in the use of anchoring effect between Prague, Moravian-Silesian region and Vysočina region is not very significant.

The results further show that if managers know and use the anchoring effect, they use it relatively often. All results clearly show that the largest rate of use of the anchoring effect is in Prague.

According to the authors, the research was limited by the following four parameters:

- the surveyed companies were not only from Jihlava but also from its surroundings (there are not so many enterprises with 100+ employees in Jihlava as in Prague)
- the surveyed companies were not only from Ostrava but also from its surroundings (there are not so many enterprises with 100+ employees in Ostrava as in Prague);
- a huge part of enterprises with 100+ employees in the Czech Republic have foreign owners;
- the sample of respondents from the Vysočina region was not very large.

The results of the research provide further support for the understanding the anchoring effect, in particular in the awareness of the anchoring effect and its intensity of use.

In the future, it is possible to carry out similar research in other cities of the Czech Republic or abroad. Authors believe that this simple research will help initiate further research in this interesting field of behavior economics by using more specific questionnaire.

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## CURRENT RANSOMWARE TRENDS

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### **Abstract:**

The paper deals with ransomware, which is currently the most commonly used malicious code in cyber attacks, compromising the end devices of computer users and computer networks. This paper not only describes the latest trends in ransomware attacks, but also characterizes the specific ransomware that are most common in cyber attacks and points out what specific objects are targeted by cyber attacks of this type. The article also describes how this malicious code spreads, what vulnerabilities the system exploits for its remote execution, what consequences it can have and how it can be defended against it. The aim of the paper is to use scientific methods to express a cybernetic view of the system concept of Ransomware as a modern tool in the hands of today's hackers.

### **Key words:**

Ransomware, cyber attack, malicious code, vulnerability.

### **JEL: L86**

### **Introduction**

The performed system analysis of modern cyber attacks on defined levels of cyberspace was the basis of my scientific approach to the issue of information and cyber security. From this cyberspace, I defined, based on a detailed analysis, then a set of information sources as the basis of information and research sources for the analysis of Ransomware and for further research work. I now present the essential results of my research and publishing activities in this brief paper.

Ransomware is malicious code that usually spreads as drive-by download malware (McQuade, 2009), which means that it reaches end devices just by visiting a compromised website. However, it can also be found on completely trusted websites, as long as they display advertising. Alternatively, the user can install it himself after clicking on a link or attachment in the email.

Mainly desktop versions with Microsoft Windows OS and then mobile devices with Google Android are successfully attacked. In recent years, there have also been attacks on database servers, which exploit their vulnerabilities, control them and then encrypt the data stored on them. Unlike other types of malicious code, ransomware makes its presence clear by preventing you from working with your computer or mobile phone. For restoring the terminal to its original state, you will be required to pay a certain amount of so-called ransom from there, then the ransomware. The said burnout fee can then be allowed to be paid to the victim, for example, by transferring a certain amount to a bank account. Especially in recent years, payment in bitcoins is required, as this makes it possible to withdraw money from the bank and make it impossible to monitor the flow of money. And if the set burn rate is not too high, the percentage of those who will eventually pay can be expected to rise.

I present the systemically processed partial results of the work in the following division of my contribution with the aim of expressing this interesting and extensive scientific, publishing and pedagogical work in the modern cyberspace of attacks and defenses of the digital world.

## 1. Ransomware variants

There are many variants of ransomware, however, we can distinguish two basic types: ransomware, which encrypts files, and ransomware, which makes it impossible to work with a given device. Alternatively, you can consider a third variant, which combines both of the above, ie that it encrypts the files on the disk and at the same time makes it impossible to work with the device (Šulc, 2018).

### 1.1. Ransomware encrypting files

The ransomware encrypts the files on the disk, providing the decryption key to the user only after paying a certain amount. This ransomware treats the user in a straightforward way in the spirit of "I have encrypted the data and you will only find out the password if you pay, by a certain date, otherwise your data will be deleted or the key that encrypts your data will be deleted so that no one can access it. If you want proof that I know the key with which your data is encrypted, send me a file and I will send it back to you decrypted." (Smejkal, 2015).

Whether this ransomware will be successful depends on how sophisticated it is. It can start encrypting data from the oldest ones (eg according to the date of the last access) or focus on those that the user uses most often. They are more likely to have not backed them up, they need them and will be willing to pay to get them. The problem is also that ransomware quite often encrypts data on attached network drives, where many users store their backups and also deletes shadow copies of files. These users then do not have backups from which they could restore the data and would rather pay.

In older versions of the ransomware that we may have encountered, cryptography was poorly implemented, so it was possible to obtain an encryption key with which the data was encrypted and recovered. In the latest versions, however, the encryption key is generated on a given computer, different for each file and is encrypted using asymmetric cryptography using RSA keys with a length of 2048/4096 bits or encryption keys that are built on elliptic curves providing the same security and which can not break in real time (Graham, 2011).

### 1.2. Ransomware blocking a computer

Ransomware that makes it impossible to work with the end device usually replaces the original Windows desktop or Google Android homescreen with its own, from which nothing can be started and promises to fix it only after paying a certain amount. Keyboard shortcuts don't work, the desktop, start button, and task manager don't work, so you can't end or start another process. The screen only shows a message as to why the lock occurred and instructions on how to pay (Šulc, 2018).

An attacker often uses social engineering techniques to try to convince the victim that the lockup occurred, for example, because he uses illegal software (MS Windows, Office itself) or that copyrighted content (movies, music) or which is against the law (eg child pornography). Thumbnails of the photos on your computer's disk are often displayed. That it is pornography that the ransomware downloaded itself and then copied to a certain directory does not need to be added. The victim is required to pay a license fee or fine. This ransomware already uses more advanced social engineering techniques and tries to arouse the user's guilt and fear by pretending to be a report from Microsoft, the police or another institution.

While in recent years the removal of this type of ransomware has been relatively trivial, with newer versions it is not easy at all and ransomware is relatively effective in preventing it. Its removal is quite complicated, especially for mobile versions.

## 2. Ransomware has a higher goal

During 2018, the deployment of a remote access Trojan (RAT), pullers, and backdoors was reported, but the malware remained inactive during that year. There were fewer ransomware attacks in the first half of 2019 than the attacks recorded in the same period during the previous 3 years. However, these ransomware attacks targeted highly targeted targets. It has now been concluded that this software has given attackers the ability to identify vulnerable targets that are willing to pay higher ransom amounts. Following this, the ransomware in the year under review expanded to other sectors outside the medical industry and focused on industrial and manufacturing companies. Recently, the LockerGoga family of ransomware has been used to damage systems that control physical equipment in manufacturing plants (Enisa, 2020).

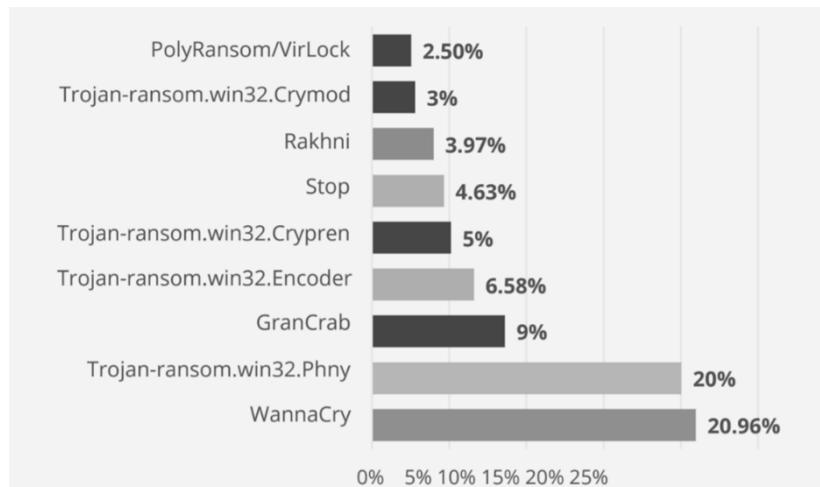
A coronavirus pandemic has also occurred in this regard. Many attackers have even told the media that they will not attack medical facilities at all during a pandemic. Unfortunately, others, such as the creators of the Ryuk ransomware, have taken advantage of the situation (Avast blog, 2020). Czech hospitals were struggling with this ransomware. In global statistics, however, we do see a certain decline in ransomware detection. However, cybercriminals cannot be expected to increase their activity again after the pandemic subsides. They will most likely use this period to improve their attack methods and codes.

## 3. WannaCry is still the most common ransomware

The most significant ransomware remains WannaCryptor, better known to the general public as the so-called WannaCry from 2017. This malicious software is responsible for 40% detection of all ransomware, despite the fact that it exploits the vulnerability for which the update was released three years ago (Kaspersky, 2019). Unlike other types of ransomware, this malicious software has certain capabilities similar to so-called worms, thanks to which it can spread very easily and quickly (Enisa, 2020).

The harmful action of this type of ransomware started its activity first in the field of the telecommunications sector in Spain, from where it quickly spread to other countries. The victims were mainly medical facilities in the United Kingdom (Trend Micro, 2019). And it is in healthcare that these attacks can have serious consequences. This is because very sensitive data (such as patient records) is encrypted or blocked. Only an attacker has the key needed to decrypt them, and only he can restore this sensitive data to its original state, of course, if the organization provides the attacker with the required ransom.

However, not only Spain and the United Kingdom were affected by this type of ransomware, WannaCryptor subsequently spread rapidly to Turkey, Thailand and Indonesia. It is very similar to the GrandCrab threat of 2018 (Kaspersky, 2019).

**Graph 1: The biggest ransomware attacks (Enisa, 2020)**

#### **4. New ransomware trends**

Cybercriminals are constantly inventing new ways to successfully attack users. The first is large-scale cyber attacks targeting end users and smaller manufacturing and service businesses. In these specific cases, the ransomware usually spreads via e-mails, exploit kits or as part of illegal software (Šulc, 2018). The most common strains are long-term Phobos, CrySiS or STOP ransomware (Enisa, 2020).

The second trend is attacks aimed at specific targets, which are either large companies or institutions from the health, transport and education sectors. To spread, attackers mainly use vulnerabilities in poorly secured applications (especially RDP) and so-called spear phishing (Šulc, 2018). The most common strains include Sodinokibi, Maze, Nemy or Snake (Enisa 2020).

At the end of 2019, cyber security experts captured a completely new trend, which attackers continued to develop this year. The creators of the ransomware began stealing very sensitive information (such as residence, phone numbers, photographs, political opinions or sexual orientation) from users and threatening to publish it if the victim did not pay the ransom. This technique is also called doxing (Trend Micro, 2019).

In practice, this technique works specifically in such a way that even before this sensitive data is encrypted, attackers copy their victim's attractive files (for example, various documents, employee or customer records or source codes). If the victim refuses to pay the required ransom, the attackers will either publish or sell these files on the darknet. For example, in the case of companies, attackers can begin publishing stolen new product design documents and other valuable business information.

This doxing is mainly used by Maze ransomware operators (Enisa 2020). However, this technique has visibly proven itself, and with the onset of 2020, other attackers began to use it as well. It is likely that we will struggle with doxing in the coming months.

#### **5. Attack vectors**

A newly discovered ransomware called Sodinokibi exploits a recently reported Oracle WebLogic server vulnerability to gain remote code execution capability. The victim is infected without any measures being taken. Official fixes have also been released for Oracle WebLogic (Enisa, 2020).

This attack exploits the vulnerability to gain multiple user privileges, terminate blacklist processes, delete blacklist files, and filter host information. Another potential vulnerability is also used to deploy ransomware.

Specifically, it allows unauthorized connections through the Microsoft Remote Desktop Protocol (RDP) (Trend Micro, 2019).

Several successful ransomware families, such as SamSam, BitPaymer and CrySiS, target RDP servers (Enisa, 2020). Unfortunately, many organizations still use RDP instead of a much more secure virtual private network (VPN) for remote access. The specific problem with RDP is that it often suffers from vulnerabilities that can be easily exploited. It has even been reported that more than 800,000 systems with RDP services are unrepairs and vulnerable. These include systems within the scope of the Microsoft Azure IP data center. Although Microsoft has assured the public that these systems belong to a third party, there is a problem with the security of cloud service providers.

## 6. How to defend against ransomware?

There are several possible ways to successfully protect against these ransomware attacks. In order to prevent this, the following actions need to be taken (Singer, 2013):

- First of all, you need to install a proven and high-quality antivirus program that will detect these ransomware attacks and then successfully detect them. It is through this antivirus program that the system's defense against cyber attacks will be significantly improved.
- Subsequently, it is very important to keep not only all programs and browsers, but also the operating system always up to date. The new updates bring both completely new features and may include various security bug fixes, which potential attackers can then very easily exploit to their advantage.
- Another preventive measure is undoubtedly the backup of data on cloud or physical storage. If the data is backed up in this way, there is no need to worry about a ransomware attack that encrypts or blocks the data on your computer. Thanks to the storage, access to these data will still be possible.
- In the event that the device is actually attacked by ransomware despite all security measures, it is necessary to disconnect it from the network first. This is the only way to prevent the subsequent spread of the virus to other possible devices. In the next step, it is necessary to contact IT professionals.

## 7. Conclusion

Ransomware has become a very popular weapon in the hands of today's hackers who try to harm governments, businesses or individuals on a daily basis. In such cases, the victim of the ransomware may suffer certain economic losses, either by paying the required ransom or by paying certain costs of recovery from the loss, if the victim does not meet the attacker's requirements.

However, in most countries, several challenges need to be addressed first, such as the lack of coordination and cooperation between agencies and authorities and the lack of legislation that clearly criminalises ransomware attacks. Although cyber insurance contracts have existed since the beginning of 2002, ransomware attacks are one of the main reasons for the increased interest in this type of insurance over the last 5 years. Unfortunately, if potential ransomware targets are known to be insured, attackers assume they are likely to be paid out. Another disadvantage for a potential victim is that insurance providers pay a ransom in advance to mitigate the damage and maintain the victim's intact reputation. However, stating compliance with the ransom pay supports the hacker community and does not ensure the victim's recovery or reputation.

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# DID STAY-AT-HOME-ORDERS PRODUCED A SIGNIFICANT EFFECT ON CONSUMER SPENDING AND EMPLOYMENT IN THE US?

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## **Abstract:**

The consumption theory did not pay much attention to the stay-at-home-orders as an important factor that can influence consumer spending or employment (at least, before the current pandemics). The purpose of this research is to prove that the pandemic and its associated lockdown policies can have a non-negative impact on consumer spending (partially, in relation to employment). The research focuses on the United States of America. The data at state and county levels used in this study. Since consumer spending is connected with personal income, employment could be an important factor to be considered in this research. The research question of this study is: what is the impact of the regional stay-at-home-orders (SHO) on personal consumer spending and employment in the USA? We assumed a hypothesis that the SHO treatment can produce non-negative effects on the total consumer spending and its main components, but affect employment so that the high-waged employees and some sectors could have benefited more. The employment for the US states and counties is analyzed for helping in answering the research question and estimate the main hypothesis.

## **Key words:**

COVID, effect of pandemics on personal consumption, effect of pandemics on employment, US

JEL: J63, J68, R28

## **1. Introduction: The Essence of Research**

**The research question** of this study is: what is the impact of the regional stay-at-home-orders (SHO) on personal consumer spending and employment in the USA? We assumed a hypothesis that the SHO treatment can produce non-negative effects on the total consumer spending and its main components, but it affects employment so that the high-waged employees and some sectors could have benefited more.

We assumed **a hypothesis** that the SHO treatment can produce non-negative effects on the total consumer spending and its main components, but affect employment so that the high-waged employees and some sectors could have benefited more.

**The goal of the paper** is to analyze the employment for the US states and counties; this helps in answering the research question and estimating the main hypothesis.

The very first works on macroeconomic policy decisions date back to 1941 (S. Kuznets, 1941; S. S. Kuznets, 1941; Smith, 1942). Since these times, the US Federal Government provides surveys and researches for the patterns in household and business behavior. Consumption is an important part of the

economy; it is partially represented with consumer spending when estimating the households' consumption (Beckhart & Keynes, 1936; Carrier & Heyman, 1997; Firat & Dholakia, 2010). We can distinguish firms that operate within a particular region in the entire regional economy (Ershova, 2017). The other participants are federal and regional authorities and their activities (Lucas, 2004; Ross & Campbell, 2008), activities of banking and financial structures (Léon & Zins, 2020; Shemetev, 2011; Sun, Harimaya, & Yamori, 2013), financial markets (McKinnon, 1974; Potter, Binns, Elliott, & Smith, 2008), households (Engelhardt et al., 2009). Thus, we see that households<sup>1</sup> are an important element of the system of the national and regional economy.

Households' activities depend on the income they receive (Williamson, 2018). A household can receive income from their labor activity, from the use of the capital they have, sometimes part of the capital can pass in the form of a gift (for example, inheritance, lottery winnings, found valuable things or funds somewhere) (Doepke, Lehnert, & Sellgren, 1999).

There are only two ways and directions for household expenditures. The household can either spend money or save it (Perloff, 1998). If households save money, then they have only two ways: to store the money in cash or take the money to banks, to accounts. Nevertheless, if households spend money, then the indicator of their spending is the indicator of consumer spending<sup>2</sup>. Consumer spending is an important component of the national economy (Huntington, 1993; Levitt, 1983a, 1983b) and the regional economy by sectors (Carruth & Henley, 1993). Business partially draws its money from consumer spending (Piketty & Zucman, 2014). Even more, part of the B2B businesses operates according to the following scheme. One enterprise buys raw materials, tools, or similar values from another enterprise. An enterprise can also buy services or work from another enterprise for its own needs. Ultimately, many enterprises buy goods and services from other enterprises in order to sell them to end consumers in their region, in their country, or abroad. Thus, consumer spending is also an indicator of business health by sector<sup>3</sup>. The more consumers spend on businesses in certain industries, the better those businesses do and the more products they produce. When companies need to produce more output, they either have to pay their employees to stay and work longer or harder, or hire new workers to cope with the increase in workload. If the consumer spending for the goods, or work, or services of a certain sphere of business falls, then the business will be forced to reduce the number of working hours and the consequences of wages to workers or to reduce the number of workers increasing unemployment.

Thus, an increase in demand for goods, or works and services, simultaneously leads to the growth of household incomes and to a reduction in unemployment through transmission mechanisms (fig. 1, fig. 9). A reduction in consumer spending on the purchase of commodities, works, and services leads to a reduction in household incomes, as well as to an increase in unemployment. Enterprises simply do not need additional hours of labor from workers, and they less need the workers themselves. This also affects the state of the banking system.

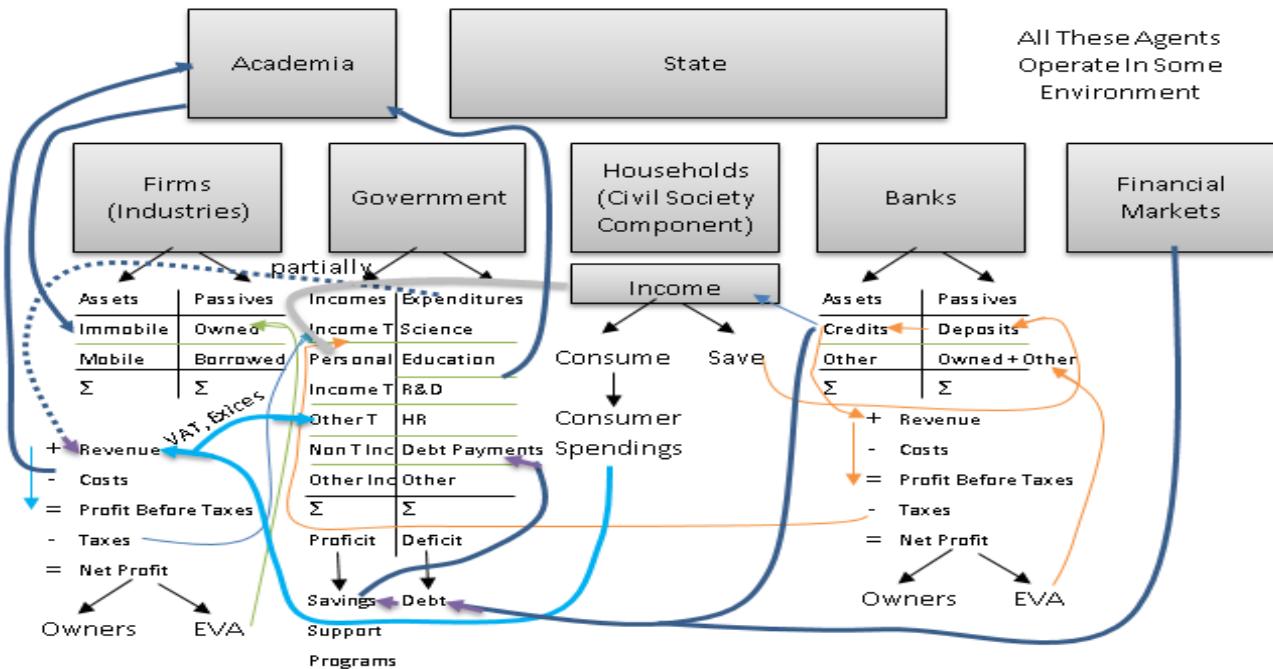
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<sup>1</sup> This research uses the term "households" as a group of one or more people living together, sharing their income, and spending.

<sup>2</sup> This research suggests consumer spending is the total amount spent by people for personal use or enjoyment that maximizes their utility.

<sup>3</sup> This research suggests consumer spending can be a proxy for the business-environment health in a particular country or region.

Figure 2: Consumer Spending In Terms Of Quintuple Helix



As workers' incomes decline, and the number of unemployed workers increases, people are saving less and, thus, investing less money in bank accounts. Moreover, as people need more money, they begin to withdraw money from bank accounts (fig. 1, fig. 9). Since few banks have a capital adequacy ratio higher than 11% (Shemetev, 2012), it is difficult for banks to pay off the excessive needs of the population to withdraw their deposits. This can increase the risks of the banking sector. Some banks can even go bankrupt. Since businesses often keep their funds in banks, bank failures can lead to a freeze on the funds of the businesses. In the event of bankruptcy of banks, companies rarely have insurance for the full amount of funds that are in bank accounts. As a result, the load on the regulator increases. If the activity of the regulator turns out to be insufficiently effective, the bank may go bankrupt and freeze the accounts of many companies. As a result, even more firms may be closed for technical reasons; therefore, even fewer workers will be needed in the region and in the country. Unemployment will increase, while household incomes will fall and consumer spending will fall as well.

The state also depends on consumer spending through transmission mechanisms. If employees are busy and earn much, then more personal income tax is imposed on their salaries. The higher this tax, the higher the budget revenues of the region and the country. In addition, the more people earn, the more they will spend or save. If people are spending more, then some of their spending may be subject to value-added tax, which can help the government funding federal programs. In addition, household expenditures on consumer spending turn to revenue for some businesses. Revenue largely determines the amount of profit before tax for firms. The more pre-tax profit a firm earns – the more income tax it will pay. The growth of income from companies' profits increases the incomes of the state budget. Conversely, if consumers spend less, businesses and the government will receive less income. The business units will have less money to pay salaries as well.

Consequently, this will further decrease household funds and can reduce consumer spending even more. As a result, the business will have even fewer funds. This can lead to a drop in household income and to an increase in unemployment. The transmission mechanism of the importance of consumer spending is presented below.

It can be seen that consumer spending is an important component of the functioning of the economy of an entire state. Consumer spending stimulates business income by sector of the economy; it increases tax

revenues of the government as well. As a result, the government can invest more in the academy. The interest of enterprises in financing the academy depends on the volume of sales it can make, in particular, in many cases, this is related to the volume of consumer spending spent for this particular industry and company. A household member can be employed by all participants in the scheme. Household members can work both in academia, in firms, in government, in banks, in financial markets, and they can be self-employed. The more income households receive, the more they can spend. Banks are categorized as a separate actor as "banks" because they play an important role in controlling the money supply. In this way, banks can have a direct impact on household income and policies on whether they save or spend. If it is more profitable for a consumer to put funds on a deposit in a bank than to spend them today, the household will do so. If a household sees it is more beneficial to consume now, the household will concentrate more on consumer spending. In addition, financial markets are allocated in a separate category. The state can cover part of the debt through operations in the financial markets. The activities of banks and their strategies also largely depend on the state of the financial markets. Banks not only convert deposits into loans, but they can also be active participants in financial markets. Banks can send some of the funds to financial markets. A household can also participate in financial markets, for example, by buying securities and having an income from them. Households may participate in financial markets for the accumulation of funds for more even consumer spending throughout life. This influences the level of household consumer spending.

## 2. Methods: The Shortcomings of the Classical Macroeconomic Data Approach for the Regional Level and the Suggested Approach

We used the database that characterizes the average consumer spending per capita per day (from the beginning of 2020 to the time of this writing, that is, until mid-November 2020). Since the consumer spending data has a relatively low frequency, we used its proxy: consumer spending from debit and credit cards that cover most of the true consumer spending in levels and should have similar changes in trends.

From this panel data, we would like to use the classical fixed effects model (1):

$$\text{Daily Consumer spending Per Capita}_{it} = \beta_1 * \text{If After Treatment Period}_{it} + \beta_2 * \text{If After Treatment Period}_{it} * \text{If Treated}_i + \beta_3 * \text{COVID Death Rate}_{it} + a_i * \text{US State D}_i + \beta_4 * \text{COVID Death Rate}_{it} * \text{If Treated}_i + E_{it}$$

Notes: Daily Consumer spending Per Capita<sub>it</sub> - per-capita average daily consumer spending for each state for different periods;

If After Treatment Period<sub>it</sub> - this is a dummy variable which is equal to 1 if a period for a specific state is after the treatment (0 otherwise);

If Treated<sub>i</sub> - this is a dummy variable which is equal to 1 if a specific state has ever been treated with the SHO (0 otherwise); this dummy variable would be of interest for the models other than the FE; that is why the consequence of "+  $\beta_5 * \text{If Treated}_i$ " is not used in equation (1);

COVID Death Rate<sub>it</sub> - is a variable to control for the COVID spread over each state for the periods before and after the treatment;

US State D<sub>i</sub> - is a set of state dummies for each particular state;

E<sub>it</sub> - this is our residuals term for each state for each specific period.

We made the decision to use the difference-in-differences identification strategy. This identification strategy will keep the differences between the control and treated groups if the core DID trend similarity assumption is satisfied.

A few words should be mentioned about the "COVID Death Rate" indicator. This is a complex indicator to control both the new cases and the new deaths of the COVID. At the same time, this indicator to be comparable between more and less populated states and counties. We used the number of the new COVID deaths in a specific state for 100 000 people and divided it by the number of the new COVID infected people in a specific state for 100 000 people. This indicator shows the number of COVID deaths relative to the number of COVID cases. It makes no big sense to conduct a discussion about the fact that the methods of

counting sick and dead people from coronavirus in different states may be different because this research is performed in a single country. The US used the same methods in counting the COVID statistics. Therefore, this data should be comparable across different states and counties.

## 2.1. The Shortcomings of the Classical Macroeconomic Data Approach for the Regional Level

The classical data sources are related to the macroeconomic data (like GDP, population, GRP, GNP, deflators, currency exchange rates, and many more). These indicators provide a very powerful tool for understanding the core processes within the national economies. At the same time, when climbing down to the regional level, researchers would face a limited number of observations and parameters that could do any potential regional research biased and non-representative (Chetty, Friedman, Hendren, & Stephner, 2020; Chetty et al., 2016). This is why the researcher will have to return to the macroeconomic data.

The second shortcoming of classical macroeconomic data is that it is issued on low frequencies. Usually, they are published annually, or semi-annually. Few indicators have a quarterly or even monthly basis. Nevertheless, those more frequent indicators do not necessarily mean they can replace more compound indexes. For example, the production index (issued monthly to quarterly) is regarded as a proxy for the GDP or GRP (issued quarterly/annually). At the same time, production becomes a less significant component in the GDP and GRP of the modern economy. Thus, this variable becomes less applicable proxy each year. The best data possible for household consumer spending could be found in the Consumer Expenditure Survey (CEX) issued two times a year.

Thus, a low frequency and an insufficient number of observations on the regional level data might be inefficient for the application of qualitative researches and analyzing the microeconomic policy, especially in times of instabilities (like pandemics).

## 2.2. The Policy Evaluation Benefits of the Suggested Approach

This research could help in obtaining insights on how to receive data on shocks that appeared within the 3-4 last weeks (like pandemics, panics, or crises). This tool would help in analyzing the effects of potential or real policy implications.

This research suggests combining the data from financial service companies, credit card processors, and payroll companies for obtaining data on consumer spending, and employment. This research also suggests using such an approach for the business revenues and job postings for each individual state or county.

Any researcher would benefit from using raw data; at the same time, privacy policy could benefit from aggregating and filtering the data for improving confidentiality. This research uses several aggregated and masked official datasets to overcome these challenges. It is described in the Data section in more detail.

Thus, policy evaluation could become more frequent and fast in terms of time boundaries. Researchers could estimate the changes just within a few weeks after the shock or policy implementation actually happened.

## 2.3. Discussion If a State Can Be a Research Object on a Regional Level

We should also find out if a state might be regarded as a region for the purpose to select and compare its strategy on the lockdown policies. Legally, the state is at the federal level. Most studies in the field of regional economics agree with this. However, for example, DeVol (1999) conducted regional studies (confirmed as regional by Huggins, Izushi, Prokop, & Thompson, 2014) measuring US states in dozens of dimensions. He created a composite index that was the average of the scores of the regional indexes. Huggins (Huggins, Izushi, Prokop, & Thompson, 2014, p. 18) also endorsed an approach in regional

economics to study single states as regions. Thus, with some assumptions, we can analyze the states separately and draw conclusions regarding this. After all, no state is as independent participant in foreign policy as Angola, Kenya, China, New Zealand, or Denmark. We cannot directly compare a state like Texas with New Zealand. We believe that the country (federal) level is such a unit of legal relations that can conduct an independent foreign policy. Since most of the countries are included in some blocs, for example, BRICS, ASEAN, the European Union, and the Eurasian Economic Community, the countries' political independence in foreign policy is also somewhat limited. Nevertheless, the abilities of each individual US state to conduct independent international politics are limited even more.

## 2.4. Databases Used

A few words should be said about the databases used in this research. We used the U.S. Bureau of Economic Analysis data (U.S. Bureau of Economic Analysis, 2020a), Google Databases (Google, 2020c, 2020a, 2020b), WHO Database on COVID Disease (World Health Organization, 2020), Opportunity Insights Project by Harvard University (The Opportunity Insights, 2020), US Regional Economic Accounts (U.S. Bureau of Economic Analysis, 2020b), Our World in Data (Data, 2020), FRED database on PCE (Federal Reserve Bank Of St. Louis, 2020), Paychex (Paychex, 2020), Intuit (Intuit, 2020), Earnin (Earnin, 2020), Kronos (Kronos, 2020), Worldometer (Worldometer, 2020) and other datasets affiliated with the Johns Hopkins University (Johns Hopkins University, 2020), Affinity Solutions (Affinity Solutions, 2020), and Bill and Melinda Gates funds projects. The states selected for analysis are those whose FIPS-code starts with 1 and ends with 56. Hence, there are 51 states and their counties available for the analysis (including Alaska and Hawaii). We did not find consumer-spending-data for the two counties that make up the United States of America.

### 2.4.1. Discussion about the Observations

We have a dataset of 109 variables with 15708 observations on a state level. There are 2224 data with NA values for the COVID death rate indicator. The difference of 15708 and 2224 creates 13484 observations for the regression analysis for the levels of consumption. The research suggests excluding the missing observations due to a number of factors. First, only 154 NAs describe any days when the number of COVID confirmed cases was above zero (that is, NAs describe the pre-pandemic period when there were no infected people [therefore, no COVID-deaths] in different states in our dataset). These dates are usually before the end of February 2020. The remaining 154 NAs describe few cases in the days of the very beginning of the pandemics in the US states. The researchers received two possible solutions for continuing the analysis: either artificially counting the NA data in the COVID death rate control indicator as zeroes (thus, balancing the dataset), or omitting these observations (comparing the “unhealthy” regions that accepted/abandoned the “remedies” by the SHO-treatment – this would be the medical approach [treating the sick patients during the disease]). Both solutions would be justified. This research focuses on the pandemic period; thus, the periods before the pandemic are qualitatively different from the periods with the pandemics.

The programming language R is used to combine and work with different databases. All variables are related to the coronavirus, employment, and consumer spending on an average daily basis. We also analyzed the data on the anti-coronavirus measures that US federal and regional governments applied during the COVID pandemics.

The data for consumption is available for the period from 21-01-2020 until 29-11-2020 (no data for 5 days: November 23 – November 28); this is 313-5=308 observations per US state. The regression output represented in figure 6 describes the interrelations for these 13484 observations (51\*308-2224). In addition, this research verifies the patterns from the previous dataset with an additional dataset for a similar period containing 111 variables of 3143 observations for each period on a county-level.

Moreover, the dataset with 13484 observations has additional missing values for unemployment variables on high-frequency-data. For example, employment for high-waged-Americans has 1016 missing values (in addition, missing values: SS<sup>4</sup>70 – 254; SS65 – 508; SS40 – 254). The data for employment is available for the period from 21-01-2020 [US first COVID case] until 30-09-2020; this is 254 observations per state or 254\*51=12954 observations. The missing values for the COVID death rate control variable decrease this number of observations by 2224 cases (pre-pandemic period after the first US COVID case), which is 12954-2224=10730 observations (please, see figure 8 (SS60) and figure 7 (except high-waged Americans)). The other types of employment have missing values; in some cases, part of these missing values are yet covered by the NAS in the COVID death rate indicator.

#### 2.4.2. Discussion about the Assumptions of the Model

##### 2.4.2.1. The Core Assumptions of the Model

This research suggests the implementation of the **difference-in-differences methodology**. The **core assumption** is that the control group of states (those that did not issue the stay-at-home-orders [SHO]) clearly shows the tendencies of the treated group of states if there would be no treatment at all (this comes from the core assumption of the DID approach).

**Another assumption** is that the states are more homoscedastic within each other and, thus, are more homogenous (this is another core assumption of the method).

The **third assumption** is that the data should not be anyhow modified and, thus, the treatment starts from the actual date when it happened in reality with no changes in the primary data.

The main method to prove these assumptions are true would be methods from physics with the randomized experiments with the randomized treatments for randomized communities of people. At the same time, these methods cannot be applied in reality due to the ethical issues. This is why this research suggests utilizing these assumptions as a strategy for the data analysis.

##### 2.4.2.2. The Justification of the Core Assumptions of the Model

The **core assumption** is highly probable in reality. The best way to prove a better solution would be the mentioned methods from physics (which is impossible due to ethical issues). This is why the DID methodology core assumption can be properly justified as a fair (although relatively strong) assumption.

The **second assumption** is probable in reality because US states are more homogenous than, for example, different countries (like Angola VS Canada). The homogeneity among the US-states are among the highest values possible in the real world (for example, regions of Russia, or the regions of EU are many more heterogeneous than the US states). We suggest implementing the principle of relativity (like in physics) that suggests that we should estimate homogeneity by comparing one region with another and estimate their homogeneity in relative terms. Moreover, the fixed effects DID model removes much of the potential heterogeneity among different states; this makes this justification even stronger.

The **third assumption** has a value (non-modifying the data). Such an approach can provide better results, this research suggests.

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<sup>4</sup> SS – NAICS job super-sector.

#### 2.4.2.3. The Justification of the Independent Variables

First, this research suggests utilizing the dummy variable for the SHO-treated states for selecting them from the control group of states. Second, it is vital to implement a dummy for the period after the SHO-treatment for identifying this time. Third, this is important to control for the COVID; the suggested variable is the relative death rate [/cases rate<sup>5</sup>] (per X inhabitants). The X estimated in this research might be of any scale (for 10, 100, 1000, 10000, 100000, 1 million) – this is not a crucial component of research (it just is important to take control on the COVID; the other things (like X) are mechanical). Dividing deaths by cases (or vice-versa) could become a ratio for the efficiency of the medical system in a particular state; such variable holds for the control of COVID.

In addition, this research controls two interactions. The first interaction is the dummy for the after-treatment period and the dummy for the treated states. This interaction should estimate the suggested effect of the economic policy implementation (what did SHO treatment provide to the treated states after the treatment procedure is over). The second interaction is the COVID death rate [/cases rate] (per X) and the dummy for the SHO-treated states. This interaction should catch the reaction to an additional (if any) death rate for the treated states (population can consider negative cases when the SHO-treatment did not provide a proper medical effect in terms of the death rate [/cases rate] (see fig. 2)).

#### 2.4.2.4. The Expectations before the Analysis

After seeing the data, it became unclear if the treatment effect should actually be statistically insignificant for all the dependent variables. Moreover, our research shows the SHO orders on state/regional level might be a beneficial tool in times of pandemics. The US policymakers accepted intuitively correct decisions in terms of economic policymaking.

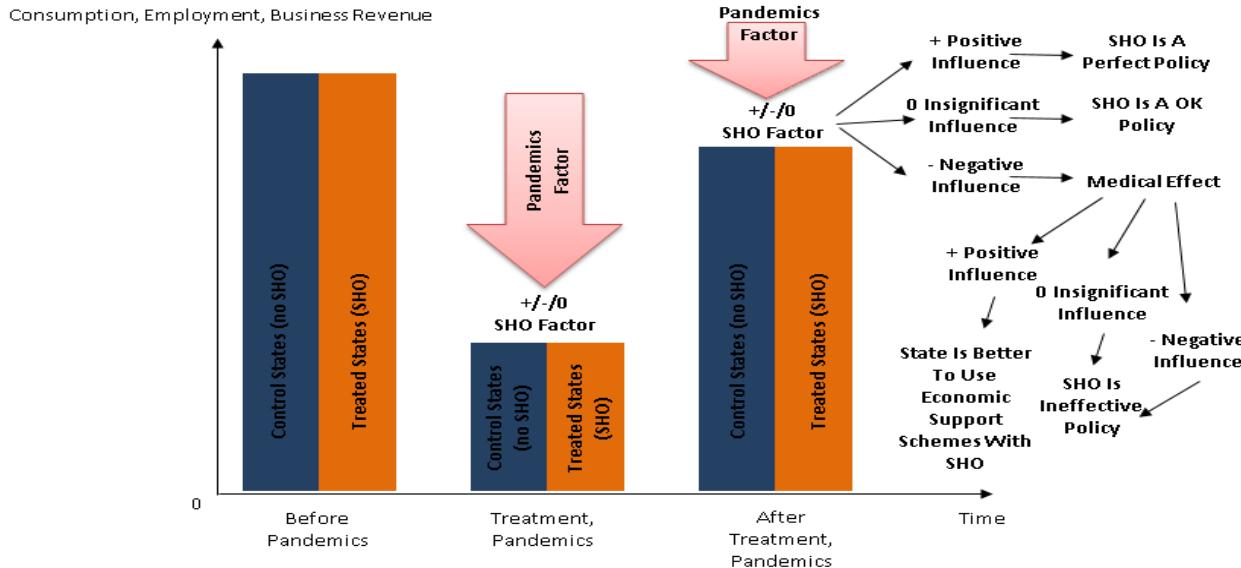
The death rate should cause negative effect on consumption; the interaction of the death rate and the dummy if the state is SHO-treated should provide negative effect as well (see fig. 2). The effect on employment should not be that clear, because different sectors and employees received different outcomes during the pandemics. For example, mask-producers should require more workers; hotels should require less workers.

### 3. Paper Results

It is considered wrong to estimate the drop in consumer spending in different states blaming pandemics as a reason and, thus, estimate the impact of the SHO on consumer spending, employment, or business revenues. It would be wise to split the states into those that applied the treatment and those that did not do so. SHO (stay-at-home orders) could be a good treatment. The pandemics would drop consumer spending, employment, and business revenues. Does it mean that the SHO would cause an additional drop after the treatment?

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<sup>5</sup> This bracket shows the indicator implemented in this research. Simple death rate (or cases rate) per X inhabitants could be a substitute of this indicator in other researches (holding the same function to control for the pandemics). This is how some people see the efficiency of the medical system when making decisions: new deaths per X / new cases per X.

**Figure 2: The US Rational Policy Implications Depending On the Impact of the SHO**

### 3.1. The Overall Results for Consumer Spending

It is clear that consumer spending patterns normalized after the stay-at-home order period. Some counties even increased their consumption relative to the levels of the beginning of January.

This pattern reveals some optimism related to the overcome of the consequences of the first wave of pandemics. It is clear that some counties in the treated States significantly increased their consumption. At the same time, counties in the control group of states have relatively modest achievements in restoring consumer spending.

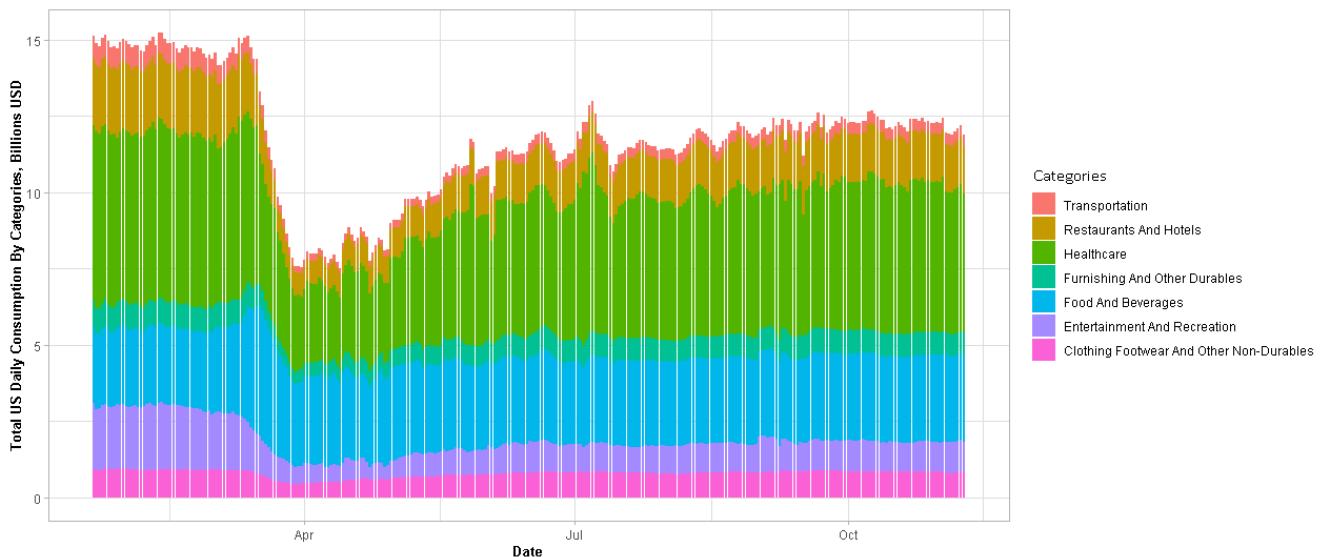
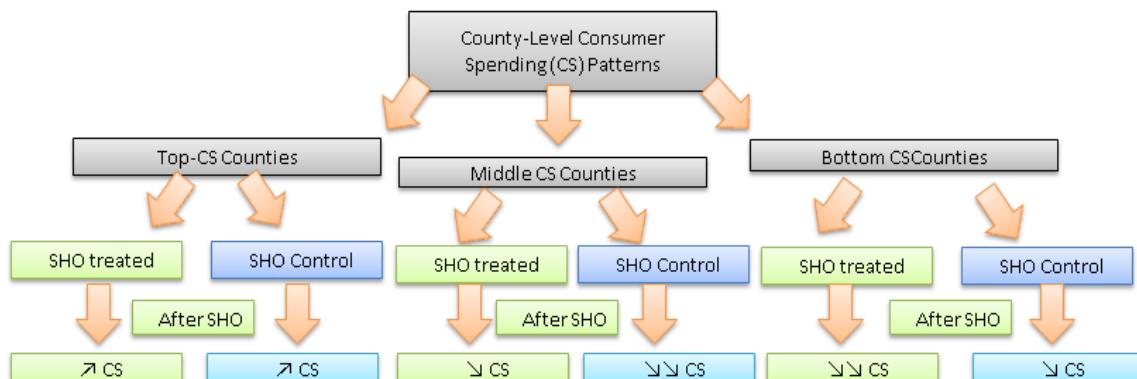
**Figure 3: The US Daily Total Consumer spending Pattern, USD PC (Jan 21 - November 11, 2020)**

Figure 4: The Analysis of Consumer Spending In Counties in Treated and Control Groups



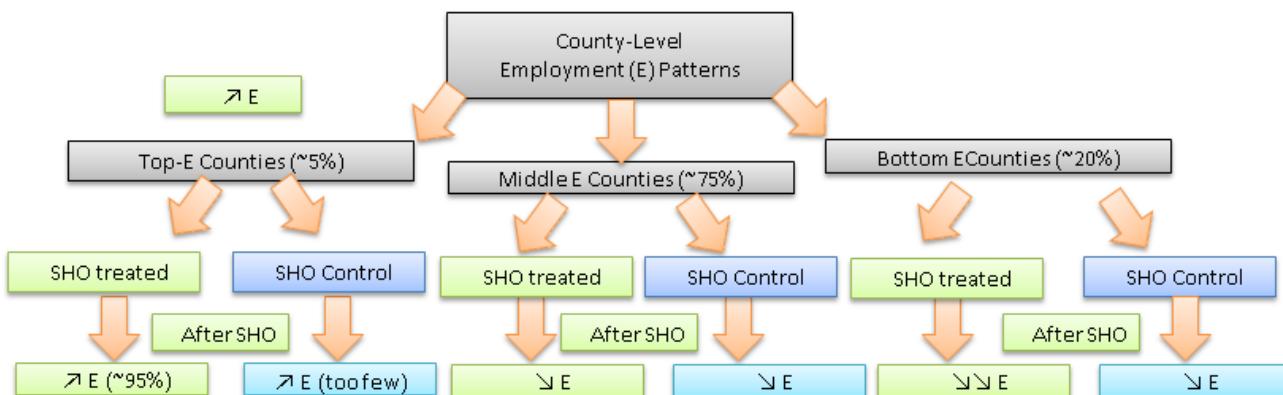
**This research suggests a complicated question** if stay-at-home orders produced any effect on consumer spending, in addition to the effect produced by the pandemics. The regression analysis estimates there could be no negative effects of the stay-at-home order except for only a few sectors.

### 3.2. The Overall Results for Employment

The household expenditures on personal consumption decrease when the income of the household decreases, the Engel curve suggests (Engelhardt et al., 2009; Jackson, 1984; Lewbel & Pendakur, 2008; Li, 2019; Seale, Bai, Wahl, & Lohmar, 2012; Trigg, 2004). The economic theory logic suggests the same (Perloff, 1998; Williamson, 2018). There are two sources of income a household could receive: labor income and non-labor income (Doepke et al., 1999). Labor income is positively related to employment (Perloff, 1998; Williamson, 2018). Unemployment could decrease the opportunities for households to earn money. Therefore, they can reduce their consumer spending (Ganong & Noel, 2016). Finally, reducing consumer spending will make businesses earning less because consumers will buy fewer commodities. The decrease in incomes of households also pushes households to withdraw their savings from bank accounts. This decreases the incomes of commercial banks and increases the risks for them as well.

This research suggests estimating the employment rate through trends, not through levels. Analysis of counties in levels could point out the outliers rather than average counties. This research does not suggest to anyhow truncating the data. This is why it is decided to use trends. The employment level in January 2020 is taken as 100%. Such an approach attracts attention to the counties as they are. It becomes easier to analyze suggested or expected patterns.

Figure 5: The Analysis of Consumer Spending in Counties in Treated and Control Groups



Pearson's product-moment correlation coefficient is 0.54 (p-value 0.000). It means there is a significant correlation between employment level and personal consumer spending. It means both variables could be interrelated if no spurious correlation persists.

It was decided to separate the states that increased their employment after the treatment period in a separate category in the figure above. Their pattern is different from the entire US pattern and additional research could be devoted to this issue. At the same time, this research does not suggest to anyhow truncate or modify the data.

### 3.3. The Main Results from the Evaluation of Levels of Consumer Spending with Heterogeneity across Sectors

The spending pattern in COVID times was heterogeneous. Some sectors significantly dropped down while other sectors even increased. This research suggests that the treatment effect could lead to an increase in total consumer spending, even though some sectors decreased or stayed approximately at the same level. The study suggests that coronavirus produced a negative impact on total consumption. At the same time, there are no sufficient pieces of evidence to blame the stay-at-home orders that they could somehow worsen the situation in consumer spending even more.

**Figure 6: The Estimation of the SHO Treatment Effect for the Heterogeneous Sectors of US Personal Consumption, Fixed Effects DID**

Dependent variable:				
	Total_CS (1)	Healthcare (2)	Food&Bever. (3)	Hotels&Rest (4)
if_after_treatment_period	0.090*** (0.004)	0.112*** (0.009)	-0.105*** (0.005)	0.131*** (0.006)
IfAfterTreatmentPeriodXIfTreated	0.018*** (0.004)	0.059*** (0.010)	0.006 (0.005)	-0.006 (0.006)
COVID_DeathRate	-0.450*** (0.111)	-0.423 (0.294)	-0.535*** (0.158)	-1.478*** (0.184)
COVIDDeathRateXIfTreated	-0.262** (0.114)	-1.102*** (0.301)	-0.174 (0.162)	-0.097 (0.189)
Observations	13,484	13,484	13,484	13,484
R2	0.381	0.196	0.158	0.311
Adjusted R2	0.378	0.193	0.155	0.308
F Statistic (df = 4; 13429)	2,063.289***	820.480***	630.403***	1,516.885***

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Additional notes: Total\_CS – total consumer spending; Healthcare – consumer spending on healthcare; Food&Bever. – consumer spending on food and beverages; Hotels&Rest – consumer spending on accommodation and food services.

Regressions on the trends are not always easy to interpret. The best way to create a trend that could be interpretable from the regression output is to create a trend by changing from some basic levels each new period. Such an approach creates benefits in interpreting the results of the regression analysis. The outcomes of regressions will be either proportions or percentage changes. Such changes could be interpreted as cents per each USD.

At the same time, it is not that trivial to interpret the results even of such regressions. The trend data could be called more preferable by the data vendors due to the reasons it is not private data, because it is complicated to obtain any private-related information from such datasets. The researchers would love to have data for each individual firm and each individual person on her consumption and employment. Nevertheless,

the high-frequency data vendors would prefer to provide trends. That is why trend regression analysis could be a useful tool for estimating high-frequency data. The results for trend regressions for the heterogeneous sectors of personal consumption are presented above.

The interpretation of the regression in trend is a little bit different (fig. 6). This could be interpreted as cents per one USD of spending. The total PC consumer spending was about \$100 in total before the pandemic. That is why there are similar results in interpretation with the regression in levels. Healthcare regression is a bit more difficult to interpret. The proportion method could help in estimating the regressions on levels. The pre-pandemic consumption in healthcare was around \$17. The regression in trends suggests this is approximately equal to \$6 for every 100 dollars spent (or 6 cents for each USD).  $17*6/100 = 1.02$  which is approximately similar to the outputs in the regression in levels. The regressions in food and beverages, hotels and restaurants, and transportation services could be interpreted in similar ways. That is why the regressions in trends could be good substitutes to the regressions in levels. Thus, companies could provide masked high-frequency data to the researchers and this data can be processed and interpreted.

### 3.4. The Main Results from the Evaluation of Trends of Employment with Heterogeneity across Wages and Sectors

It is suggested that employment could be heterogeneous for the sectors with low wages, middle wages, and high wages. Low wage is interpreted as being in the bottom quartile of the income distribution. It is fair to have an income under around 27,000 USD per annum for the United States for this category of employees. The middle income is related to income that is neither in the bottom quartile nor in the top quartile of income. This corresponds to the income of approximately 27,000 to 60,000 US dollars per annum. High income is regarded as being employed in the top quartile in terms of the income distribution. Such workers receive usually above 60,000 US dollars per annum.

**Figure 7: The Estimation of the SHO Treatment Effect for Employment (Heterogeneity across Wages), Fixed Effects DID**

Dependent variable:				
	Total Employment (1)	Low-Wages Employment (2)	Middle-Wages Employment (3)	High-Wages Employment (4)
if_after_treatment_period	0.033*** (0.003)	0.060*** (0.004)	0.023*** (0.003)	0.023*** (0.002)
IfAfterTreatmentPeriodXIfTreated	0.004 (0.003)	-0.052*** (0.005)	0.019*** (0.003)	0.031*** (0.002)
COVID_DeathRate	-1.037*** (0.085)	-2.061*** (0.132)	-0.713*** (0.085)	-0.497*** (0.081)
COVIDDeathRateXIfTreated	-0.062 (0.087)	0.369*** (0.136)	-0.387*** (0.087)	0.016 (0.082)
Observations	10,730	10,730	10,730	9,909
R2	0.346	0.274	0.352	0.434
Adjusted R2	0.342	0.271	0.349	0.432
F Statistic	1,410.192*** (df = 4; 10675)	1,008.314*** (df = 4; 10675)	1,448.696*** (df = 4; 10675)	1,893.026*** (df = 4; 9858)

Note:

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01

SHO produced an insignificant effect on total employment. SHO produced a significant negative effect on employment in low wages sectors. The employment level decreased by 5%, on average, additionally to the other factors taken into control in the states that experienced the implementation of the SHO policy. These employees became the most vulnerable part of the employment pattern. This could cause a decrease in the consumption by these employees, according to the Engel curves' theory (Jackson, 1984; Lewbel &

Pendakur, 2008; Seale et al., 2012; Trigg, 2004) and the economic logic (Doepke et al., 1999; Perloff, 1998; Williamson, 2018). The sector of middle-wage employees and high-wage employees benefited significantly more in the states that experienced stay-at-home orders. Subsidizing the low-wage employees could be suggested so that they could increase their incomes and, therefore, personal consumption spending. Another solution could be in tax benefits at the level of the federal government, states, and counties.

This research made an overlook for the heterogeneity across sectors of employment. Some sectors could benefit from the pandemic and other sectors could drop in employment. The regression results for controlling this heterogeneity are represented in the table below.

**Figure 8: The Estimation of the SHO Treatment Effect for Employment (Heterogeneity across S-Sectors), Fixed Effects DID**

Dependent variable:				
	NAICS supersector 40 trade, transp. and utilities (1)	NAICS supersector 60 prof.& business services (2)	NAICS supersector 65 education&health services (3)	NAICS supersector 70 leisure and hospitality (4)
if_after_treatment_period	-0.003 (0.003)	0.039*** (0.003)	0.054*** (0.004)	0.113*** (0.007)
IfAfterTreatmentPeriodXIfTreated	0.039*** (0.003)	-0.017*** (0.003)	-0.014*** (0.004)	-0.033*** (0.007)
COVID_DeathRate	-0.971*** (0.092)	-1.128*** (0.095)	-1.503*** (0.125)	-2.368*** (0.202)
COVIDDeathRateXIfTreated	-0.029 (0.094)	0.379*** (0.097)	0.398*** (0.127)	-0.058 (0.207)
Observations	10,525	10,730	10,321	10,526
R2	0.341	0.170	0.297	0.343
Adjusted R2	0.338	0.166	0.294	0.340
F Statistic	1,355.622*** (df = 4; 10471) 547.827*** (df = 4; 10675) 1,085.013*** (df = 4; 10268) 1,367.153*** (df = 4; 10472)			
Note:				
	<sup>*</sup> p<0.1; <sup>**</sup> p<0.05; <sup>***</sup> p<0.01			

The sector of trade, transportation, and utilities is the only sector that benefited in terms of employment in the treated states. The employment in other sectors represented in this research dropped significantly down in the treated States. This research could obtain data for several sectors of employment only. The influence of orders to stay at home and pandemics to other sectors of employment could be a topic for future research.

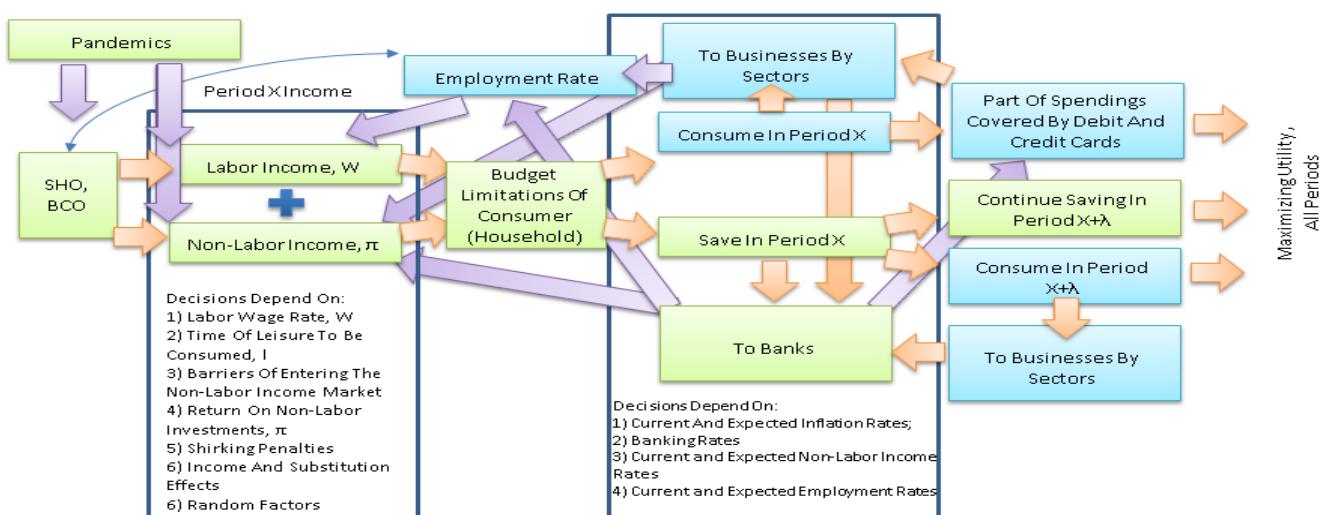
#### 4. Discussion

The Engel curves from the economic theory suggest that it is expected that consumers should reduce spending on all goods as a response to the reduction in incomes (Williamson, 2018). However, banks can stimulate consumption expenditures at higher levels than the level of the drop in incomes due to credit mechanisms. People could still purchase commodities online in times of pandemics. This conclusion is supported by the data of the US Department of Commerce in 2020 (U.S. Department of Commerce, 2020). This research confirms that online purchases were increased by 37% in the second quarter of 2020 compared to the first quarter (which means partial losses from offline trade might be compensated online for some sectors; thus, the online trade might become a partial substitute for the offline trade). Altruistic concerns about people's own or others' health could reduce spending significantly in some sectors (Chetty et al., 2020). Most of the commodities could be purchased online instead of offline. It is suggested that consumers could reduce spending for some commodities due to the cheaper price of online commodities in some categories. Another factor could be expectations about future returns in savings and non-labor capital, and about inflation rates as well. The third factor should be expectations about the possible employment rates in times of pandemics.

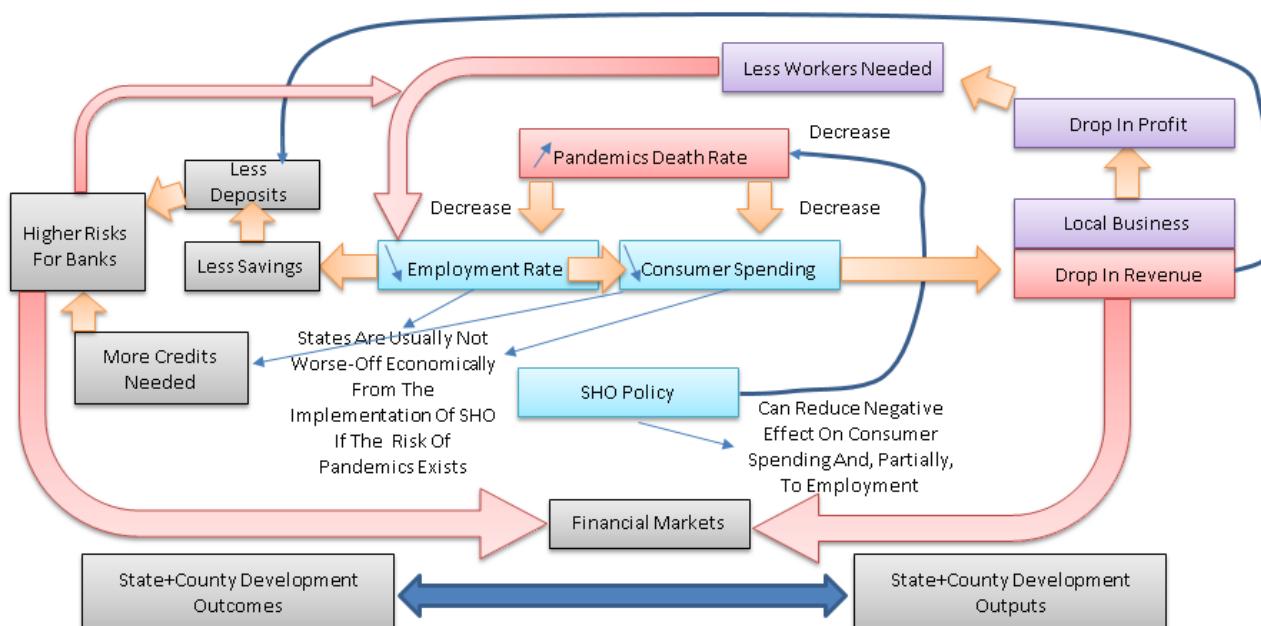
All these factors could lead to a decrease in consumer spending in some sectors more than in other ones. This research suggests transmission mechanisms on the pandemic and stay-at-home orders as factors for employment, consumer spending, and savings.

**Our research question** (as mentioned in the abstract) is: what is the impact of the regional stay-at-home-orders (SHO) on personal consumer spending and employment in the USA? We consider the SHO treatment can become a factor that affects consumer spending. It may have a negative effect on consumer spending for such categories as clothing, footwear, furnishing, and durable household equipment. The SHO treatment makes people spend more money at home and make purchases over the phone and internet, we assumed. We think the SHO treatment was assigned randomly (tested by the distribution of the Google search on COVID in the related period – random pattern relative to SHO-orders).

**Figure 9: Place of Consumer Spending and SHO Policy in the Federal and Regional Economies**



**Figure 10: Suggested Influence Mechanism of the SHO Treatment**



Thus, the DID approach is applied to estimate the pure treatment effect. The SHO treatment produced a statistically significant positive effect on the total consumer spending and some of its components, this study suggests. We hope these results may be interesting for the researchers and public policymakers when thinking about the potential SHO in terms of pandemics. This research assumed a hypothesis that the SHO treatment can produce non-negative effects on the total consumer spending and its main components. Nevertheless, it affected employment for the low-waged employees and some sectors as mentioned in this research. This part of hypothesis is also confirmed by this research.

## 5. Acknowledgment

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# EVALUATION OF ECONOMIC IMPACTS OF CYBER THREATS ON KEY AREAS OF THE INFORMATION ENVIRONMENT

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## **Abstract:**

Identification and determining the financial impacts of cyber threats in the information environment of organizations is still a major problem, especially in the field of insurance. In the last few years, a large number of organizations have been exposed to cyber attacks that threaten their existence. This fact is exacerbated by the current COVID-19 epidemic, which makes many organizations and businesses very vulnerable. Assessing the impacts of cyber threats on organizations and their information environment is a very complex process that requires a combination of economic approaches, IT knowledge and risk assessment. This paper discusses key areas of organizations that are often affected by the impacts of cyber threats and in which organizations caused the most financial damages. The identification of these areas was carried out on the basis of research by the authors of this paper, which is being developed from 2015 to the present. In each of these areas, an analysis is carried out to define the principle and magnitude of the financial impacts that may be caused by the impact of cyber threats. In conclusion of this paper, based on the achieved results, a discussion is made, which outlines the possible future development of this area and the requirements that the scientific community should focus. The results of this research can be applied in the field of economy in the insurance of organizations against the economic impacts of cyber threats.

## **Key words:**

cyber threats, impact, economic, information environment, risk

## **JEL: L53, L86**

### **1 Introduction**

In the last few years, small and medium-sized organizations have been increasingly exposed to cyber attacks. These cyber attacks are become more and more sophisticated every year. Attackers often exploit malicious files that can be downloaded to users computers and targeted intrusions into organizations information systems through their computer networks. Cyber-attacks based on social engineering techniques, which aim to obtain sensitive information from potential victims of such an attack, are also become more common (Bahsi et al. 2019, Woods et al. 2017, Hofmann 2007).

Cyber attacks can have very serious financial consequences, not only for the organization's tangible assets, but also for intangible assets. These financial impacts include a very wide range of financial damages and defects, which may include damage to physical parts of the information system (hardware, server, etc.) or breach of integrity, availability and confidentiality of sensitive organization data (data on employees, customers, technological processes production, etc.). The impact of cyber threats can also negatively affect

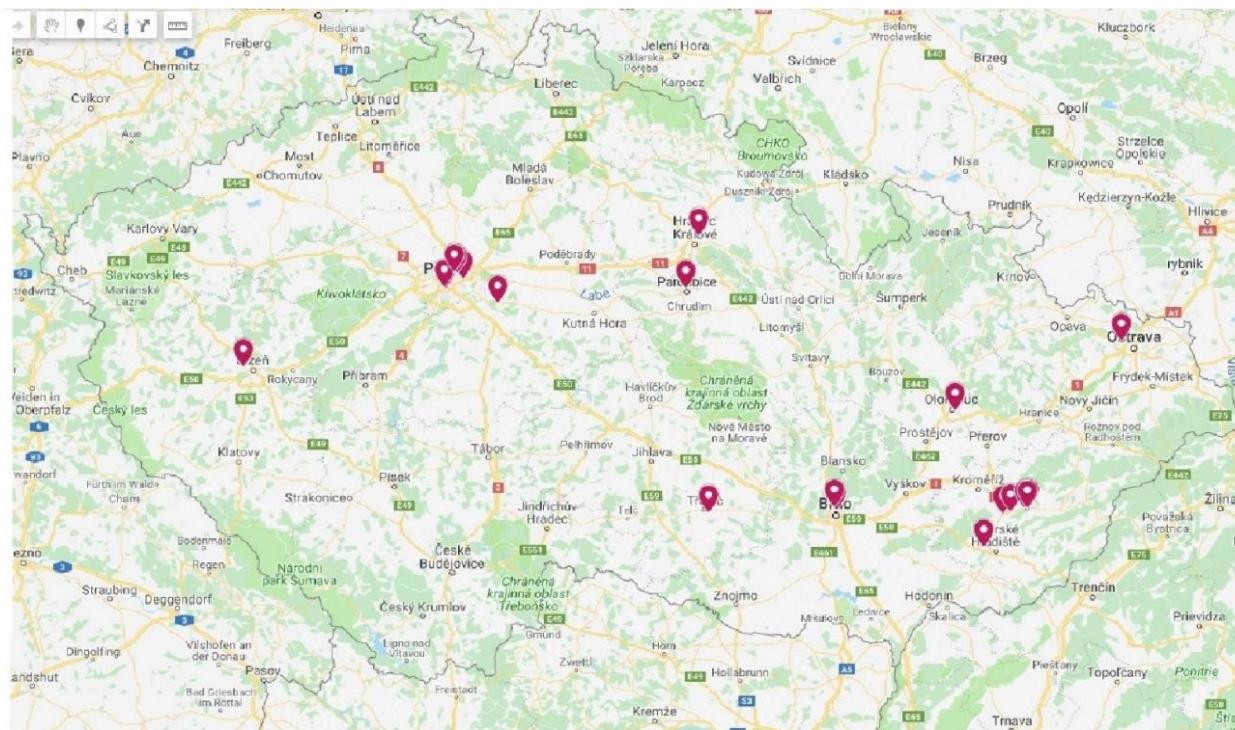
an organization's intangible assets, such as reputation (European Insurance and Occupational Pensions Authority 2019, Yan 2015).

All these areas also need to be assessed for their protection against cyber threats and their impact. Expressing the price of these areas is rather problematic. Valuation of tangible assets can be determined on the basis of their acquisition price or the current depreciation price. For intangible assets, determining the price is even more complicated. The reputation of an organization has been built for many years and it is very complicated to calculate its current value on the basis of all the factors, which should be involved. The aim of this paper is to define all areas of the organization that are necessary for economic or insurance purposes to value (Schwartz 2019, Krautsevich et al. 2011, Farnan 2016).

## 2 Methods

The definition of areas that may be affected by the impact of cyber threats was made on the basis of several factors. The first of them is based on a questionnaire survey that was conducted in the Czech Republic. This confiscation took place in 2019 in 20 organizations and was based on the respondents answers to 20 questions concerning the organization's security against cyber threats and their impacts. The questionnaire survey was shortened for the purposes of this paper. The original number of questions was 26. The number of respondents remained the same. The names of the organizations that were the subject of the questionnaire survey are hidden for security reasons. Below we can see a map with marked places where these organizations are located. Above we can see a map with marked places where these organizations are located (Pavlik 2019).

**Fig. 1 Map of the location of the organizations that were the subject of the questionnaire survey**



(own resource)

During the implementation of the questionnaire survey, the leading employees of the addressed organizations were acquainted with the fact that this is a university research and that the names of the interviewed organizations and individual employees will not be published. A questionnaire was submitted to

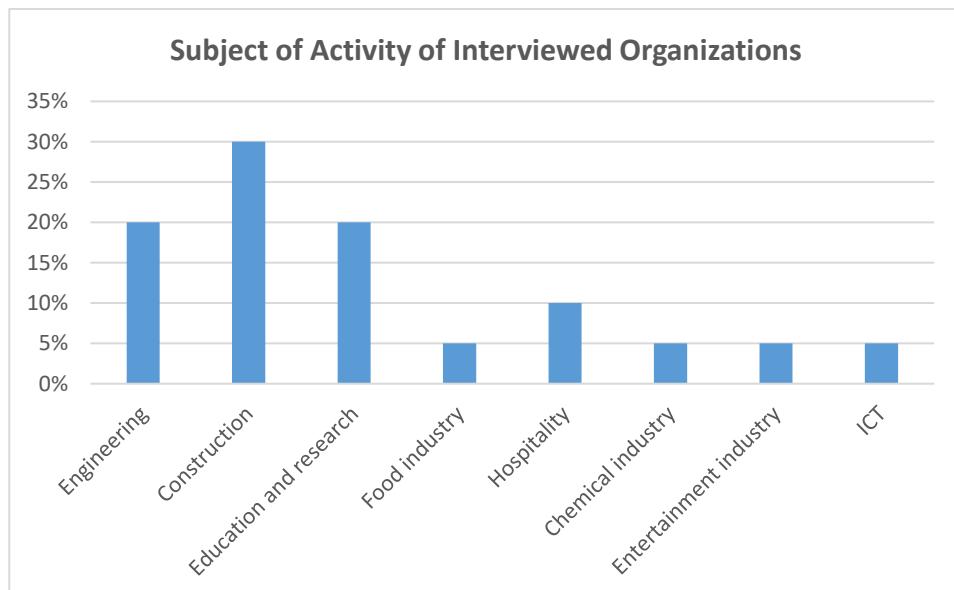
senior executives with a verbal supplement. If one of the employees indicated a misunderstanding of any of the questions submitted, this question was verbally explained to him. The average duration of the interview and the completion of the research questions was 50 minutes. The percentage expression was used in the evaluation of the performed research, the results of which are shown in the following graphs. The results of the questionnaire survey are divided into four separate categories according to the focus of the questions.

For a more accurate characterization of the interviewed subjects, their basic attributes are described here, which include:

- scope of business,
- number of employees,
- annual turnover,
- number of units.

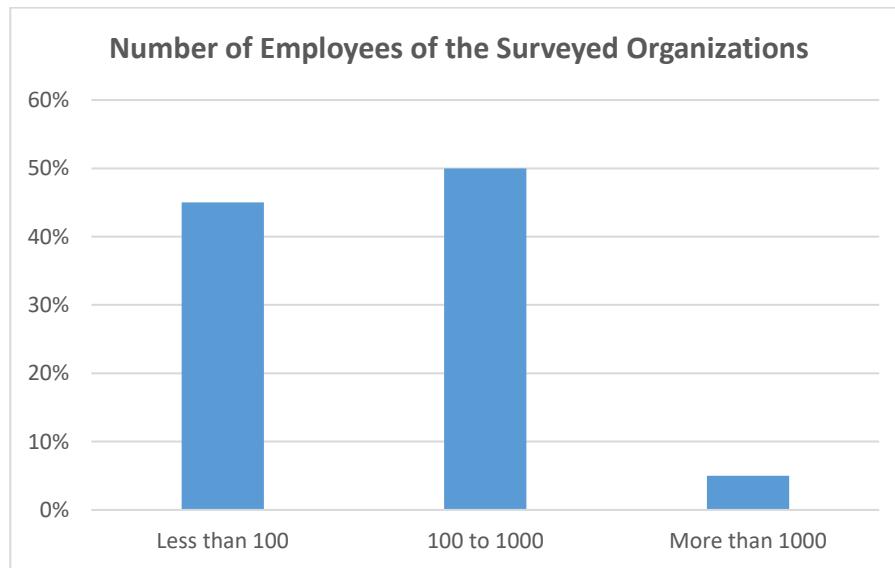
### a) Scope of Business

**Fig. 2 Subject of Activity of Interviewed Organizations**



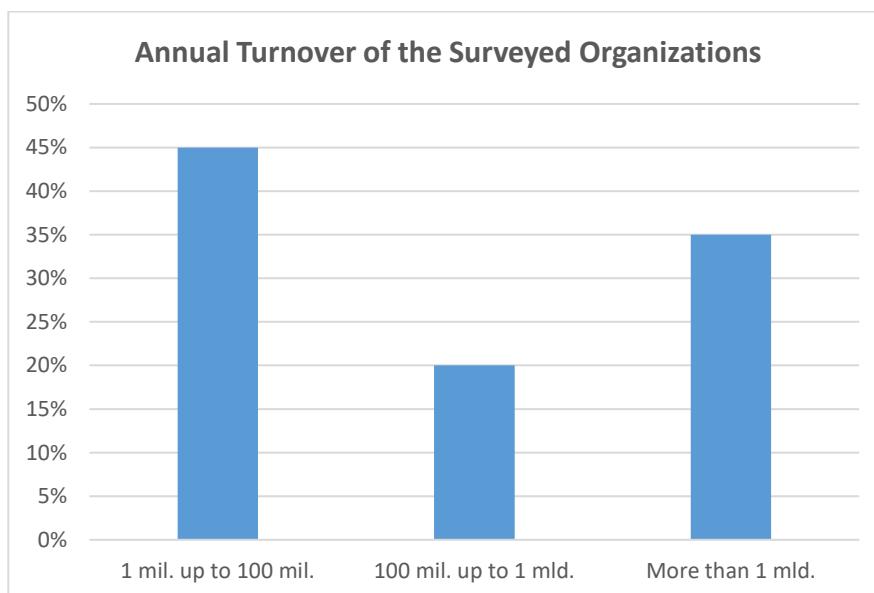
(own resource)

A total of 20 % of organizations were selected from the field of engineering production. This is due to frequent cyber attacks on organizations targeting this market segment. Furthermore, organizations from the field of construction were included in the questionnaire survey, which makes up 30 % of the respondents. The area of education and research is represented here with 20 %, the area of food industry represents 5 %, hospitality 10 % and chemical industry 5 %. One organization was also selected for the research survey, which can be included in the entertainment industry according to the subject of its activity (5 %) and one organization that is focused on ICT technologies and IT solutions (also 5 %).

**b) Number of Employees****Fig. 3 Number of Employees of the Surveyed Organizations**

(own resource)

As part of the implementation of the questionnaire survey, organizations were selected that can be classified as small and medium-sized enterprises. The area of small organizations represents a total of 9 objects (45 %) and the area of medium-sized organizations represents a total of 10 objects (50 %). One of the surveyed organizations has more than 1000 employees (5 %).

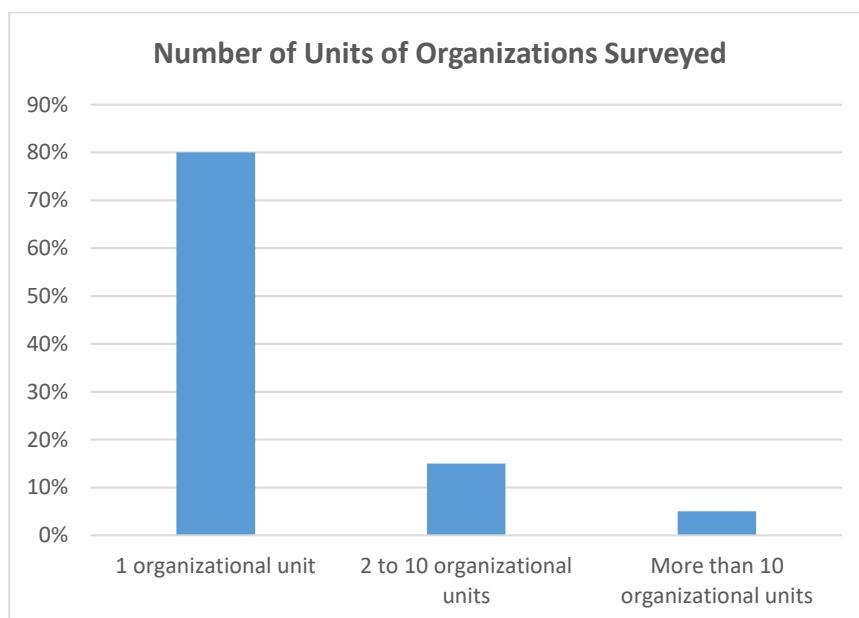
**c) Annual turnover****Fig. 4 Annual Turnover of the Surveyed Organizations**

(own resource)

A total of 45 % of the surveyed organizations have an annual turnover in the range of CZK 1 million to 100 million. The second most represented category are organizations with a turnover of more than CZK 1 billion. The smallest number of organizations has an annual turnover in the range of CZK 100 million to CZK 1 billion.

#### d) Number of units

**Fig. 5 Number of Units of Organizations Surveyed**



(own resource)

Of the organizations contacted a total of 80 % have only one organizational unit. From this fact it can be stated that a large part of organizations that can be classified as small and medium-sized organizations have only one parent unit. A total of 15 % then operate two or more organizational units (but a maximum of ten). The smallest number of organizations (5 %) then operates 10 organizational units.

For the purposes of our research, all questions asked to the respondents were processed in the following table. As we can see, most of the questions are designed with one-word answers. However, some give the possibility to answer in several possible ways. For this reason, the questions and answers are divided into the following two tables.

**Table 1. Open-ended questions**

Number of question	Question	Answer	Note
1	Indicate how many information systems you operate in the organization.	Most respondents (70 %) stated that they use three information systems in the organization.	This question is included in the questionnaire due to the characteristics of the information environment of the organization.
2	Enter the names of your information systems in the marked fields.	A total of 15 % of respondents answered this question that they use STAG and SAP information systems. Other systems most used include Helios, Karat and IPOS, which gained 10%.	
3	In case of violation of sensitive data in the organization, you are able to ensure its functioning until:	A total of 70 % of the respondents answered that in the event of a cyber threat, it is able to ensure the functioning of its organization within 24 hours. The second most common response was resumption of function within 12 hours. Options within one hour and 48 hours then gained 5 %. None of the reference objects marked a response within 5 days.	
4	Indicate which of the organization's assets do you consider to be the most vulnerable to cyber threats?	Question 12 was answered by 85 % of respondents that they consider the organization's data and know-how to be the most vulnerable assets. 80 % gained reputation of the organization. According to selected organizations, another important asset is turnover. IS users and software gained a total of 50 %. The last assets in terms of vulnerability were technical components and customers, which gained 10 %.	

(own resource)

In the next table we can see questions with closed answers. In this table, the answers (YES or NO) are also supplemented by the number of percentages, which express the percentage of the answers. For better resolution, the answers are color-coded. The dark gray colour represent the answer YES and light gray colour represents the second aswer NO.

**Table. 2 Closed questions**

Number of question	Question	Answer YES	Answer NO	Note
1	If you operate two or more information systems, are these systems separated from each other by their functionality?	85 %	15 %	
2	Do you process and collect business and marketing data in your organization?	95 %	5 %	
3	Do you process and collect personal data from the organization in the field of banking and financial transactions?	100 %	0 %	
4	Do you process and collect personal data in the field of human resources in the organization?	100 %	0 %	
5	Has your organization ever been exposed to any of the above cyber risk scenarios? If YES, indicate the specific type of situation (scenarios).	95 %	5 %	The most frequent cyber threats was a malware (75 %). The second was a ransomware (10 %) and third and fourth were hacking and DDoS attack (both 5 %)
6	Are your organization regularly updated in the field of information security?	90 %	10 %	Updates are mainly regular checks of information system components, data backup tec.
7	Do you have a help-desk service available for users in the event of a cyber threat?	15 %	85 %	
8	Do you have a contingency plan (scenario) for the case of cyber threats?	5 %	95 %	
9	Are there contractually agreed penalties for customers in your organization that may be imposed in the event of a disruption to normal business services?	85 %	15 %	
10	Is your organization insured against cyber threats?	0 %	100 %	
11	Would you also expect this insurance to cover damage to hardware and software?	95 %	5 %	
12	Would you also like to cover damage related to damage to the good name of the organization within this insurance?	100 %	0 %	
13	Would you expect to cover the costs of data recovery and reconstruction under this insurance?	85 %	15 %	
14	Should cyber threat insurance also cover financial fees that may be imposed on an organization for leakage or damage to personal data?	100 %	0 %	
15	Should cyber threat insurance cover the costs of reporting the loss or leakage of data to the competent authority?	85 %	15 %	
16	Would you expect that it will also be possible to compensate for lost organizational turnover from cyber threat insurance?	85 %	15 %	

(own resource)

### 3 Results

The aim of the questionnaire survey was to find out the perception of the interviewed organizations towards the issue of cyber security and threats. A partial goal was also to determine which areas these organizations consider the most vulnerable in terms of the possible impact of cyber threats on the economic side of the organization and also to determine the need for insurance against cyber threats. Based on the achieved results of the questionnaire survey, the following conclusions can be drawn:

- the interviewed respondents have at least basic knowledge in the field of insurance, which is focused on compensating for the costs incurred in the implementation of some of the selected cyber threats,
- all of the addressed organizations (i.e. 100 %) process sensitive personal data concerning third parties (i.e. employees, suppliers, customers, etc.),
- 90 % of the organizations contacted answered that in the event of a cyber threat, they would not be able to cover from their own resources the costs that would arise as a result of such a situation,
- 85 % of the addressed organizations consider data and know-how to be the most vulnerable assets of their organization,
- more than 80 % of the organizations surveyed said they would welcome compensation for cyber threats insurance for hardware, software, the organization's reputation, data reconstruction and recovery, fines for leakage or damage to personal data, costs to report lost or leaked data and to make up for lost profits.

Based on the findings, it can be stated that the areas that may be most affected by the impact of cyber threats are:

- hardware,
- software,
- reputation of the organization.

Other costs that may represent a significant financial burden include:

- costs of data reconstruction or renewal,
- the cost of fines that may be required by supervisory authorities in connection with leakage or damage to personal data,
- funds to report the loss or leakage of data to the entities concerned,
- lost turnover of the organization beyond the period of limitation of operations or functions that are necessary to ensure the activities of the organization.

### 4 Conclusion

The purpose of this paper was primarily to analyze possible areas of impact of cyber threats to the information environment of the organization. Defining these areas is a key issue, especially for the insurance industry. Insurance coverage, which is part of insurance products that are designed to compensate for financial damage associated with the effects of cyber threats, is often based on statistical indicators. Due to the fact that cyber threats and their development change very quickly over time, according to actuaries, current approaches to actuarial mathematics are insufficient to determine the amount of insurance coverage (Bohme 2010, Bandyopadhyay et al. 2009, Maurya 2018).

For this reason, it is necessary to look for other ways to determine the possible amount of financial damage that can be caused by the impact of cyber threats. One of the possible approaches is the valuation of defined areas in which tangible and intangible assets are located, the disruption of which could cause

serious financial damages. This paper presents part of the research that has been going on from 2015 to the present. The main goal of the research was to identify these endangered areas. This goal was met on the basis of a questionnaire survey, which took place in selected organizations in the Czech Republic. The result of this research is primarily an evaluation of the impacts of cyber threats on the information environment of the organization. Based on the achieved results, it can be stated that the most important areas of the organization in terms of the impact of cyber threats can include hardware, software, fines that may be imposed by supervisory authorities for personal data leakage, cost of restoration, loss of turnover or reconstruction costs or data recovery (Pavlík 2019, Maurya 2018).

These areas represent an important factor in the process of determining the amount of insurance coverage in the provision of insurance against cyber threats. Future research should focus primarily on determining the financial expression of these areas and individual tangible and intangible assets. Assessing a good name or the potential financial costs of data reconstruction or recovery is a relatively demanding process. The financial expression of these factors thus represents another possible future development of this transdisciplinary area (Chaisiri et al. 2015, Naghizadeh & Liu 2014).

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## FINANCIAL INSTRUMENTS TO SUPPORT THE BIOECONOMY IN THE EU

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### **Abstract:**

Global challenges force us to seek new ways of producing and consuming that respect the ecological boundaries of our planet. The bioeconomy or biobased economy encompasses the production of biobased resources and their conversion into food, feed, bioenergy, and biobased materials. Bioeconomy can contribute to build a more competitive, innovative, and prosperous Europe. Financial support is a significant element for the future growth and development of the bioeconomy, which is expected to move society towards a more sustainable economy. Concerning these issues, the authors focus on financial instruments and their possible impacts. The main aim of this article is to introduce and compare various financing opportunities promoted by the European Union to support the development and growth of the European bioeconomy. Regarding the methodology, desk research and comparative analysis will be used. The results show the comparison of various financial instruments to support the bioeconomy in the EU. The main advantages or disadvantages are highlighted, policy recommendations formulated. Based on the results, we can say that the main types of financial instruments enabling bioeconomy development include taxes, tax relief, grants, subsidies, feed-in tariffs, loans, direct public funding, and tradable permit.

### **Key words:**

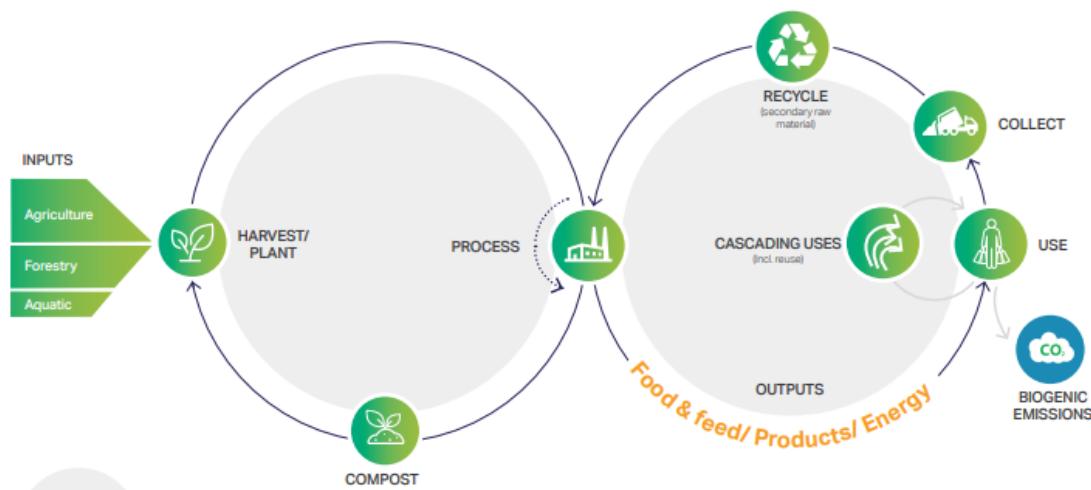
bioeconomy, circular bioeconomy, financial instruments, Horizon Europe, ECBF, BBI JU

### **JEL: Q57**

### **1 Introduction**

The bioeconomy is a renewable segment of the circular economy. The circular economy replaces the original, linear economy, which operates on the principle where resources are turned into products, sold, consumed, and after a very short lifespan burned, landfilled (Institut cirkulární ekonomiky, 2016), or lost in other ways. Core policy objectives of the bioeconomy are to manage natural resources sustainably, reduce dependence on non-renewable, unsustainable resources whether sourced domestically or from abroad, mitigate and adapt to climate change, and create new jobs. Currently, the global challenge is to unlock the potential of the bioeconomy.

Figure 1 Circular Bioeconomy Cycle



(World Business Council for Sustainable Development, 2019)

According to European Union calculations, the annual turnover from the bioeconomy is around EUR 2 trillion and employing around 18 million people and by 2030, up to a million new jobs could be created (European Union, 2018). In the countries of Central and Eastern Europe, the potential of the bioeconomy is untapped. The Czech Republic has not yet developed or adopted any strategy for the bioeconomy and turnover from the bioeconomy in the Czech Republic is 40% lower than the EU average. On the other hand, the Czech Republic is a member of the BIOEAST, which is a Central-Eastern initiative for knowledge-based forestry, agriculture, and aquaculture in the bioeconomy. The Platform for Bioeconomy also operates in the Czech Republic, which deepens knowledge of individual areas of bioeconomy through research and education.

Financial support is a significant element for the future growth and development of the bioeconomy, which is expected to move society towards a more sustainable economy. The European Union provides several financial instruments to support and develop the bioeconomy. Funding opportunities include the research and innovation program Horizon Europe 2021-2027, the European Circular Bioeconomy Fund (ECBF), the European Structural and Investment Fund (ESIF), the European Fund for Strategic Investments (EFSI). Due to the highly topical topic article will mainly focus on the research and innovation program Horizon Europe 2021-2027.

Regarding scientific studies in the bioeconomy area, the issue of financial instruments and their impacts on the bioeconomy sector is not sufficiently analyzed. We can find studies focused on supporting bioeconomy in the EU that ensure economic, environmental, and social sustainability. According to Stichting Wageningen Research Netherlands results, the main types of financial instruments enabling bioeconomy development include taxes, tax relief, grants, subsidies, feed-in tariffs, loans, direct public funding, and tradable permits. (Stichting Wageningen Research Netherlands, 2016)

Other results show that research and development activities are crucial to enable sustainable bioeconomy. The report highlights the importance of biomass availability and financial support for farmers, landowners, and forestry owners. It is important that actors in the field of bioeconomy are fully aware and engaged with the bioeconomy potential in their region. In case to promote biomass availability, there is a need to take advantage of advances in IT for managing, refining, and utilizing feedstock-related data. Then, necessary logistics and storage chains can be established and the complexity of the sustainability report scheme can be reduced - high administrative and cost burden could be streamlined. (European Association of Bioindustries Belgium, 2016)

Bio-Based Industries Consortium's report declares synergies between funding programs in European Union. Synergies are an opportunity to increase the impact of projects and maximize public investments. The report describes synergies between Horizon 2020 (H2020) and the European Structural and Investment Funds (ESIF), the European Structural and Investment Funds (ESIF) and the European Fund for Strategic Investments (EFSI), the EU Finance for Innovators (InnovFin), and the European Fund for Strategic Investments (EFSI). (Bio-based Industries Consortium, 2017)

Financial instruments can support also innovations. Based on the study performed by Lovric et al. (2020), the most frequent types of innovations are within the development of production methods, followed by innovations in goods and services. There are few innovation cases in later stages of development, and more disruptive and complex innovations are usually more successful ones. Successful innovations also depend on support from organizational leadership and external financial support. Project-based funding in innovation development is offset by the revenue generated from these innovations. The vast majority of companies consider the EU framework projects as a useful tool for supporting the development of innovations.

Therefore, the authors will try to fill the gap in current research. The main aim of this paper is to introduce and compare various financing opportunities promoted by the European Union to support the development and growth of the European bioeconomy. The key task is to evaluate their advantages and disadvantages.

## 2 Material and methods

### 2.1. Material and data

This paper will use various resources, the key data sources are official websites of the European Union, the European Investment Bank, the Bio-based Industries Consortium, the Bio-based Industries Joint Undertaking, the European Circular Bioeconomy Fund, and data published in scientific studies (databases WoS, Scopus, Research Gate, etc.). Searched data will be divided into several categories. Materials and data focus mainly on the bioeconomy and access to finance opportunities for investments in bioeconomy sectors.

### 2.2. Methods

Regarding the methodology, this paper represents the pilot study of the more complex research. Since it is the initial research phase, the authors use desk research and comparative analysis.

Desk research is another name for secondary research. The goal is to review previous research findings to gain a broad understanding of the field. Desk research is the assembly, collation, and analysis of information that is already published or in existence (Armstrong, 2002). Desk Research is the research technique that is mainly acquired by sitting at a desk. Desk research is involved in collecting data from existing resources (Management Study Guide). For the purposes of this pilot research, the authors work with the sources described above.

A comparative analysis is a key operation in any empirical scientific effort (Rihoux, et al., 2009). A comparative analysis is the act of comparing two or more objects with a view to discovering something about one or all of the things being compared (Heidenheimer, et al., 1983). A comparative analysis is a data analysis technique for determining which logical conclusions a data set supports (Invernizzi, et al.). The authors will compare various financial instruments to support the bioeconomy in the EU. The main advantages and/or disadvantages will be highlighted, policy recommendations will be formulated.

### 3 Paper results

#### 3.1. Horizon Europe

Horizon Europe 2021-2027, the new research and innovation framework program, will be structured in three Pillars. Pillar 1 - Excellent Science, Pillar 2 – Global Challenges and European Industrial Competitiveness and Pillar 3 – Innovative Europe are complemented by a fourth program area, Widening participation and strengthening the European Research Area (European Commission, 2019).

Focus on bioeconomy will include Pillar 2 – Global Challenges and European Industrial Competitiveness, namely Cluster 6 – Food, Bioeconomy, Natural resources, Agriculture and Environment. The main aim of investments in research and innovation concerning food, bioeconomy, natural resources, agriculture, and environment is knowledge development, capacity building, and demonstrating innovative solutions to accelerate the transition to a more sustainable and circular system.

**Figure 2 Horizon Europe structure**



(European Commission, 2019)

Cluster 6 will contain several key research and innovation orientations. Cluster 6 and challenges under this cluster are highly interconnected and transdisciplinary approaches in the research and innovations orientations are needed. The key research and innovation orientations of Cluster 6 are:

- Environmental observation,
- Biodiversity and Natural capital,
- Agriculture, forestry and rural areas,
- Seas, oceans and inland water,
- Food systems,
- Bio-based innovation systems,
- Circular systems.

European Commission provides the following characteristics for each research and innovation orientations (European Commission, 2019) The main challenge in the Environmental observation area is to deliver more reliable and standardized information to better understand the dependence of global changes. Impacts of this research and innovation work are based on better access to existing environmental information through European and global repositories.

Biodiversity and natural capital orientation will focus on the development of innovative methodologies, technologies, and solutions that can lead to the protection, restoration, and sustainable management of natural capital. Forecasts, scenarios, and projections that integrate socio-economic, behavioral, and bio-physical factors of biodiversity will be developed. Innovators, public authorities, businesses, and the public will participate in these activities.

The main goal of the Agriculture, forestry and rural areas is knowledge development and development of solutions that are more sustainable for land use. Activities related to build up climate-friendly agriculture and forestry systems with agro and forest ecology principles will be supported. Activities will help to understand the impacts of primary production on biodiversity and to identify bioeconomy and its ecological boundaries. ICT and bottom-up innovation in agriculture, forestry and rural areas will be supported.

The mission of the Seas, oceans and inland waters area is to develop a sustainable ocean economy that fully respects ocean-climate, ocean-food, ocean-land, and ocean-society perspectives. The fifth orientation of Cluster 6 – Food systems, represents a significant part of the European bioeconomy.

Food safety systems, reduction of food waste and rethought packaging are the main challenges of the Food systems research and innovation area. Whereas, environmental, cultural and socio-economic factors influence consumer food preferences and lifestyle, innovative food systems should lead to sustainable production and consumption.

The area of Bio-based innovation systems plays a major role in the transition to a climate-neutral and circular economy which operates within planetary boundaries. Bio-based innovation systems will pursue the establishment of sustainable biomass production systems for high value bio-based products and new bio-based value chains. Governance model elaboration can increase the impact of bio-based innovations.

The last orientation of Cluster 6 – Circular systems will focus on the development of material flows indicators and metrics, circular economy and life cycle performance, governance systems, cross-value cooperation and finance instruments.

Figure 3 Horizon Europe budget (EUR billion in current prices)



(Koníčková, 2020)

Horizon Europe 2021-2027, with a proposed budget of EUR 100 billion, represents the largest multinational collaborative research and innovation investment in Europe and is open to participants worldwide (European Commission, 2019). The budget of Horizon Europe EUR 96.5 billion is supplemented by EUR 3.5 billion for the Invest EU fund. For the Pillar 1 – Excellent Science EUR 25.8 billion is earmarked. In the Pillar 2 – Global Changes and European Industrial Competitiveness, which also includes the bioeconomy, EUR 52.7 billion is allocated. The Pillar 3 – Innovative Europe works with a budget EUR 13.5 billion. More than half of the budget of Horizon Europe is dedicated to Pillar 2 - Global Changes and European Industrial Competitiveness, which includes the bioeconomy. Horizon Europe budget includes EUR 2.4 billion for Euratom and EUR 2.1 billion for Widening participation and strengthening the European Research Area.

### 3.2. European Circular Bioeconomy Fund

European Circular Bioeconomy Fund (ECBF) is the first venture fund exclusively focused on the bioeconomy and the circular bioeconomy in Europe. ECBF is an initiative of the European Investment Bank (EIB) and the European Commission (EC) with a target size of EUR 250 million. The European Investment Bank has committed EUR 100 million. ECBF Management GmbH, set up by Hauck & Aufhäuser, will be responsible for raising an additional €150 million private investment and advising on how it should be spent. Fund provides access to finance, in particular in the form of debt or quasi-equity, to innovative bioeconomy companies and projects of various sizes. (European Circular Bioeconomy Fund, 2013)

New investors on ECBF are Nestlé - the largest food company in the world; Neste – the leading producer of renewable diesel; Volkswohl Bund Versicherungen; a German insurance company; the One family Office, and NRW.BANK. European Circular Bioeconomy Fund is backed by investors from five European countries. The main goal of the European Circular Bioeconomy Fund is to mobilize public and private investors and fill a funding gap in the European bioeconomy. ECBF provides equity investment to growth-stage bioeconomy and circular bioeconomy companies. European Circular Bioeconomy Fund, as a financial instrument, has a significant impact to achieve the European Green Deal goals and Sustainable development Goals. (European Circular Bioeconomy Fund, 2020)

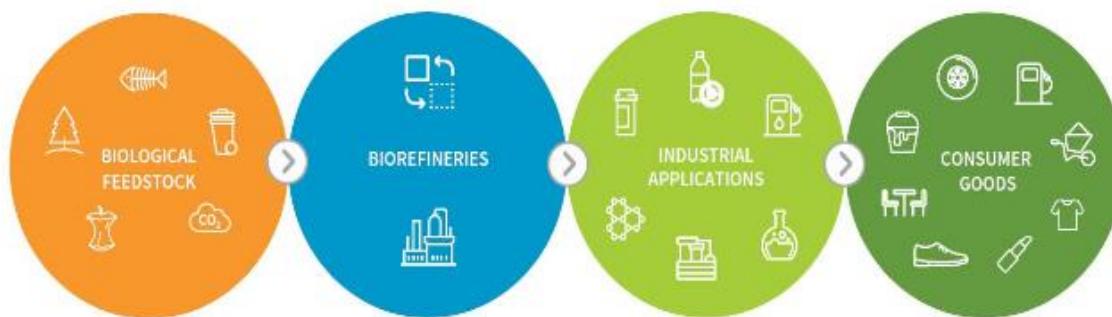
European Circular Bioeconomy Fund supports projects focused on bio-based chemicals, textiles recycling, biotechnology, agri-tech and bio-based-compostable packaging. Investment criteria include growth-stage bioeconomy companies located in the EU, projects link to TRL (Technology Readiness Level) levels 6 to 9 and commitment to Environmental, Social, and Governance criteria (ECBF's ESG guideline). (European Circular Bioeconomy Fund, 2020)

### 3.3. Bio-based Industries Joint Undertaking

Bio-based Industries Joint Undertaking (BBI JU) is an initiative under Horizon 2020 and EUR 3.7 billion Public-Private Partnership between the European Union (EU) and Bio-based Industries Consortium (BIC). BBI JU was established in 2014 to implement initiatives up until the end 2024. (Bio-based Industries Joint Undertaking, 2014)

Bio-based Industries Consortium (BIC) represents the private sector in the Bio-based Industries Joint Undertaking (BBI JU) and BIC members are large industries, small and medium-sized enterprises, regional clusters, universities, research and technology organizations, European trade associations, and European Technology Platforms. Bio-based Industries Consortium (BIC) supports bio-based projects under the Horizon 2020 program and provides information about access to funding, loans and grants from European institutions (Bio-Based Industries Consortium, 2013). Bio-Based Industries Consortium activities are focused on local sourcing and production, job creation, rural and coastal development, sustainability and resources efficiency.

Figure 4 BBI JU focus areas

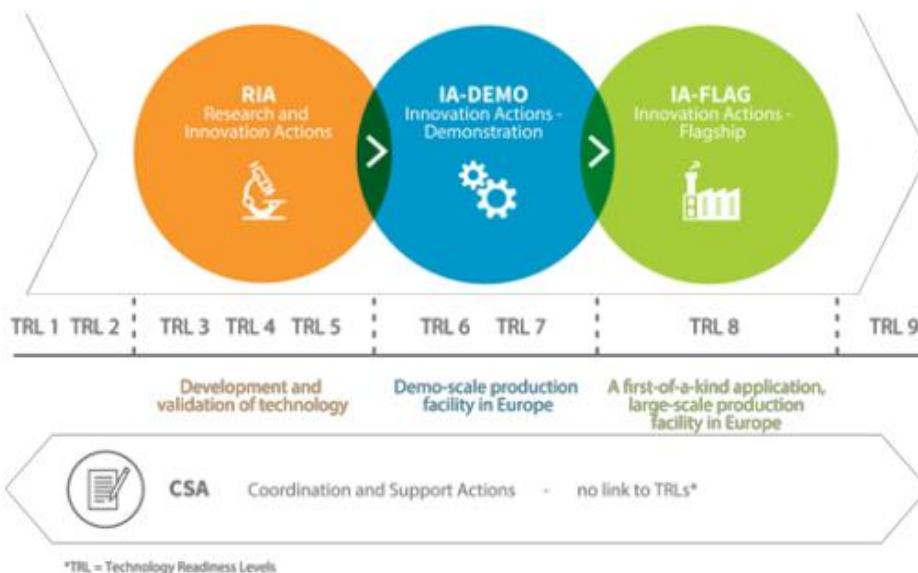


(Bio-based Industries Joint Undertaking, 2014)

The major challenge of the Bio-based Industries Joint Undertaking (BBI JU) is the development of new technologies that are able to transform renewable natural resources into bio-based products, materials and fuels. BBI JU projects should be divided in three categories – Feedstock, Biorefineries and Markets, products and policies.

Feedstock area supports a sustainable biomass supply and builds new supply chains. Biorefineries area focuses on optimization of efficient processing through research and development and demonstration of economic and efficiency viability at a large scale. The third area – Markets, products and policies, includes the development of markets for innovative bio-based products and optimal policy framework to accelerate the market uptake of bio-based products.

Figure 5 BBI JU Project Classification



(Bio-based Industries Consortium, 2017)

Based on project aims and their TRL (Technology Readiness Level), the calls are grouped in two categories: Research and Innovation Actions (RIA) and Innovation Actions (IA). Coordination and Support Actions (CSA) are not linked to TRLs. Research and Innovation Actions (RIA) are focused on the development of new technologies. Basic research, technology testing, testing, and validation are used. Projects link to TRL levels 3 to 6. Innovation Actions – Demonstration (IA-DEMO) are focused on demo-scale

production facilities. It involves flow optimization, costs reduction, and the development of new technologies in an operational environment. Projects link to TRL levels 6 to 7. Innovation Actions – Flagship (IA-FLAG) are focused on focus on first-of-a-kind (FOAK), large-scale production facilities. It consists of technical and economic performance at pre-commercial level, in real-life operating conditions. (Bio-based Industries Consortium, 2017)

According to BBI JU Annual Activity Report 2019, BBI JU is an essential element of the bioeconomy strategy that mobilizing the bio-based sector by stimulating investments expected to generate a leverage effect of over EUR 2.1 per each euro of public funds. The BBI JU project portfolio is growing and comprised 124 granted projects with a total funding amount of EUR 717 million with 1466 total beneficiaries from 37 countries in 2019. BBI JU discussed in 2019 also opportunities about the future of the partnership under Horizon Europe. Project portfolio 2019 consists of funding for research organizations and higher education establishments (30%), large industries (31%), and small and medium-sized enterprises (35%). At the end of 2019, the BBI JU project portfolio reported 23 projects (12 RIAs, 6 IA-DEMOs, 2 IA-FLAGS, 3 CSAs) resulting from the calls of the year 2019. BBI JU operational budget expenditure in Calls 2019 divided EUR 49.99 million for RIA projects, EUR 31.92 million for IA-FLAG projects, EUR 31.82 million for IA-DEMO projects, and EUR 4.45 million for CSA projects. (Bio-based Industries Joint Undertaking, 2019)

### 3.4. Comparison of financial instruments

**Figure 6 Comparison of financial Instruments to support bioeconomy in the EU**

	Horizon Europe	ECBF	BBI JU
Initiators	European Commission (EC)	European Investment Bank (EIB) European Commission (EC)	Bio-based Industries Consortium (BIC) European Commission (EC)
Budget	EUR 100 billion	EUR 250 million	EUR 3.7 billion
Period	2021 - 2027	2013 - ?	2014 - 2024
Sectors	Environmental observation Biodiversity and Natural capital Agriculture, forestry and rural areas Seas, oceans and inland water Food systems Bio-based innovation systems Circular systems	Blue economy & Fishery Agro, Farming and Forestry Basic Materials & Chemicals Packaging Nutrition Home & Personal Care	Feedstock –biomass Processing & Biorefineries Bio-based products Bio-based products market uptake
TRL (Technology Readiness Level)	expected publication April 2021	6 - 9	3 - 8
Applicants	small and medium-sized companies, large industries, households, public bodies, research organizations, universities, etc.		
Expected outputs	patents, research reports, scientific articles, book chapters, large investments in infrastructure, innovations, etc.		
Goals	increase the % of the bioeconomy, reduce emissions, create new jobs, reduce dependence on fossil materials, sustainable economic growth, waste reduction, sustainable energy and water consumption, create bioeconomy value chains, circular and cascading use of biomass, etc.		

The results show that the European Union is the main initiator of financial support for the bioeconomy. Horizon Europe 2021-2027, new research and innovation framework program, with a proposed budget of

EUR 100 billion, represents the largest multinational collaborative research and innovation investment in Europe and is open to participants worldwide.

EU funding initiatives focus primarily on supporting the research and development phase and early stage innovations. For commercialization less financial support is available. We can say that the complex and continuous funding approach beyond the research and development and pre-commercial stages is not at a sufficient level. Especially, for companies to commercialize their new products more funding support is needed. In particular, the funding needs of the commercialization stage (TRL 9) remain not fully addressed in the EU.

European investment opportunities are available to many applicants, such as small and medium-sized companies, large industries, households, public bodies, research organizations, universities, etc. Projects expected results include patents, research reports, scientific articles, book chapters, large investments in infrastructure, innovations, etc. The goals of the programs help to support the development of the bioeconomy in the EU and mainly focus on increase the % of the bioeconomy, reduce emissions, create new jobs, reduce dependence on fossil materials, sustainable economic growth, waste reduction, sustainable energy, and water consumption, create bioeconomy value chains, circular and cascading use of biomass, etc.

According to Stichting Wageningen Research Netherlands results, the main types of financial instruments enabling bioeconomy development include taxes, tax relief, grants, subsidies, feed-in tariffs, loans, direct public funding, and tradable permits. Based on this study we compare only grants. We will focus on other indicators in further research.

#### 4 Discussion

Financial instruments to support the bioeconomy in the European Union are crucial factors in achieving a climate-neutral economy system in European Union by 2050. Investments in research and innovation will improve European competitiveness and accelerate the transformation of the European economy to a green and more sustainable way.

Based on our results, at the European level, the main funding opportunities for research and innovation projects in bioeconomy are represented by Horizon Europe (2021-2027). Horizon Europe, the next research and innovation program, will drive the systemic changes and ensure a transition to circular a green European economy. Horizon Europe is a powerful financial instrument and an opportunity to meet the objectives of the European Green Deal and Sustainable Development Goals.

Other financial instruments to support the bioeconomy are Bio-based Industries Joint Undertaking, European Circular Bioeconomy Fund, EU Finance for Innovators (InnovFin) under Horizon 2020, the European Fund for Strategic Investments (EFSI), the European Structural and Investment Funds (ESIF), and the European Bank for Reconstruction and Development (EBRD).

Current barriers to scaling the circular economy, bioeconomy, or circular bioeconomy are high and risky costs, bio-based technologies, non-complex policy, and customer perception of bio-based materials and products (World Business Council for Sustainable Development, 2019). The development of a new European risk-sharing financial instrument for the bioeconomy can potentially meet the needs of bioeconomy projects and mobilize private capital.

Regarding the advantages and disadvantages of financial instruments, we can say that there is currently a major European Union initiative to support the development of individual sectors of the bioeconomy. These activities are intended to help the European continent become the first climate-neutral continent by 2050. In this case, the bioeconomy is the possible way the EU can achieve its goal. We see another advantage in the wide range of financial instruments that are offered to different types of applicants. According to Stichting Wageningen Research Netherlands results, the main types of financial instruments enabling bioeconomy development include taxes, tax relief, grants, subsidies, feed-in tariffs, loans, direct public funding, and

tradable permits. Among the disadvantage is the assigned fact that there is no comprehensive system to support the development of the bioeconomy from initial research to the commercialization stage. Implementation of this system in practice will ensure that the right financing solutions and targeted advisory support in the bioeconomy will be available. The disadvantage is also the lack of private investment in the bioeconomy, so the European Union still needs to attract more private investment to scale-up innovations in the bioeconomy. Supporting the bioeconomy through financial support has enormous potential for the European Union to meet a major challenge - to meet not only the European Green Deal but also the Sustainable Development Goals (SDGs).

For evaluating of financial and economic instruments and their impacts on bioeconomy sector, it is necessary to focus on ex post analysis of impacts of these instruments. Therefore, in our future research, we will focus on such ex post analysis.

## 5 Conclusion

The main aim of this paper was to introduce and compare various financing opportunities promoted by the European Union to support the development and growth of the European bioeconomy. The key task was to evaluate their advantages and disadvantages.

Based on the results, it is obvious, that the main types of financial instruments enabling bioeconomy development include taxes, tax relief, grants, subsidies, feed-in tariffs, loans, direct public funding, tradable permits, and supporting the bioeconomy through financial support has enormous potential for the European Union to meet a major challenge - to meet not only the European Green Deal but also the Sustainable Development Goals (SDGs).

Regarding policy recommendations, the key issue is to strengthen the financial support for bioeconomy sector growth. It will help to solve sustainability issues on regional, national, and also international levels.

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# CHANGES IN MATH EDUCATION AT MORAVIAN BUSINESS COLLEGE OLOMOUC DURING THE COVID CRISIS

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## **Abstract:**

The COVID-19 pandemic brought many changes. Many people got into a financial crisis, many companies had to change their direction of business and changes also took place in education.

Almost all school levels had to switch to online teaching. This situation brings many changes in the style of teaching, examination, and work with students. Some of these changes are described in this article. The article also describes a small research among MVŠO students. The main research topic is the evaluation and experiences of students from this change. This small research shows students' study resources, student's preferences of devices, students' opinion on the online and in person study. The research tool was a questionnaire.

## **Key words:**

COVID crisis, teaching, education, mathematics, evaluation, students

## **JEL: A22**

### **1. Introduction:**

We are approximately one year in specific situation. The COVID-19 pandemic brought many changes. Many people got into a financial crisis, many companies had to change their direction of business and changes also took place in education.

Almost all school levels had to switch to online teaching. This situation brings many changes in the style of teaching, examination, and work with students.

For example, many changes came in mathematics' lectures. Mathematics is one of difficult and less popular subject. Mathematics is "scary" for many students in normal traditional lectures. Online lectures brought many new challenges – worst possibility to work individually with students, worst possibility to show procedures and calculations, less possibility to have more questions in lectures. Technical limitations were hard, fortunately, teachers have many possibilities to make online math lectures equivalent with full-time/traditional teaching. We can make live online lectures via MS Teams, Google Meet, ZOOM, etc. Students may have questions anytime during these lectures. And what about graphs, procedures, calculations via online lectures? No problem. For example, you can use whiteboard application in MS Teams. Anyone can write or draw there anything. Questions is, HOW? Drawing or writing is hard with computer mouse, touchpad etc. Answer is easy. You can use some device with touchscreen – tablet, hybrid notebook, etc. Unfortunately, without some good stylus it is not so comfortable. Cheap universal styluses with "a wide rubber tip" are often inaccurate. Electronic pens and electronic styluses are better and more accurate. Unfortunately,

they work just with specific devices. There is second possibility – you can use your device (notebook, PC, etc.) with graphical tablet. It is easy to use and you can connect it with most devices.

Figure 1: Workplace for online teaching with graphical tablet



What about experiences on other universities or other countries? For example, Wei Bao (2020) referred about 5 important points connected with online education. The first one is making emergency preparedness plans for unexpected problems. Online education platforms may not be able to host such a large scale of users and may shut down because of overload. Teachers need to have "plan B". The second one is – try to divide the teaching content into smaller units to help students focus. Other is better use of voice, because "body language" is not able via online lectures. Fourth point is maximum online support – consultations via online platforms. Fifth point is focus on active learning and combination of online learning and offline self-learning to prevent "skip the class". (Bao, 2020)

Similar findings had professor of Educational Psychology Andrew Martins (2020). He claimed that it is very important to make instructions explicit, orderly, and well-organised as possible. He had similar point about content – it is necessary to prepared high-quality content. Really important think is motivation. It is easy to lose motivation during online lectures because self-regulation of students can decline. Teachers may divide lectures to more smaller units and control results of teaching. He mentioned interpersonal relationships too. It is important to use three main channels: the interpersonal channel (emotionally supporting students), the content channel (delivering content that is well-matched to students' ability and interests), and the instruction channel (supporting students through Load Reduction Instruction). The last point is mental health, because it is not only vital outcome in itself, it is a means to other vital outcomes – such as learning. (Martins, 2020)

The questions – is online teaching as good as traditional teaching – is not new. Ried (2010) made study with four groups of students. After several lessons there were no difference in the final exam scores of the students assigned to the online and traditional classroom teaching methods. (Ried, 2010)

Another situation should be in India. Akhter Ali and Kamraju (2020) presented negative results about students' attention. In India are attentive only 2% of the students. With the existing digital divide, expanding online education will increase inequality in educational outcomes. (Akhter Ali, Kamraju, 2020) There are presented some solutions for increase of online education in India by Jindal and Chahal (2020). Online education can change the whole future of education, if they can join collaboration with industry, universities, and government. Education process needs to be changed – it should be more practical with the use of technology. (Jindal, Chahal, 2020)

Krátká and Zemanová (2020) presented, that their students perceived distance learning more difficult for teacher, especially more time consuming. It is hard to estimate the scope of tasks. And it is hard to motivate and engage pupils and students, too. (Krátká, Zemanová, 2020)

Positive results were presented by Chaitanya Cheemakurthy from Bournemouth University (UK) (2020). The results of the tests of students who incorporated online-learning models in their educations were more satisfied and showed better overall results. The results showed that students who used traditional educational methodology were not motivated enough to complete their daily tasks and showed lack of incentive. Among other things, 80% students agreed that e-learning helped them save money. (Cheemakurthy, 2020)

In this time, we have done two full semesters via online teaching. Maybe we will have third semester via online platforms. How does look online teaching from the students' point of view?

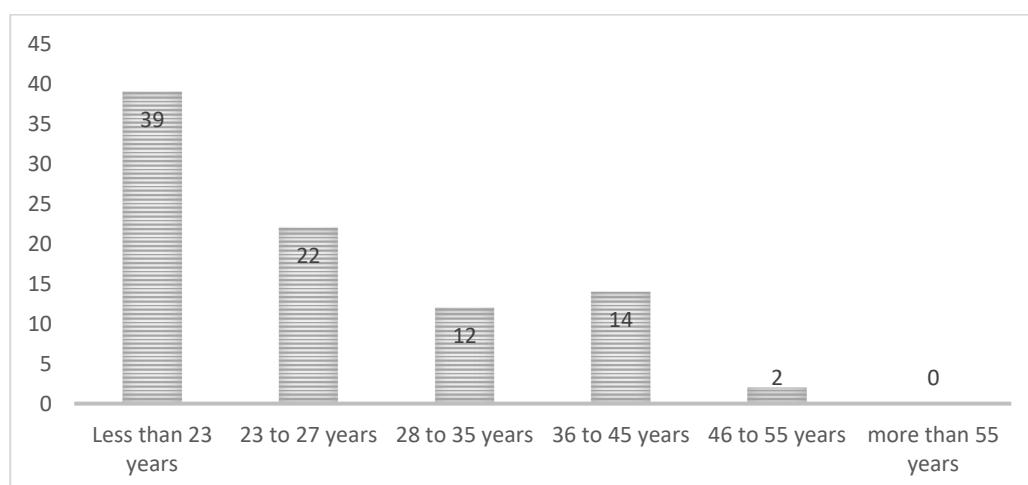
## 2. Methods:

The main research topic is the evaluation and experiences of students from this change – online education. The research tool was a questionnaire. This questionnaire was online via Microsoft Forms platform. Many questions were focused to students' devices, used study materials and their opinion and experiences.

The respondents were 89 MVSO students. The study form was full-time and part-time. It brought a better age distribution of respondents. The questionnaire was realized after two semesters and two examination periods in "online education".

There were 54 women and 35 men. 55 respondents were from full-time study, 34 respondents were from part-time study. The most of students (59) were from cities, the rest of students (30) were from villages or similar. The age of students was less than 55 years.

Graph 1: The age of students.



## 3. Paper results

### 3.1. Devices

The first important questions were focused on students' devices (they can choose more devices). It is important question, because the size of screen and the possibilities of writing is important think for online teaching. Some teachers used camera and whiteboard in the classroom, and it can be problem for

smartphones. The same problem can be with sharing of presentations or specific applications with many texts.

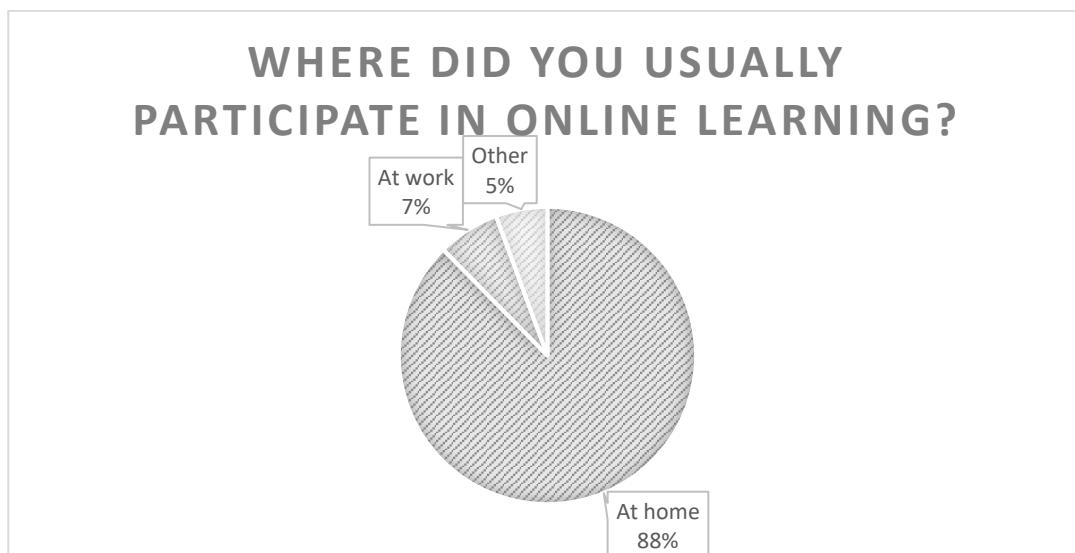
The result was positive, because almost everybody (87) used notebook or PC for lectures. Similar number of respondents (82) used notebook or PC for exams. There were many respondents, which used notebook or PC and smartphone (35). There can be two main reasons. The first one is using smartphones when they can't use notebook or PC. The second one is using smartphone together with PC, because PC's haven't often microphone and camera. Users can use PC like a big screen with information and smartphone like a "webcam with microphone". Tablet chose just 10 respondents.

Almost everybody had the device for online lectures or examination only for himself (81). 6 respondents share the device with other household members and 2 respondents with colleagues at work.

### 3.2. Places

The last information – sharing of devices – related to next question: Where did you usually participate in online learning?

Graph 2: Where did you usually participate in online learning?

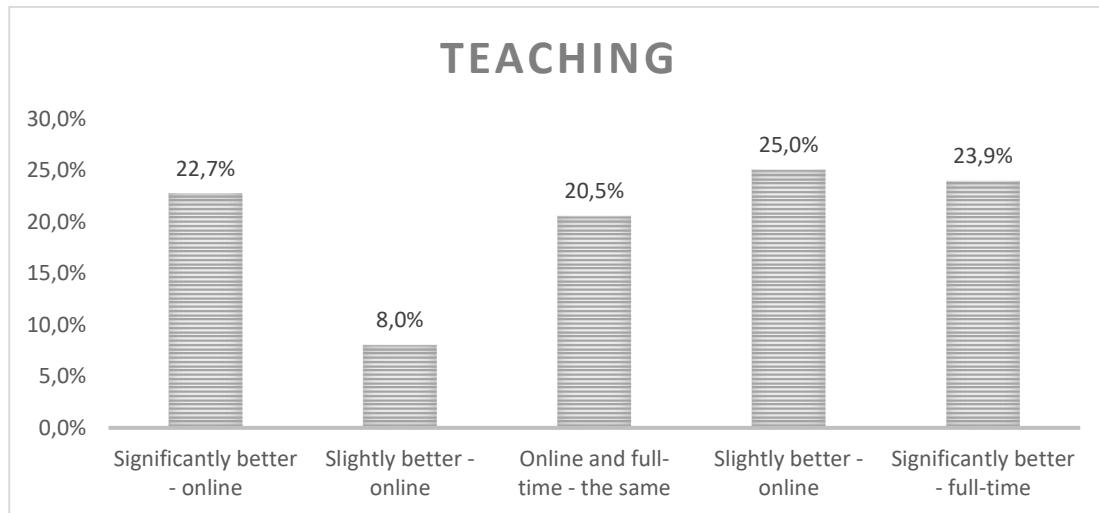
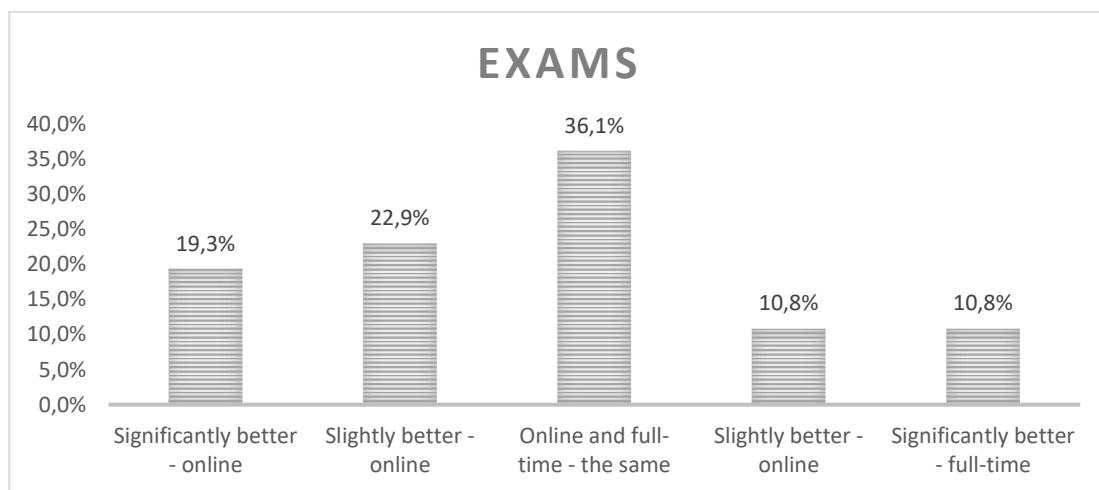
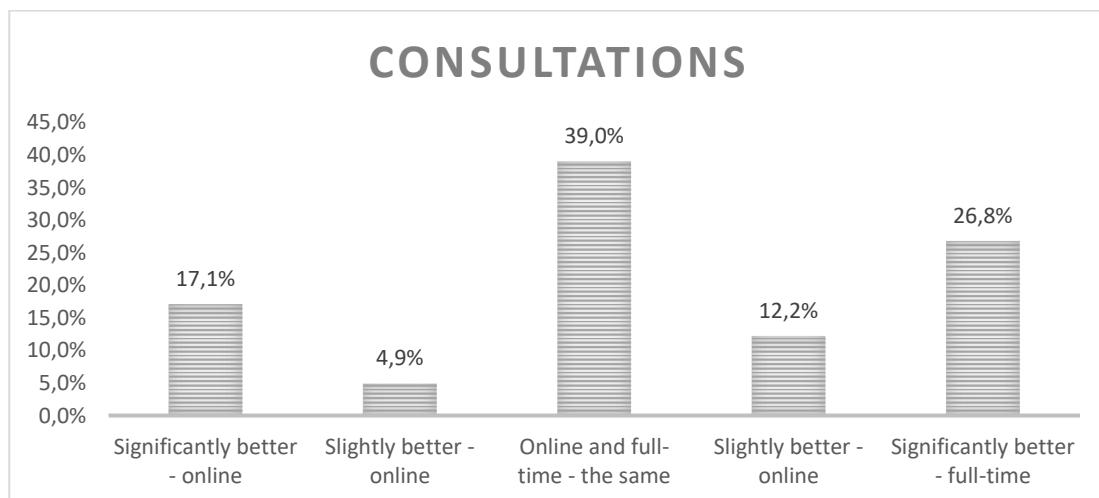


The other's response included both answers (at home and at work), in the car and at work or watching lectures' records.

### 3.3. Quality and evaluation

Next question was "How do you generally evaluate the quality of online teaching / examinations / consultations from the point of view of the technical solution?" The feedback was really good, because 74 respondents said, that all was without problems or just with small problems.

Another question was focused on the comparison of online and full-time teaching / consulting / exams.

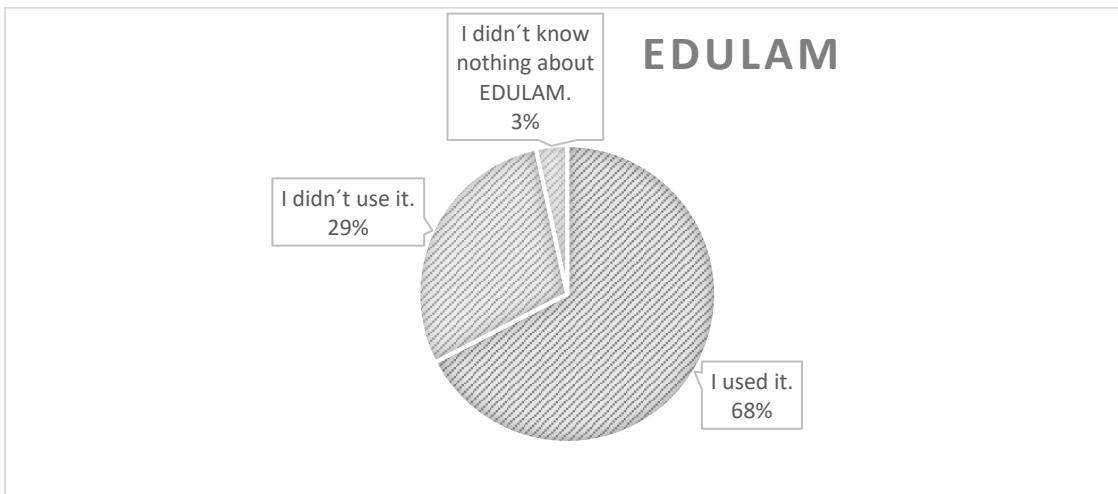
**Graph 3: Comparison of online and full-time teaching****Graph 4: Comparison of online and full-time exams****Graph 5: Comparison of online and full-time consultations**

As you can see, all answers were fairly balanced, students preferred full-time lectures, but they like slightly more online exams. Consultations was the same online and full-time.

### 3.4. Study resources

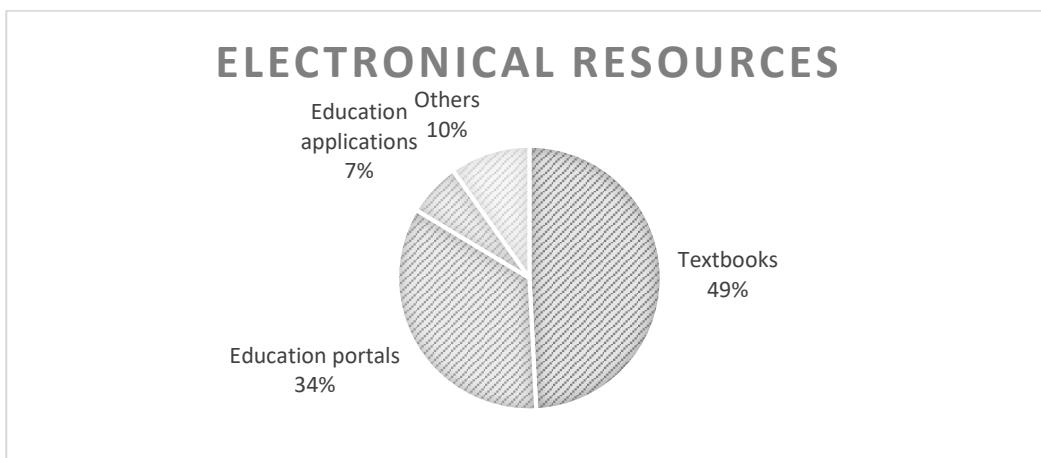
Study resources and study materials are important part of education. MVSO students can use EDULAM portal with many online books and videos. And they really used it – 68% used EDULAM videos, 29% didn't use it and just 3% didn't know about this possibility.

**Graph 6: EDULAM**



Students used more video resources – Youtube (75), Stream (13), Khan Academy (4) or others (f.e. tutoring). Students used other electronical resources, f.e. textbooks, education portals, applications or others – Investopedia, Populo, Ekospace, Isibalo.

**Graph 7: Electronical resources**



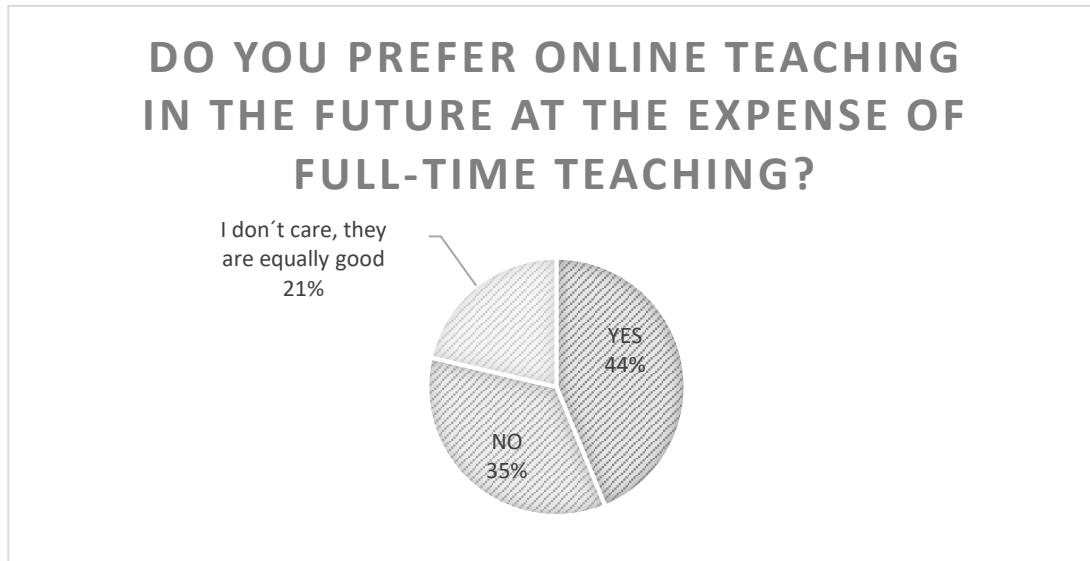
## 4. Discussion

As you can see, online education, exams or consultations changed our professional lives and students' opinion on the study. Some of them like it, others dislike it. The same situation is with teachers' opinion. It is often harder to make online lectures with the same quality, many teacher aren't "IT professionals" and they

are nervous before each lecture. It is hard to be without face to face contact with students, many teachers need it. But it is necessary to be prepared for the future and for this kind of situations.

And what about the final opinion of students? It was one of the most important questions - Do you prefer online teaching in the future at the expense of full-time teaching? You can see answers on the last graph.

**Graph 8: Do you prefer online teaching in the future?**



As you can see, it is very balanced. Question is "Why?". Answer is in positives and negatives of online teaching. Students like time and financial savings, because they can study at home and it isn't necessary to travel to school. And it is big advantage. On the other hand, students don't like the social distance, they have problems with concentration at home and some of them like contact with teachers.

So, question is, what is the future of teaching? There are several options. If the COVID crisis continues, online learning will be still dominant. After the end of the covid crisis, it is possible to expect the return of full-time students to "offline education". Online teaching may continue to dominate in part-time study programs. This prediction brings space for the implementation of research into the impact of online teaching on students' knowledge.

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## INFLUENCE OF COVID 19 ON FINANCING BUSINESS ACTIVITIES: LESSONS LEARNED FROM SELF-EMPLOYED PERSONS

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### **Abstract:**

Business activities and their financing depend in many cases on the financial knowledge of the entrepreneur. In a crisis, it is best seen whether the entrepreneur can plan in an unstable environment or rely on external resources, such as business subsidies from governmental resources. This paper's main goal is to present the results of primary research conducted during autumn 2020, which illustrate the current situation within the Covid-19 pandemic on the financial management of sole proprietors and changes in their thinking on investment impact on governmental subsidies on that behaviour. The results are based on primary research (177 interviews) in the Czech Republic. Those findings are compared with secondary data – a survey realized by the Association for SMEs, where 8% of them would survive current restrictions (lasts up to one month). In contrast, about 46% have sufficient reserves for more than three months in emergency mode. Moreover, the study confirmed a negative relationship to public support. Based on these results, this study confirmed that many self-employed people prefer to solve their current situation by their selves, not with governmental assistance.

### **Key words:**

Financial management, decision making, self-employed persons, governmental subsidies

**JEL: L26, M21, M13**

### **1. Introduction**

Deciding on the direction of these financial flows is difficult as the fact that there is a problem in choosing a suitable, future-oriented portfolio has long been known. The right portfolio is precisely the document that helps at the strategic level in deciding the direction of both cash and its future direction, as stated by Ronyastra et al. (2015). This decision also entails a certain degree of uncertainty in the loss of the invested funds. In this regard, Shksi-Niae et al. (2011) also commented in their research work that only a low level of attention has been paid to this part of the investment process. This decision is closely related to what influences a person, both rationally and psychologically, whereby either the top management or the company owner defines his more or less rational decision on the portfolio (McCarthy et al., 1993).

Business profit is usually limited in two main ways. The first is that entrepreneurs do not have enough regular customers to generate sustainable profit. The second is a limitation of enterprise capacity, which restricts the number of orders and the company's ability to accept more. Reinvestment could be a solution to both of these problems. Companies can provide earned money (in the form of reinvestments) for employees, machinery, research and development and appropriate promotion. The fact that reinvestment should help a company support handling orders can be crucial in acquiring a different business dimension. When the company reinvests profits into itself, the money is usually used for research and development, debt repayment, or possibly as a net cash flow from investment activities, all of which makes for a stronger and more competitive company. Contrarily, for a joint-stock company, the typical procedure is that a firm pays out dividends to shareholders, increases such dividends, or buys back its shares, but the company does not grow. Such companies do not enjoy a competitive advantage and do not move towards higher goals and long-term prosperity in today's highly open and competitive market. Internal reinvestment supports growth from within and has a more significant and more stable positive impact on corporate shares than the distribution of profits to shareholders, as we discussed previously. By contrast, companies driven by profit distribution to shareholders are often at the peak of their market potential and can no longer grow through organic (internal) growth (Hall et al., 2004).

An entrepreneur who "lives for the moment" prefers transient sensual satisfaction and makes his decision accordingly, i.e. not to invest this profit back into the company but, for example, to pay for a vacation. Thus, the reinvestment process does not take place. However, if the entrepreneur decides to do the opposite, his profits will be reinvested in the company. An entrepreneur or the executive management decides to invest all of the profit or just its proportion. For example, Vallejo-Martos (2011) stated that the trend in family businesses focuses on the company's future and hence the family. It is a long-term orientation of the company, and several factors come into play, namely the level of indebtedness, attitude to risk and the emphasis placed on reinvesting profit. This trend, especially in the area of reinvestment activities of family businesses, is supported by other authors: Vilaseca (1996), Gallo and Vilaseca (1996), McConaughy et al. (1998) and Poutziouris (2001), Pakšiová (2017) or Popescu and Banta (2019).

This financial behaviour is valid within a "normal" situation without any problems, which comes to whole economies due to the Covid-19 pandemic from March 2020. Many enterprises had to be closed or limited due to anti-epidemic restriction provided by national governments. It was the main reason why governmental support is provided to sole proprietors. The table below summarizes typical forms of public support focused on sole proprietors across countries worldwide (EU Commission, 2020a).

Table 3: Examples of different types of Covid-19 public business support

Source	Main focus of support	Country
Canady, 2020	CARES Act, support of mental health providers, small loans assistance, 2 trillion stimulus aid package, providers less than 500 employees	USA
Block, Fisch & Hirschmann, 2020; Nienaber, 2020	Aid package for sole and micro enterprises, immediate financial assistance at amount of € 9,000.	Germany
Brülhart, et al., 2020	Corona loans, compensations for employees	Switzerland
Granja et al., 2020; Chetty et al., 2020	Paycheck Protection Program	USA
Zoller-Rydzek & Keller, 2020	Evaluation of guarantee and loans impact on financial health of microenterprises, three scenarios	Switzerland
Florczak, 2020	Support for employers through co-financing of remuneration for employees from the Guaranteed Employee Benefits Fund, One-off payment for persons conducting sole proprietorship in 80% of minimum wage rate 2020, A low-interest loan of PLN 5,000 is available for micro-entrepreneurs	Poland
EU Commission, 2021a - State Aid SA.61358 (2021/N) – Czech Republic - 2021	Compensation bonus for self-employed persons, and partners of small limited liability companies, who have been prevented – completely or partially – from carrying out their business activities as a result of the COVID-19 outbreak	Czech Republic
EU Commission, 2021b -State Aid SA.61486(2021/N) – Sweden	Aid in the form of guarantees on new loans, loans will be guaranteed in 70%	Sweden
EU Commission, 2020b -State Aid SA.60274 (2020/N) – Cyprus	Support businesses and workers due to COVID-19 during the period 16 March 2020 – 31 October 2020 and have not proceeded to any layoffs. This one-off, lump sum grant will amount to: EUR 10 000 for self-employed and enterprises that employ up to 9 people and EUR 15 000 for self-employed and enterprises that employ 10 people or more	Cyprus
EU Commission, 2020c- State Aid SA.59996 (2020/N) – Slovakia	State Aid Scheme for support of undertakings in relation to COVID-19 outbreak – fixed costs subsidies	Slovakia

Source: Author's comparison based on literature review.

Following that table 1, the main focus of this public support is to help sole proprietors to cover fixed costs and to give state-based guaranteed loans for this critical segment of entrepreneurs in the economy when in the Czech Republic, the active number of sole proprietors is more than 603 739 persons (Solitea, 2020). FAPI research (2020), conducted on 90 sole proprietors, has shown that due to the Covid-19 situation were "closed" their business de jure 28%, de facto others could use alternative ways, how to deliver their services and products to customers (via social media, e-shops). Their profits decreased to 60%. In line with that, those people tried to find some ways, how to survive in that situation as others. They used a costs reduction (38%), a close of establishments/offices (32%) and a reduction of business activities (29%). The main costs which they have to cover are rent, energies and lease payments. Opposite to that, we obtain a piece of initial

information about a sentiment of governmental support, when almost half (49%) accept it relatively warmly ("it's better than nothing") and almost 16% are sceptical. Those entrepreneurs stated that they would have a reserve fund to cover the three-month cost (46%) in words of financial planning. In terms of plans, 39% of respondents plan to invest in gaining new customers, expanding activities or expanding into new markets. These results and the existing list of support were a starting point for finding a current research gap.

The research gap authors defined as a change in business behaviour in the area of financial planning and internal funds use for financing in the context of existing public support within a "crisis", which is not covered in previous studies. It is the reason why we set the main research question as "*Which factors affect not using public support when it is offered?*" The results we will present in the form of interview evaluation conducted with sole proprietors in the Czech Republic in the form of two hypotheses, supporting the main research question. As hypothesis one (H1) was introduced, "during the Covid-19 pandemic situation, sole proprietors reinvest more profit into business activities", and hypothesis two (H2), "sole proprietors changed their financial and investment planning due to pandemic situation when public support is available".

Following that, this paper's primary goal is to discuss the sole proprietor's sentiment in the area of finance reinvestments allocation and the behavioural change within the Covid-19 crisis.

## 2. Methods

A combination of primary and secondary research was provided to acquire relevant information on sole proprietors' activity in an area of financial decision making within a crisis (Zott et al., 2011).

The primary research with the owners of sole proprietors had to be carried out with at least a total sample of 177 active respondents randomly selected in the Czech Republic in autumn 2020 from the Amadeus database when authors asked for interview 1% from their total number of 611 833 (as a primary activity, ČSSZ, 2020). Unfortunately, the sample size was not as representative (0.03% of the general sole proprietor population in the Czech Republic but it could help to understand the more profoundly current situation in that business sector as a pilot study and confirmation study of previous research (Cavana et al., 2001, FAPI, 2020).

During the interviews conducted on the phone (due to the current situation), the entrepreneurs explored their primary motives for providing their business activity and expressed their opinion on their target group's public supports. Secondly, the entrepreneurs evaluated and answered questions focused on their financial planning, reasons for investments and their financial actions affected by the Covid-19 situation. Due to interviews, respondents were asked about current governmental subsidies such as (MPO, 2020):

- *Transport support package*. It will defer toll and road tax payments to truckers.
- *Liberation package*, which removes entrepreneurs' June advances on personal and corporate income tax.
- *Antivirus program*, the so-called "kurzarbeit", i.e. the financial compensation for employers who are disabled by the current situation from assigning work to employees due to quarantine or childcare for a significant proportion of employees who prove that they cannot produce due to limited availability of necessary inputs or limited demand for their products or services.
- *Aid for farmers* affected by the coronavirus pandemic. Thanks to it, it will be possible, for example, to accept deferred payments for commercial loans provided by the Support and Guarantee Agricultural and Forestry.
- *COVID II program*. It responds even more to the needs of companies and sole traders. The self-employed and small and medium-sized enterprises will be guaranteed by ČMZRB for loans from commercial banks and contribute up to one million Czech crowns to pay interest.

- "Nursing benefits" for self-employed persons. After the closure of schools and other establishments, self-employed persons have had to cease their business connected with caring for a child, or a disabled person will receive a nursing allowance until 30 June 2020.
- *Compensation bonus* = direct support for self-employed persons. It is a support measure for the self-employed, thanks to which those who have been most affected by the current pandemic and related government measures will receive direct support of CZK 25,000.
- *COVID Program – Rent*. It is a subsidy program, which is to contribute to entrepreneurs paying the rent from the establishment. The state would pay tenants half of the total rent for April to June 2020.
- *Czech Rise Up 2.0 program* is intended to support the completion of industrial research and experimental development, the clinical research phase, patent validation and similar intangible assets or conformity assessment and certification.
- *Cultural and Creative Industry Program*. It aims to mitigate the adverse effects of coronavirus pandemic on entrepreneurs in the cultural and creative industries in the Czech Republic.

The study's limitations can be seen in the validation of results, where they describe each respondent's subjective opinion. This choice was appropriate for the chosen research problem, which was to identify different behavioural models for social groups support based on their socio-economic and socio-cultural backgrounds (Alaslani and Collins, 2017).

*Data sample evaluation.* Basic statistical methods evaluated the dataset. We used a percentage share to show the significance of each element, which was tested by Cramer V coefficient to describe a relationship between two nominal variables when by convention, the range of  $V= 0.1$  to  $0.3$  is considered as the weak effect, then  $0.3$  to  $0.5$  = middle-sized effect, and  $>0.5$  = strong. A significance was tested on the p-value of  $0.05$ . (Cohen, 1988).

## 2.1. Data sample description

The findings presented here are founded on the authors' interpretation of in-depth interviews with social enterprises managers. In this study, the sample consists of 177 respondents who dedicated their time for the interview, based on a phone call. One call lasts 20 to 30 minutes on average. The main group of respondents were men (65.5 %). When we focused on their experience, the majority of them have experience of more than 20 years (33.5%), 11 to 20 years (16.5%), 4 to 10 years (29.6%) and the shortest experience – till three years (20.4 %).

This sample represents people with long business experience, so they have the competencies to evaluate precisely the current situation. Those descriptive variables were found as statistically significant for the evaluation of the overall situation when Cramer V coefficient = 0.745 and Sig. = 0.001.

## 3. Main results

Decision making in financial management are closely related to the company's survival in a globalized market and with competitiveness, which is reflected explicitly in the continuous process of the improvement of goods and services as well as fundraising processes and the economic potential of social enterprises within the crucial situation, especially crisis. In the first step, we asked sole proprietors about governmental public support and its adequacy.

It is essential to mention that most of the respondents (54.8%, 97 respondents) did not request public support. Several motives we had noticed were summarized in table 2.

**Table 2: Main motives to use or not use public support (N=177)**

Main motives	Sentiment P-positive; N-negative	Percentage share
I didn't use it because I didn't want to, even though I was entitled to it	N	32%
I really needed it and I used it and I reinvested it back in the business	P	29.7%
I didn't reach for any of the help	N	21.1%
I'm embarrassed about this support	N	7.1%
Why not use it when the state gives and I am entitled to it	P	5.8%
There was no need for that	P	4.3%

Source: Primary research data

The results had shown that within respondents were justly two influential groups who believe that they a) have to resolve financial problems individually (negative sentiment) and b) could use some supporting tools from the government when the offer is open (39.8%). Individual use of programmes we are demonstrating in the following table 3.

**Table 3: A comparison of real Covid programmes use**

Programmes	No	Yes
Forgiveness of social and health insurance contributions for self-employed persons	42.2%	57.8%
Compensation bonus = direct support for self-employed persons („pětadvacítka“; CZK 25,000)	48.5%	51.5%
Programme “Nursing benefits” for self-employed persons	87.4%	12.6%
COVID-Rent	91.7%	8.3%
Antivirus program- so-called kurzarbeit	94.2%	5.8%
Liberation package – removes entrepreneurs' advances on personal and corporate income tax	94.7%	5.3%
Czech Rise Up program – Smart measures against COVID-19	98.5%	1.5%
COVID – Program Accommodation	98.5%	1.5%
COVID – Spa package programme	98.5%	1.5%
Aid for farmers affected by the coronavirus pandemic	99.0%	1.0%
Cultural and Creative Industry Program	99.5%	0.5%

Source: Primary research data

According to results, sole proprietors prefer the direct form of public help to reduce insurance, compensation bonuses, nursing benefits, and rent reduction. It seems that this type of support could help them with fixed cost coverage.

In the second step of our analysis, we want to extend previous studies when asked about the sole proprietors' financial behaviour before and during Covid-19. The results (Table 4) indicate a non-significant change in that case.

**Table 4: Change in the reinvestment share**

Period	How much profit do you reinvest back to your enterprise? (in percentage share)						Evaluation	
	0%	20%	40%	60%	80%	100%	Cramer V	Sig.
A: Before Covid-19	1.10%	1.70%	14.40%	16.10%	33.30%	33.30%	0.210*	0.002
B: During Covid-19	7.28%	2.91%	11.17%	15.05%	27.67%	35.92%	0.101	0.420
Difference A-B	-6.18%	-1.21%	3.23%	-1.05%	5.63%	-2.62%	-	-

Source: Primary research data. \* Significance on  $\alpha = 0.05$

When in period A (before Covid-19), most of the respondents reinvested back 60% and more of profit back to their business activity, the situation in the period B (during Covid-19) verified that sole proprietors required internal resources (a negative difference in the segments 60% and 100%). Following that, they evaluated their current strategy and their plans for the future (Table 5).

**Table 5: Future Investment strategy (N=177)**

Planned behaviour	Percentage share
I will not change anything – my strategy was good	49%
I will create a reserve fund	23%
I will invest more	19%
None of them – I have no idea	17%
I will not change anything – lack financial sources	10%

Source: Primary research data.

This table completes the view on sole proprietor's behaviour when 49% of them are satisfied with their planning, resources, and strategy, supported by their attitude to public support, mentioned in Table 3. The lack of financial resources was selected as the last option.

#### 4. Discussion and Conclusion

Existing entrepreneurial ventures offer an additional, more specialised view to the decision-making process in enterprise functioning within financial support services. During the first phase of the Covid-19 pandemic situation, public support was presented, but sole proprietors did not correctly accept this type of support. As mentioned in table 2, most respondents rely on their savings, internal capital sources to finance their business activities. This table also gave us a more comprehensive picture, why sole proprietors did not use any public support – one obstacle was an unclear condition of supporting programmes ("I did not reach for any of the help", 21.1%) or they used their sources ("I did not use it because I didn't want to, even though I was entitled to it"; 32%). This result supported the idea of Hall et al. (2004) that sole proprietors prefer internal sources of growth. The most important type of support was used in social and health insurance contributions and compensation bonuses. Other notable programmes were not preferred (Table 3). Those findings expanded the results of FAPI (2020), which do not describe a concrete evaluation of existing support.

Crucial financial planning decisions are made as an ongoing activity in the sole proprietor's, not just single activity caused by the Covid-19 situation. Following that, we can answer two hypotheses as Hypothesis one (H1) was set as "*During Covid-19 pandemic situation social entrepreneurs reinvest more profit into business activities*" – ***the hypothesis H1 was rejected.*** A comparison between those two situations (see Table 4) have shown that the share of respondents, who invest more than 80% of their profit increased by 5.63 % in total, but the test did not find any significant effect during the Covid-19 situation (Cramer V = 0.101, Sig. = 0.420, p-value = 0.05). Surprisingly, the reinvestment portfolio was found as statistically significant within period before Covid-19 (Cramer V = 0.210, Sig. = 0.002, p-value = 0.05).

In contrast to that, hypothesis two stated: "Sole proprietors changed their financial and investment planning due to pandemic situation when public support is available". The results in table 5 present the answer. Sole proprietors stated in 49% that they do not change anything due to their "good" strategy. This ***hypothesis (H2) have to be rejected.***

Without proper financial business structures and strategy (table 5), there is a risk that sole proprietor's enterprises will only have a slight local advantage and problems within each crisis. The lack of funds for financing and the risk aversion of business activities associated with sole proprietor group members' low business confidence is the main topic there. The professionalization of those enterprises could help them become sustainable and plan to get external financial sources or get public support (Zott et al., 2011; Shakhsin-Niaezi et al., 2011). Nevertheless, those ideas were not confirmed by the pilot research.

Further research is required regarding these mainstream supporting financial processes in those enterprises, as previous analyses have generally offered more questions than answers regarding designing and implementing appropriate financial tools and reinvestment segment to be more effective (Paksiova, 2017; Zoller-Rydzek et al., 2020, Granja et al. 2020). Those results could be seen as significant for discussion only when respondents were randomly selected from the database, independent on branch or specialisation of respondents.

## 5. Acknowledgement

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# INTENSITY OF INNOVATION ACTIVITIES AND BARRIERS LIMITING THEIR IMPLEMENTATION IN COMPANIES IN THE CZECH REPUBLIC

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## **Abstract:**

The majority of owners and managers are aware that the long-term competitiveness of the company depends on the implementation of innovative activities in the form of innovative technical and non-technical solutions, but also on investments in new technologies. Despite the fact that the importance of innovation activities implementation is perceived, the intensity of innovation activities in companies in the Czech Republic is not at the level of innovation leaders in EU countries. The implementation or launch of innovation activities carried out in enterprises is limited by barriers that exist, for example, in the form of a lack of stimulus for innovation, own financial resources, skilled workforce, etc. The aim of the paper is to analyse the intensity of innovation activities and barriers limiting their implementation, taking into account company size, ownership, industry and cohesion region (CZ-NUTS). The analyses are processed on the basis of secondary data obtained by a questionnaire survey on innovation activities for the period 2016-2018 worked out by the Czech Statistical Office. In some aspects, a comparison is made with the previous period 2014-2016. The analysis uses methods of classification and arrangement according to the number of innovative companies with regard to size, ownership, etc., comparative method, purpose probe and cluster analysis.

## **Key words:**

Innovation activities, Innovation barriers, product innovation, business process Innovation, cluster analysis

**JEL: O3, O31, M1**

## **1. Introduction**

Contemporary conditions of high competitive enterprise environment lead business owners and managers to strategic focus on innovations. Companies innovate in order to survive, maintain its position in the market and at the same time be able to respond flexibly to customer requirements, or even come up with ideas before the market shows interest in them. Implementing innovations brings business opportunities, increased competitiveness, and the emergence of new markets. Innovation has an impact not only on the business sector, but also on the competitiveness of the economies of individual countries (Tidd & Bessant, 2014).

Many companies are already aware of the importance of innovation for their survival and development, but the latest research survey on innovation activities 2016-2018 shows that 47 % of companies with 10 or more employees implemented innovations, which is less than the EU28 average countries (51 %). Based on

the results of the CZSO innovation survey and the author's own research (Peterková & Ludvík, 2015; Peterková, 2018; Krasnicka et al., 2018), it follows that the intensity of implemented innovation activities is influenced by a number of factors such as company size and ownership, which determines the degree of independence in strategic decision-making. Another key factor for the company's innovative activities is its own research and development, which brings higher-level innovations. The industry and the size of the market in which the company operates also have an impact. Macroeconomic factors also play an important role. They include state of the economy affected by economic cycles and unpredictable facts such as various crises, disasters and restrictions negatively affecting free trade (CZSO, 2018). Klímová & Winklér (2017) call these factors innovation barriers or obstacles to innovation. According to the Oslo Manual (2018), an innovation barrier prevents a non-innovative firm from engaging in innovations or an innovatively active firm from introducing specific types of innovation. Innovation barriers increase costs or create technical problems, but they are often solvable. As a result, innovation barriers lead to a reduction of enterprise innovation activities, and this results in a reduction of the innovation performance of regions and national economies. The CZSO collects data on innovation barriers for business entities, both for innovative and non-innovative companies, while the latest data are from the innovation survey from the period 2016-2018, which were published in June 2020. Determination of innovation barriers enables government bodies and local self-government bodies to respond to them with appropriate steps.

The aim of the paper is to analyse the intensity of innovation activities and barriers limiting their implementation, taking into account size of the company, ownership, industry, and cohesion region (CZ-NUTS) and identify barriers in case of innovation and non-innovation enterprises including their comparison. The analyses were processed on the basis of the CZSO's secondary data on innovation activities for the period 2016-2018; a comparison with the previous period 2014–2016 is also made in some aspects. The comparison method and purpose probe are applied in the article. At the same time, the evaluation of innovation barriers in innovative and non-innovative companies in the Czech Republic with regard to the size, ownership and branches of the economy is performed, using cluster analysis, Ward's method with Euclidean distance.

## 2. Theoretical and methodological background

### 2.1. Approaches to the definition of innovation and innovation barriers

Innovations represents the driving force not only for companies but also for entire economies and result in increased competitiveness and economic performance. Therefore, in almost all developed economies, there is a discussion about setting innovation policy at the governmental and regional level, which should support the emergence of innovation in the current dynamic market environment (Kraft & Kraftová, 2012, 2015; Seidler-de Alwis & Hartman, 2008; Tödtlin & Tripl (2005). Innovation as an engine of economic growth has a leading position in both industrial and regional policy (Warne et al., 2014; Capello & Lenzi, 2017, 2013).

According to the Oslo Manual (2018), a distinction is made between product innovation and business process innovation. Product innovation means introduction into the market of a new or significantly improved product or service with regard to its characteristics or use. It includes significant improvements in technical specifications, components and materials, software, user friendliness or other functional characteristics (CZSO methodology, 2020). Internal process innovations are the introduction of a new or significantly improved way of producing or providing services, including their distribution, storage, processing of business information or communication within the company, introduction of new IT systems and providing supporting business activities such as maintenance, purchasing or accounting. Internal process innovations also involve a significant change in the technologies, equipment or software used. Marketing innovation is related to the introduction of a new or significant change in the way products / services are traded, including changes in design and packaging, promotion, pricing strategy or the use of new sales methods. Organizational

innovation represents the introduction of a new way of organizing the management of supplier-customer relationships, human resources, or external relations, including the use of outsourcing of business activities. It is therefore a fundamental change in the organizational structure or management methods within the company, which were not previously used, in order to improve the use of knowledge, quality or streamline the course of work. Creating innovation is a complex process that is influenced by a number of external and internal factors. According to Kraft & Kraftová (2015), these factors are: factors of market structure and potential (e.g., monopoly or oligopolistic markets, etc.), factors directly influenced by managerial decisions such as pricing and marketing, product quality, etc. and other aspects of innovative diffusion processes such as spill-over effects.

According to Hudson & Minea (2013), Stejskal & Maťáková (2012), Sleuwaegen & Boiardi (2014) interactions among various factors of innovation activities, corporate creativity, learning, and innovation are two-way, synergistic and lead to the creation of spill-over effects. The impact of knowledge and the spill-over effects of knowledge in today's most advanced economies has become one of the key issues for many scientists (e.g., Coe & Moghadam, 1993; Baicker et al., 2005). They examine their impact on economic growth, corporate productivity, supply and demand, as well as their creation, dissemination, use for the benefit of innovation production.

According to the authors Coad et al (2016), Hudson & Minea (2013) analysis of factors resp. innovation barriers for innovative and non-innovative enterprises is of great importance for innovation policy, both at regional and national level, as their identification can contribute to the development of more effective governmental and regional measures that will increase the number of innovative firms or increase the innovation performance of existing innovators. Barriers to innovations are generally factors that hinder the innovation process. D'Este et al. (2012) point out that it is necessary to distinguish between different types of barriers, as this will help government and regional policy makers to determine why and to what extent businesses are excluded from innovation activities. For similar reasons, detailed knowledge of innovation barriers is also important for company managers. According to the Oslo Manual (2018), innovation barriers are identified in three areas: markets, public policy and society, see Table 1.

Table 1: Innovation barriers in three areas

General area	Specific area
Markets	Domestic customers, access to international markets, suppliers and value chains, availability/cost of skills, availability/cost of finance, competitors, standards, markets for knowledge, digital platforms.
Policy	Regulations Functioning of courts and rules enforcement, taxation, public spending (level and priorities), government support for innovation, government demand for innovations, public infrastructure General policy stability.
Society	Consumer responsiveness to innovation, favourable public opinion towards innovation, level of trust among economic actors.

Source: Oslo manual (2018)

At the same time, Coad et al. (2016) point out a positive correlation between involvement in innovation activities and the perception of barriers. That is, those seeking to innovate feel more pressure from innovation barriers than non-innovative companies. Moreover, authors point out that innovation barriers need to be identified, as the findings will enable the implementation of effective measures at the regional and government level, which will have a positive impact on the intensity of implemented innovation activities.

## 2.2. Data processing methodology and applied methods

The data obtained by the survey on innovation activities by the Czech Statistical Office for the period 2016-2018 represents the basis for the analysis. The survey has been conducted in two-year cycles and coordinated by Eurostat, subject to EU Commission Implementing Regulation No 995/2012 of 26 October 2012 implementing Decision No 1608/2003 / EC of the European Parliament and of the Council concerning the production and development of Community statistics in the field of innovation. The Czech Statistical Office used a harmonized Eurostat model questionnaire to collect data on companies' innovation activities. CZSO reworked the questionnaire into a national (shorter) version including several national questions. 6 685 companies with at least 10 employees from selected areas of industry and services (financial and non-financial) based in the Czech Republic were contacted. The net rate of return (number of questionnaires used) was 85%. The questionnaire and the results prepared by the CZSO in tabular form have been published broken down according to the following aspects: the Czech Republic as a whole, by company ownership (domestic enterprises - foreign enterprises), by enterprise size (small: 10–49 employees; medium: 50–249 employees; large: 250 and more employees), by field of business (sections by CZ-NACE), by regions of cohesion (CZ-NUTS).

The own probe purposefully focused on determining the intensity of implemented innovations, including the division into product and business process innovations with regard to the size of the company, ownership, economic sectors, and cohesion regions (CZ-NUTS) was carried out. The probe was worked out on the basis of data published by CZSO. Priority was given to data for the period 2016-2018 in some aspects compared to the period 2014-2016. Within the implemented probe following research questions were asked:

1. Which companies have introduced the most innovations in particular sectors of the economy?
2. Which companies have introduced the most innovations in particular cohesion regions (CZ-NUTS)?
3. What barriers prevent the implementation of innovation activities in innovative companies, taking into account the size and ownership of the company?
4. What types of barriers belong to innovation and non-innovation companies regarding size, ownership of the company and sector of the economy?

In order to find answers to above mentioned questions, following methods were used:

- classification and organization according to the representation of enterprises with established innovations with regard to the economic sector and the cohesion region (CZ-NUTS2),
- comparative method,
- special-purpose probe on barriers to innovation activities in innovative and non-innovative companies, taking into account the size and ownership of the company,
- cluster analysis.

Cluster analysis refers to a group of methods whose goal is to classify a set of objects into several relatively homogeneous subsets, called clusters, based on the analysis of multidimensional data. Objects inside clusters should be as similar as possible and objects belonging to different clusters as different as possible. The basic criterion for creating object clusters is the similarity between objects. Similarity measurements can be made using an appropriate correlation measure, distance measure, or association measure. Correlation and distance measures are used mainly for ratio data, while association measures are intended more for enumerated (nominal) data. Common measures of distance include Euclidean distance, Euclidean distance square, Manhattan distance (Hamming metric), generalized Minkovian metric, chord distance, and Mahalanobis metric. The Ward's minimum variance method is the most commonly used method in management (Charry et al (2016)).

The cluster analysis was performed separately for innovative companies and non-innovative companies. Both types of enterprises were grouped on the basis of 14 variables (ownership, enterprise size, and

industry). The distance (proximity) between the individual profiles was calculated by the Euclidean metric. The connection of objects was performed by Ward's method for a purpose of comparison. Cluster analysis was performed using SPSS software.

### 3. Results

#### 3.1. Results from the realized purpose probe

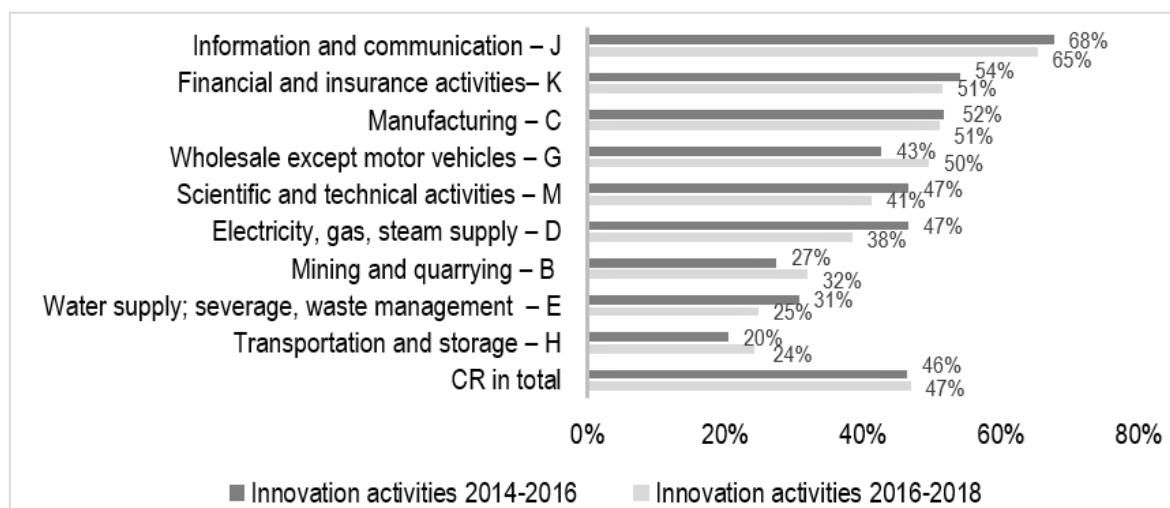
The results of the statistical survey of innovations for the period 2016-2018 show that companies in the Czech Republic implemented more innovations in business processes (40 % of companies) than product innovations (27 % of companies). Within business process innovations, companies focused mostly on internal process innovations (32 %), followed by innovations related to organizational changes (23 %) and innovations in marketing methods (22 %).

The analysis of CZSO data also shows that the relative frequency of enterprises with innovations in business processes that are under foreign control is higher (21 %) than in enterprises with domestic owners (17 %). At the same time, the share of companies innovating business processes varies by size. While in the category of small companies only 16 % of companies introduced business process innovation, in large companies it was 27 %. In contrast, the introduction of product innovations is relatively balanced, taking into account both the size of the enterprise (4 % small enterprises, 5 % medium and large enterprises) and ownership (4 % domestic enterprises, 4 % foreign-controlled enterprises).

#### **Analysis of the frequency of enterprises with established innovations with regard to the economic sector**

Differences in the number of enterprises with introduced innovations by sectors of the economy, including a comparison with the national data for the period 2014-2016 and 2016-2018, can be observed, see Figure 1. In the graph, the sectors are arranged for the period 2016-2018 in descending order according to the shares of enterprises with introduced innovations in the total number of enterprises in the given sector.

**Figure 1: Comparison of shares of enterprises that introduced innovation in 2014-2016 and 2016-2018 - by economic sector**



Source: own elaboration based on data from CZSO (2020)

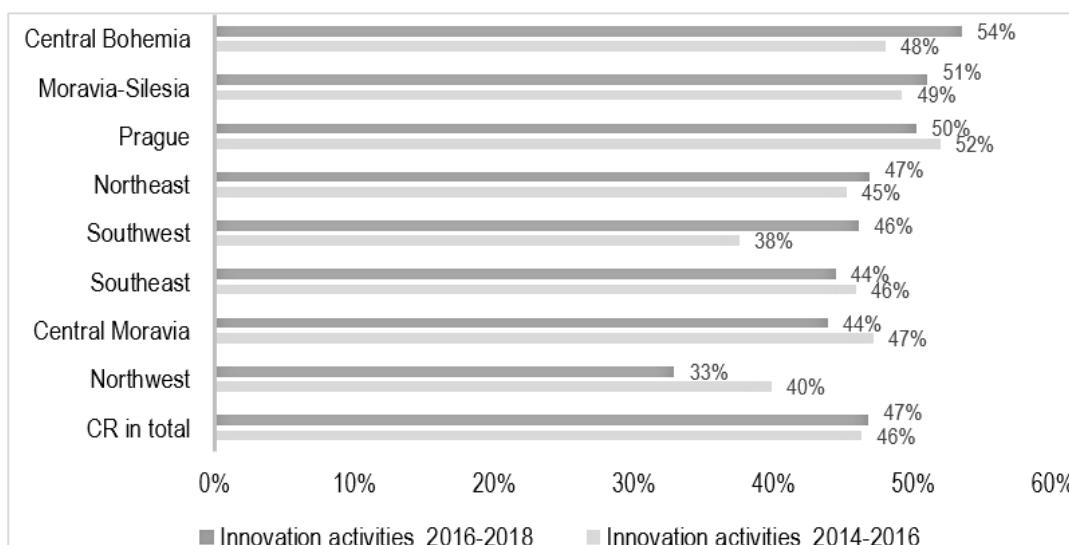
In the period 2016-2018 the information and communication sector dominates in the implementation of innovation activities. 65% of companies in this sector introduced innovation. This is followed by finance and

insurance (51% of enterprises) and manufacturing (51% of enterprises). In these three sectors, the share of companies with established innovations exceeds the national share. On the contrary, innovations introduced in 2016-2018 are the least (significantly below the total share of companies in the Czech Republic with introduced innovations) introduced in the sectors of transport and storage (24%), water supply, including activities related to waste (25%) and mining and quarrying (32%). Compared to the period 2014-2016, there was a significant improvement in the wholesale sector excluding motor vehicles (by 7 percentage points) and in mining and quarrying (by 5 percentage points).

#### **Analysis of the frequency of enterprises with established innovations with regard to the cohesion region (CZ-NUTS2)**

Differences in the number of enterprises with introduced innovations by cohesion region (CZ-NUTS2), including a comparison with the national data for the period 2014-2016 and 2016-2018, can be seen in Figure 2. In the graph, the sectors are arranged for the period 2016-2018 in descending order according to the shares of enterprises with established innovations in the total number of enterprises in the given sector.

**Figure 2: Comparison of the number of companies that introduced innovation in 2014-2016 and 2016-2018 - by industry**



Source: own elaboration based on data from CZSO (2020)

In the breakdown by cohesion region (CZ-NUTS2), in the period 2016-2018, innovations were mostly introduced by Central Bohemia (54%), Moravia-Silesia (51%) and Prague (50%). In these three regions, the share of companies with established innovations exceeds the national share. On the contrary, in 2016-2018 the lowest number of introduced innovations (significantly below the total share of companies in the Czech Republic with established innovations) was found in the Northwest region (33%). Compared to the period 2014-2016, there was a significant improvement in the Southwest region (by 8 percentage points).

#### **Analysis of the frequency of innovation barriers in innovative and non-innovative companies**

As part of the innovation survey, the CZSO monitors 8 innovation barriers, see Table 2 and Table 3 for innovative and non-innovative enterprises with 10 or more employed persons. Taking into account the ownership of the company, the biggest barrier for innovative domestic companies (19 %) is the lack of own funds, while for companies under foreign control (19 %) the innovation barrier is insufficient decision-making authority of the company on new product development or investment see Table 2.

Taking into account the size of the company, the biggest barrier is the lack of own financial resources for small companies (19 %) and the lack of qualified employees in the company for medium-sized enterprises (18 %), as well as large companies (15 %), see Table 2.

**Table 2: The share of companies with innovation barriers in the total number of companies with innovation activities - according to the size and ownership of the company**

	Innovation barriers							
	Lack of ideas for innovation in the company (1)	Lack of customer incentives to innovate (2)	Lack of own funds (3)	Lack of financial resources outside the company (private, public) (4)	Lack of skilled workers in the company (5)	Lack of suitable partners for innovation cooperation (6)	Insufficient decision-making powers of the company on the development of new products or investments (7)	Low or uncertain return on investment due to low purchasing power or market size (8)
Non-innovative companies								
CR in total	5 %	8 %	14 %	10 %	12 %	8 %	8 %	13 %
Domestic enterprises	6 %	8 %	15 %	11 %	13 %	9 %	5 %	13 %
Foreign-controlled enterprises	5 %	8 %	12 %	8 %	7 %	7 %	21 %	11 %
Small enterprises	5 %	8 %	15 %	10 %	12 %	8 %	6 %	12 %
Middle-sized enterprises	7 %	11 %	12 %	10 %	12 %	9 %	13 %	15 %
Large enterprises	3 %	5 %	7 %	5 %	7 %	5 %	18 %	8 %

Source: own elaboration based on data from CZSO (2020)

Taking into account business ownership, the main innovation barrier is the same for both innovative and non-innovative companies. For domestic companies, the biggest barrier is the lack of own financial resources (15 %), while for companies under foreign control, the innovation barrier is insufficient decision-making power of the company on the development of new products or investments (21 %), see Table 3.

**Table 3: Share of enterprises with innovation barriers in the total number of enterprises without innovation activities - according to the size and ownership of the enterprise**

	Innovation barriers							
	Lack of ideas for innovation in the company (1)	Lack of customer incentives to innovate (2)	Lack of own funds (3)	Lack of financial resources outside the company (private, public) (4)	Lack of skilled workers in the company (5)	Lack of suitable partners for innovation cooperation (6)	Insufficient decision-making powers of the company on the development of new products or investments (7)	Low or uncertain return on investment due to low purchasing power or market size (8)
Innovative companies								
CR in total	3 %	5 %	17 %	12 %	16 %	7 %	7 %	12 %
Domestic enterprises	3 %	6 %	19 %	14 %	18 %	7 %	2 %	13 %
Foreign-controlled enterprises	1 %	3 %	11 %	7 %	11 %	5 %	19 %	10 %
Small enterprises	3 %	5 %	19 %	14 %	15 %	7 %	5 %	12 %
Middle-sized enterprises	2 %	4 %	16 %	10 %	18 %	8 %	9 %	13 %
Large enterprises	3 %	5 %	11 %	6 %	15 %	4 %	14 %	12 %

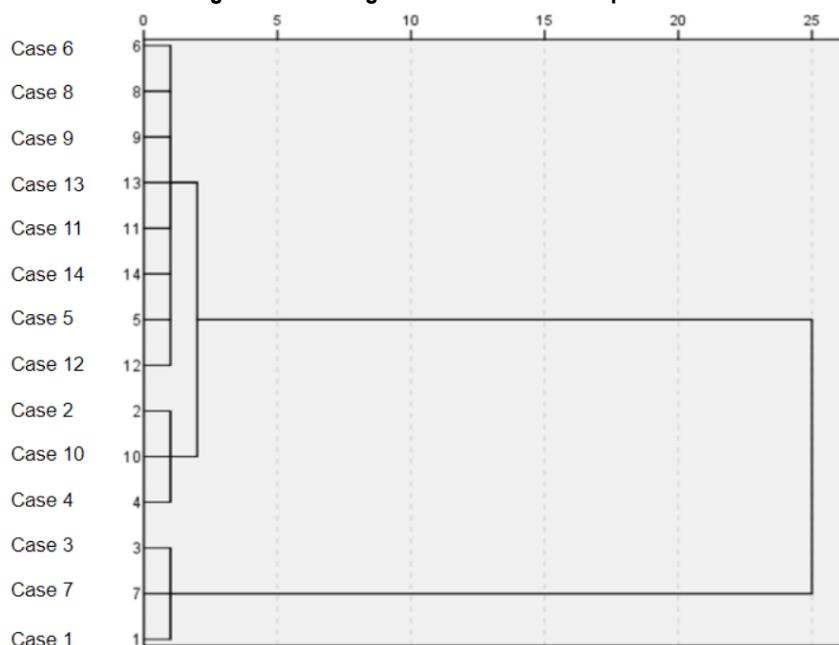
Source: Own elaboration based on data from CZSO (2020)

Taking into account the size of the company, the biggest barrier for small companies is the lack of own funds (15 %) and for medium-sized companies low or uncertain return on investment due to small purchasing power or market size (15 %) and for large companies insufficient decision-making power to develop new products or realize investments (18 %) see Table 3.

### 3.2. Results from cluster analysis

Hierarchical cluster analysis and Ward's Euclidean distance technique, were used to perform cluster analysis. The whole clustering process is clearly represented by a dendrogram generated by the Ward method, see Figure 3, 4. The cluster analysis was performed separately for the group of innovative companies and the group of non-innovative companies. Within the clustering, 14 criteria are applied (ownership - 2 criteria, company size - 3 criteria, sector of economy - 9 criteria) taking into account 8 barriers.

**Figure 3: Dendrogram of innovative companies**



Source: own elaboration

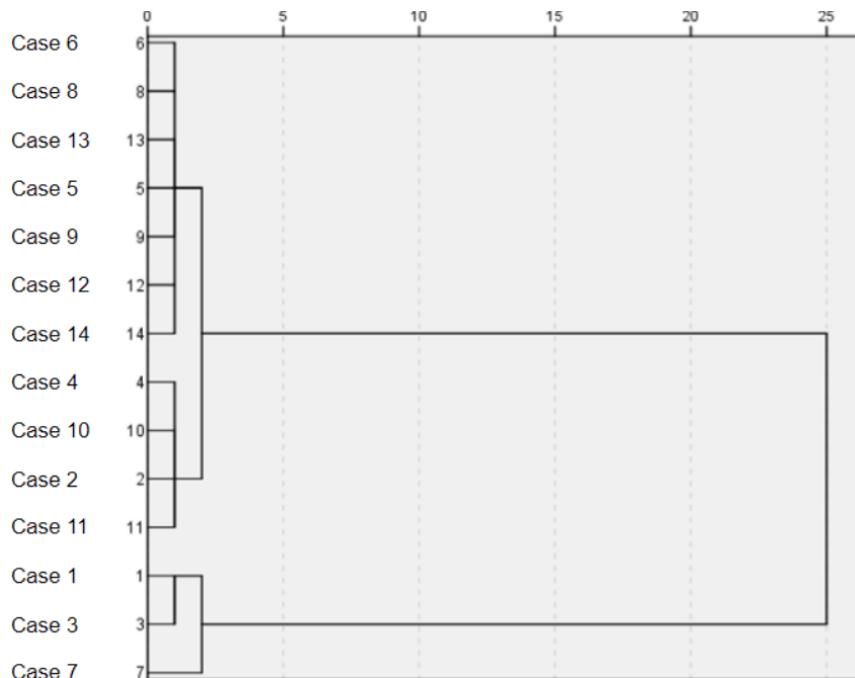
It can be stated that using the Ward method, 3 clusters of innovative companies were created for a group of innovative companies. The first largest cluster 6, 8, 9, 13, 11, 14, 5, 12 consists of innovative companies, which are connected by the size of the company, respectively all of them are large enterprises, operating in following sectors of the economy: mining and quarrying (B), production and distribution of electricity, heat and air (D), water supply, wastewater activities (E), finance and insurance (K), transport and storage (H), scientific and technical activities (M), information and communication activities (J) and the three most important innovation barriers: lack of qualified staff, insufficient decision-making powers of the company on new product development or investment in the company and low or uncertain return investment due to low purchasing power or market size.

The second cluster 2, 10, 4 consists of innovative companies, which combine foreign ownership of the company, medium size of the company, operation in the wholesale sector (G) and innovation barriers: lack of skilled workers in the company, lack of own funds and low or uncertain return. The third cluster of 3, 7, 1 consists of innovative enterprises, which belong to small enterprises. With regard to ownership enterprises

are domestic operating in the manufacturing industry (C) and innovation barriers are lack of own financial resources, lack of qualified workforce in the company and lack of financial resources outside the company.

Using the Ward method three clusters were created also for a group of non-innovative companies see Figure 4.

**Figure 4: Dendrogram of innovative companies**



Source: own elaboration

The first most numerous cluster 6, 8, 13, 5, 9, 12, 14 consists of non-innovative companies, which are characterized by size (all of them are large enterprises) and activities in the economic sectors: mining and quarrying (B), production and distribution of electricity, gas, heat, and air (D), finance and insurance (K), water supply, sewerage activities (E), information and communication activities (J), scientific and technical activities (M). The most significant barriers to innovation s are insufficient decision-making powers of the company to develop new products or investments, low or uncertain return on investment due to low purchasing power or market size and lack of skilled workers in enterprise. The second cluster 4, 10, 2, 11 consists of non-innovative enterprises, which are characterized by the following facts: medium-sized enterprises, foreign-controlled enterprises operating in the following economic sector: wholesale (G), transport and storage (H) and innovation barriers such as low or uncertain return on investment due to low purchasing power or market size, insufficient decision-making power of the company on the development of new products or investments and lack of own financial resources. The third cluster 1, 3, 7 consists of small non-innovative enterprises with a domestic owner, operating in the manufacturing industry and innovation barriers in the form of lack of own funds, low or uncertain return on investment due to low purchasing power or market size and lack of qualified workforce in the company.

#### 4. Conclusion and discussion

Innovations represent the driving force for further development not only at the level of companies, but also of the whole economy. Based on the CZSO data for the monitored period 2016 - 2018 and in some aspects for the period 2014-2016, an evaluation of the intensity of innovation activities of companies in the

Czech Republic was performed on the basis of a special-purpose probe. It should be pointed out that the current statistical data are for the observed period 2016-2018, in which Covid-19 has not yet been taken into account, which significantly affected the activities of all companies, i.e., the entire economy. For some companies, the coronavirus situation has, on the one hand, accelerated product and process innovation but, on the other hand, significantly limited business activities. Its impact has a societal character.

The CZSO data show that companies implement more process innovations than product innovations while innovations of business processes have been more implemented by foreign-controlled enterprises than domestic ones and large enterprises more than small and medium-sized enterprises.

Analysis of statistical data of innovation activities of the companies with established innovations showed that the most innovations have been implemented by enterprises from information and communication sector. On the other hand the least innovations have been introduced by companies from the transport and storage sector. With regard to cohesion region (CZ-NUTS) the most innovations have been introduced by companies in Central Bohemia.

As part of innovation survey the CZSO monitors 8 innovation barriers that influence innovation activities of innovation and non-innovation enterprises. It was found that the main barrier for innovative and non-innovative companies with a Czech owner is the lack of own financial resources. In the case of innovative and non-innovative companies under foreign control, the innovation barrier is insufficient decision-making powers of the company on the development of new products or investments. At the same time, it was found that the biggest barrier for innovative small businesses is the lack of their own financial resources, for medium and large ones it is the lack of a skilled workforce.

In case of small non-innovation enterprises the biggest barrier is lack of own financial resources, in case of medium-sized once low or uncertain return on investment due to low purchasing power or market size and in case of large enterprises it is insufficient decision making power.

Based on cluster analysis by Ward's technique with Euclidean distance using SPSS software, innovation barriers were assessed with regard to ownership, company size and economic sector, especially for innovative and non-innovative companies. For both innovative and non-innovative enterprises, 3 clusters have been created, each associated with a certain type of ownership, the size of the enterprise, the sector of the economy and the innovation barrier. The largest cluster of both innovative and non-innovative companies is characterized by innovation barriers in the form of insufficient decision-making power of the company to develop new products or investments, low or uncertain return on investment due to low purchasing power or market size and lack of skilled workers. Based on these findings, measures to eliminate innovation barriers can be better set at the level of regional and government institutions. Entrepreneurs can solve the lack of funds for the implementation of innovation activities by using subsidies from European and state funds. From 2021, a new subsidy period has begun and will finish in 2027.

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## OPTIMIZED PRODUCTION TECHNOLOGY (OPT) – CASE STUDY OF IMPLEMENTATION S-DBR METHOD

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### **Abstract:**

Optimized Production Technology (OPT) is quite researched and stabilised topic among the research in business since 1985 and the research is still active and developing. It has been influenced and fuelled by the Theory Of Constraints (TOC). This article deals with the OPT approach research focused on the application of the Simplified Drum-Buffer-Rope (S-DBR) in specific company while using the case study research design. The study shows the developed model of S-DBR in specific company as well as summarizes the impact of applying the S-DBR approach. Results show significant positive impact on the productivity, staff stabilisation and the rate of unused costs.

### **Key words:**

OPT, S-DBR, TOC, Bottleneck

**JEL: M11, L11, L23**

### **1. Introduction: Optimized Production Technology**

The Optimized Production Technology (OPT) has been developed in the 1979 by Eliyahu M. Goldratt as a software product (Graham, 1989). However it has become known after the publication of the so called “business novel” The Goal in 1984, which has been reprinted since (Goldratt, Cox, & Whitford, 2004). More scientific approach to the problem has been developed under the name TOC - Theory Of Constraints (Goldratt, 1990). Despite being non-scientific, the book “The Goal” had a huge impact on modern management and the TOC had been researched since (Graham, 1989). The area of research focused not only to the TOC itself, it also researched the software products, which were used to implement TOC and OPT in the practical use (FRY, COX, & BLACKSTONE, 2009). OPT has been compared and evaluated towards other systems, such as JIT, MRP and others (Gelders & Van Wassenhove, 1985). As the industry (where OPT and TOC was largely used) developed, so did the OPT and other methods, such as Kanban, MRP and others (Thürer, Fernandes, & Stevenson, 2020), (Bai, Dai, Wei, & Zhang, 2019). Even though the OPT and S-DBR is largely used within the manufacturing companies, especially those who are using components to complete the final products, the usage of OPT is much larger and in the literature there are cases of TOC / OPT applications within the timber harvesting, (Kelly & Germain, 2020), banking (Reid, 2007) and even in medical services (Garza-Reyes, Villarreal, Kumar, & Diaz-Ramirez, 2019).

This paper will be focused on similar topic as (Thürer et al., 2020) as the case study research will be focused on the rubber seal component matrix production. Researched company used for the case study is interested in improving of the seal matrix production, as the imperfections in this part of the company are affecting the rest of the business. Even though the TOC is rather theory, it can be applied in the subsystem

of the company, as long as the goals of the subsystem and the whole system (company) are properly aligned (Reid, 2007). As both goals (subsystem and the whole system) fit, the optimisation within the subsystem – searching for local optimum – will be also global optimum. The production of the rubber seals matrices meets this condition and that is why the case study is focused strictly on this production.

Production management for the rubber seals is “make-to-order” model, the job order is derived from the customer orders and that is why the S-DBR pull method is suitable (Miguel, Ribera, Guillem, & Pérez, 2010), (Darlington, Francis, Found, & Thomas, 2015). These individual orders are the main pull for the production and the production setup. Based upon the order specifications (size, shape, surface, design, logo etc.) the CAD prototype of seal is prepared. This digital prototype is then reversed into “negative” and the negative is than used as design for the metal matrix. Production of the matrix is time and resources consuming process and requires rather expensive material. Finished matrix is than ready for production of ordered seals. As the quality of the matrices is required to be excellent and the seals (by its very nature) cannot fail, the quality control is approx.. 35% of production time and each production step is controlled and inspected.

The aim of this paper is to develop and describe the S-DBR model as described in (Buestán Benavides & Van Landeghem, 2015) and (Schragenheim & Dettmer, 2000), applied on the production of the rubber seals and also to measure and estimate the impact of the developed and implemented S-DBR through the metrics used in the company. Observed metrics used for research, are working time fund, employee fluctuation, rate of unused costs and labour productivity.

## 2. Methods

Basic research methodology for this paper is the case study. This research methodology is widely used especially in social and medical research as well as in business (Crowe et al., 2011), (Rashid, Rashid, Warraich, Sabir, & Waseem, 2019). Due to the qualitative research, we approached the case study from the perspective of relativist ontology and subjective epistemology.

Primary way of gaining detailed knowledge related of the company and the department of rubber seals production is through the structured and semi-structured research interview with the managers of the company and of the department. Areas covered by the interviews were the areas covered by the following ISO standards (brief description of standards is cited from <https://www.iso.org/>):

- a) EN ISO 9001:2015 – standard “specifies requirements for a quality management system when an organization needs to demonstrate its ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements, and / or aims to enhance customer satisfaction through the effective application of the system, including processes for improvement of the system and the assurance of conformity to customer and applicable statutory and regulatory requirements.”
- b) EN ISO 14001:2015 – standard “specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance. It is intended for use by an organization seeking to manage its environmental responsibilities in a systematic manner that contributes to the environmental pillar of sustainability.”
- c) EN ISO 45001:2018 – standard “specifies requirements for an occupational health and safety (OH&S) management system, and gives guidance for its use, to enable organizations to provide safe and healthy workplaces by preventing work-related injury and ill health, as well as by proactively improving its OH&S performance.”

Research interviews were conducted two times during the year with 6 months spread. Each block of interviews was performed for one week according to the pre-arranged time schedule and standard was approx. 50 interviews per week, hence 100 interviews per year. All interviews were with top management

and in some cases with other members of top, mid or first-line management. Typical session was CEO or CFO with some other manager for approximately 45 minutes. For the interviews were prepared sets of questions as well as open questions with the suggestions of managers for improvement. All research interviews were recorded into protocols and archived in research file for the following processing and data extraction.

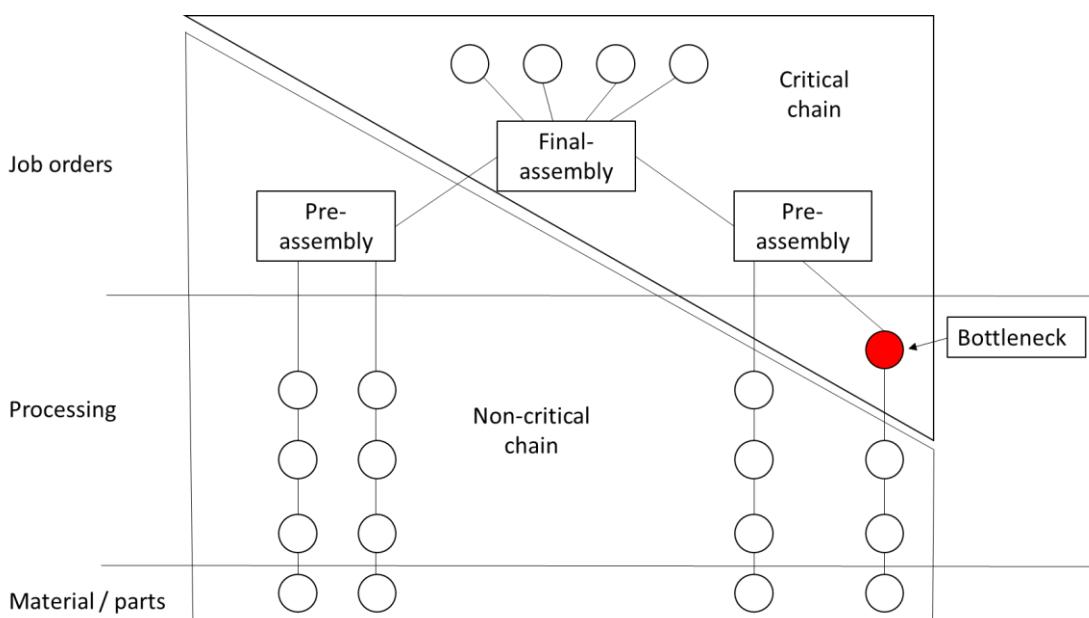
Within our case study we employed induction as defined by (Blaikie, 2015), as we want to test the impact of the OPT S-DBR implementation on the production of the rubber seals and confirm the expected positive effect of the S-DBR on company's performance. Performance is measured through non-financial indicators and metrics. Observed metrics are:

- a) Working time fund – The usage of the standard working time (7,5 hour / shift) before and after the implementation of the S-DBR, the usage is measured as a ratio Time used / Time available. The ratio before the implementation of the S-DBR is taken as 100%.
- b) Employee fluctuation – the rate of the employee fluctuation, measured before and after the S-DBR, fluctuation is calculated as ratio Loss of employees / All employees.
- c) Unused costs – Unused costs are estimated based upon the observation of the working and production process, Ratio of unused costs / Total costs is measured, the ratio before implementation is set as 100%.
- d) Labour productivity – the amount of activities fulfilled by employee, the amount before implementation is set as 100%.

Due to the very confident and internal nature of the information obtained during the research, the company agreed to cooperate during the research under the strict confidentiality rules. That is why we cannot present absolute numbers, only relative metrics in % and also the name of the company is forbidden to disclose. Within our case study we compared the periods of 2016 and 2017, this delay between the research period and publishing is another condition we needed to meet due to the confidentiality.

For our S-DBR model we used the following scheme depicted on Figure 1, inspired by (Hádek, 2006) whereas bottle neck is the drum and the job-orders are the rope.

Figure 4: Critical / Non-critical chain



Designed based upon the (Hádek, 2006)

### 3. Paper results

Based upon the gathered data, the production layout has been modified for the rubber seals production. Original layout was designed as the process layout, where similar tasks were grouped together. Based upon the interviews, we decided to change the layout to the cellular production layout, while applying the TOC critical path method for manufacturing components (Albers & Leslabay, 2009), (Shurab M, 2015), (Xu, Shao, Yao, Zhou, & Pham, 2016). This was based upon the identification of the critical path / critical chain and bottle necks, thus helping to design the S-DBR around these bottle necks.

#### Working time fund

First measurable impact of the OPT S-DBR application was modification in the working time fund usage. Before the application, standard 7,5 hours per shift (+ 0,5 hour for lunch) were scheduled as production time. Our observation suggested that around 8:00 am and 12:00 pm the rate of scrap raised, lead times were higher, and the quality of production was significantly lower. It seems that due to the natural rhythm and pace of the day, these two moments were critical. That is why at that times two 30 minutes breaks were introduced. Thus, break the pattern while not reducing production.

#### Employee fluctuation

As a result of 50% decrease of production employees needed, company increased wages of involved production employees by 75%. From the perspective of employees, they were now working 6,5 hours per shift for 175% wages while from the perspective of the company, production improved while saving 25% of wages. This situation was therefore perceived as win-win as it creates positive effects for employees as for the rubber seals production.

This change was accepted by production employees and contributed to another measurable effect, which was the stabilisation of the staff, as the fluctuation rate among the production employees dropped from approx. 14% to approx. 7%.

#### Unused costs

Unused costs – costs which are expensed yet are not creating any value added – decreased from the initial level of 100% to 27% - 32% (for various production sites) thus reducing significantly.

#### Labour productivity

Also, the productivity of production employees increased from approx. 60% to 85% - 92% (varies for various production sites). The upper values are almost “too good to be true”, yet we checked, and our finding support them. This increase in productivity in combination with above mentioned decrease in scrap and other inconsistencies allowed reduction of the production employees by approximately 50%.

### 4. Discussion

Based upon above mentioned findings we conclude the OPT / S-DBR implementation as successful. The impact on the production of rubber seals was significantly positive not only from the perspective of the company but also from the perspective of employees. This supports the shift from the more traditional or rather historical share-holder approach to more contemporary stake-holder approach, which reflects the CSR more and thus supports sustainability. This is also confirmed by other sources (Costas & Kärreman, 2013),(Young & Thyil, 2009) ,(Bernardová, Ivanová, Fink, & Arkhangelska, 2019). The sharing of the positive effects of the increased productivity – in fact sharing of the potential profit – greatly increased the motivation of employees and stabilised them. This was expected, as the sharing approach is not new (Kruse, 1992) and has been repeatedly confirmed by the researchers (Long & Fang, 2012).

Our evidence also suggests that the TOC S-DBR is – despite the year of the origin – still beneficial for the practical use nowadays and has measurable positive impact, as suggested and confirmed by (Cox, 2021) or (Wu, Zheng, & Shen, 2020). Our findings and conclusions are also supported by similar papers (Rabiei Hosseiniabad, Adib, & Zaman, 2020).

Despite this paper this paper being a case study and thus applicable only in the one specific situation and one specific company, all the above-mentioned papers together with our findings suggest that the S-DBR OPT, based upon the Theory of Constraints, is still beneficial and robust approach / theory, which can be translated in to the real business with positive impacts.

## 5. Conclusion

Despite our research being a case study – hence all our collected data and results are applicable only on this case, there are some outcomes which can be beneficial to other subjects / companies.

The above presented results can be used as a certain benchmarking of the successful application of the S-DBR method. For other companies, which are considering the S-DBR, these results can serve as the specific levels to compare whether another application is below or above.

Also, the process of the S-DBR implementation created pools of knowledge, which is not public per se, however the knowledge, mental models and experience is carried by the employees and if they – in future – change position within or outside company, they will bring this specific knowledge with them.

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# PROCESS OF STRATEGIC MANAGEMENT AS A TOOL OF MANAGEMENT IN TURBULENCE TIME

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## **Abstract:**

The paper views the process of strategic management as one of the key tools of a top manager in managing an organization in a period of turbulent changes. Strategic management can be understood as a process where the top manager defines the goals of the organization as a whole and formulates and subsequently implements a strategy to achieve the declared goal. The priority is to make full use of the organization's resources and at the same time make the most of market opportunities. The purpose of strategic management is to eliminate the risks of strategic traps and bring the organization into a situation in which it can anticipate changes, respond to them, induce changes, and use them to its advantage. The method of the systematic literature review systematizes and subsequently integrates selected models of the strategic management process. The result of the paper is the construction of such a model of the strategic management process, which best reflects the current problems of the turbulent environment.

## **Key words:**

Strategic management, strategic management process, top manager, turbulence, strategic analysis

## **JEL: M10**

### **1. Introduction**

As many economists point out, today's world is evolving faster and faster, with social, technological, and other changes constantly taking place, to which companies must learn to react quickly, ideally to anticipate them. The old, relatively clear and quite predictable, hierarchically organized corporate world is rapidly disappearing. For the new world, companies need new knowledge and skills, new management systems. Together with the development of the company, the conditions for business also change. Today, when managing a company, it is difficult to make do with the same tools that the classics did. Some authors (Bartes, 2015; Nasri & Zarai, 2013) point out the need to make fundamental changes in current management methods, according to which most companies must change significantly to succeed in the global market today.

The global economy poses a greater risk to organizations, but on the other hand it also creates more opportunities. The global market is forcing organizations to make fundamental changes not only to compete and prosper, but to survive at all. The effects of globalization are exacerbating technological development, international economic integration, and the maturity of domestic markets in developed countries. These influences affect all organizations, including transnational ones. Even regional organizations can feel the effects of globalization. Foreign competitors with branches in the given regions also become their competitors. Locally oriented organizations thus find themselves in the global market without leaving the borders of their region.

Market globalization creates a level playing field for all organizations in terms of access to information, resources, and technology. Distances are playing an ever-smaller role. This raises the need to address all processes on a global scale. Competition changes into so-called super-competition. Thanks to new technologies that enable not only networking of organizations around the world, but also rapid updating of information databases, every organization can and even must immediately adapt to changing conditions and individual customer wishes.

Drucker defines this phenomenon of change as "turbulence" (Drucker, 1993). The term turbulence has its origins in physics, which refers to the type of flow characteristic of high fluid flow rates. In meteorology, the term turbulence is used in connection with the formation of irregular atmospheric currents. By analogy, Drucker introduced the concept of turbulence in a business environment where organizations face constant change (Drucker, 1993). In the environment of the current market, we will no longer find almost any immutable or predictable processes, the course of which we could assume in the future based on past experience. Even the structure and nature of the competition can hardly be estimated in the future. According to Drucker, our only certainty is that the future will be different from what we have today. Our only certainty is that things will change. This situation has two levels - it is necessary to learn to expect the unexpected, but at the same time to be able to distinguish and use trends that can be predicted.

The turbulence described above continues to deepen to a state that some authors even refer to as chaos. However, this situation paradoxically represents a potential for those who accept chaos as something and learn to take advantage of the opportunities that this state offers, instead of looking at it as a problem that needs to be avoided. Chaos and insecurity are and will be market opportunities for the wise (Peters, 1987).

The only way to succeed in the outlined market conditions is to implement the concept of strategic management in the environment of the organization. The implementer of strategic management is a top manager (owner, CEO, self-employed person). The basic task of a top manager is to formulate the strategy of the organization, i.e. the way to achieve the success of the organization, which, thanks to appropriately chosen strategic goals, can succeed in the competitive environment of today's turbulent world.

## 2. Methods and Design

There is no single model for the strategic management process. Each author develops his own model, which contains a different number of phases and is developed with different levels of detail. From the inexhaustible number of models, those models were selected as illustrations for the study, which are ideal for fulfilling the goal of the study, i.e. meet the following requirements: are structured, allow reinterpretation of strategic management process as one of the management tools in times of crisis and allow the application of the methodical framework. Aim of this study is to find or create such a model of strategic management process, which best reflects the current problems of the turbulent environment and help top manager to develop its organisation in time of crisis. To reach the goal of this study, a systematic literature review approach is taken. A systematic literature review provides opportunity to identify, interpret, evaluate, synthesize, and integrate all the existing substantial evidences pertaining to a research question (Afzal et al., 2016).

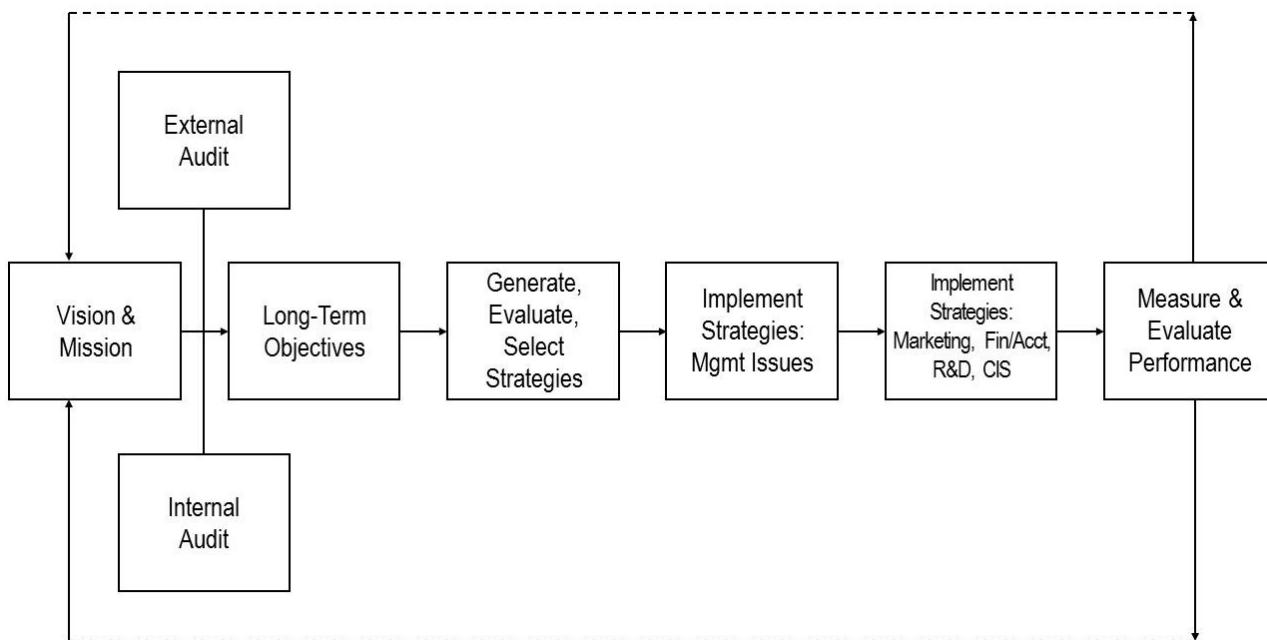
## 3. Concepts of strategic management process review

### 3.1. The concept of strategic management process according to David

David (David, 2020) in his concept of strategic management process comprises three stages: strategy formulation, strategy implementation and strategy evaluation (see Figure 1). It drives all the activities of an organization. Strategy formulation involves the following steps: development of vision and mission

statements, analysis of external and internal environment, long-term objectives and generation, evaluation, and selection of strategies. The second stage is strategy implementation. In this stage, business strategy is implemented. It involves activities such as establishing annual objectives, devising policies for each business function, allocating resources, etc. for achievement of organizational goals. The final stage of the David's concept of strategic management process is strategy evaluation. In this stage top manager changes or takes corrective actions in strategy and measures and evaluates the performance. To achieve these purposes, it is necessary to update key external and internal analysis continuously and reveal other especially external factors emerged. In addition, it involves comparison of actual performance with the planned. If key external or internal factors change during the continuous assessment of environments or new factors are identified, top management must take adequate actions immediately.

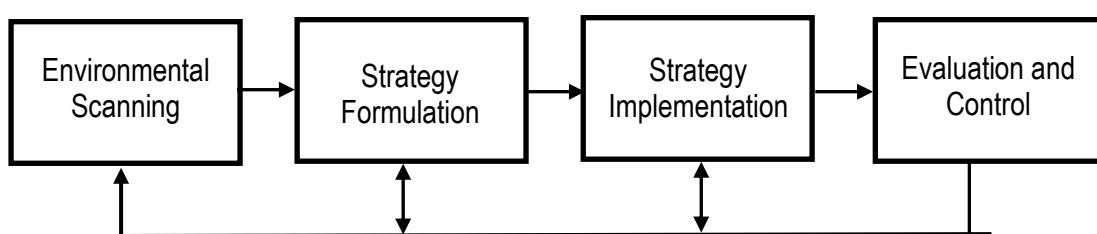
**Figure 5: The concept of strategic management process according to David**



### 3.2. The concept of strategic management process according to Hunger and Wheelen

Hunger's and Wheelen's (Hunger & Wheelen, 2011) conception (see Figure 2) is relatively brief compared to the others. Their perception of the strategic management process begins, as, for example by Keřkovský and Vykypěl, with an analysis of the environment (meaning both external and internal) and ends with an evaluation of the entire process.

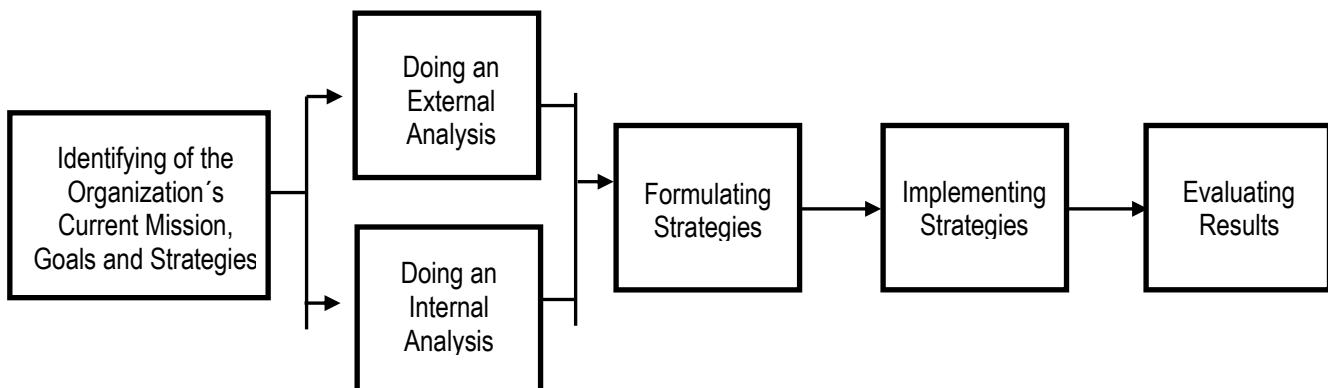
**Figure 2: The concept of strategic management process according to Hunger and Wheelen**



### 3.3. The concept of strategic management process according to Robbins and Coulter

In Robbins's and Coulter's (Robbins & Coulter, 2017) model (see Figure 3), the process of strategic management begins by formulating missions, goals, and resources, only then followed by analyses. The whole process is concluded by evaluation of results.

Figure 3: The concept of strategic management process according to Robbins and Coulter



### 3.4. The concept of strategic management process according to Košťan and Šuleř

Košťan and Šuleř (Bělohlávek, Košťan & Šuleř, 2006) emphasize a cyclical character in their graphic concept of the strategic management process (see Figure 4). Placement of the formulation of the goal and vision beyond strategic analysis is interesting. Similarly, to other authors, the whole process is completed by the monitoring and evaluation phase.

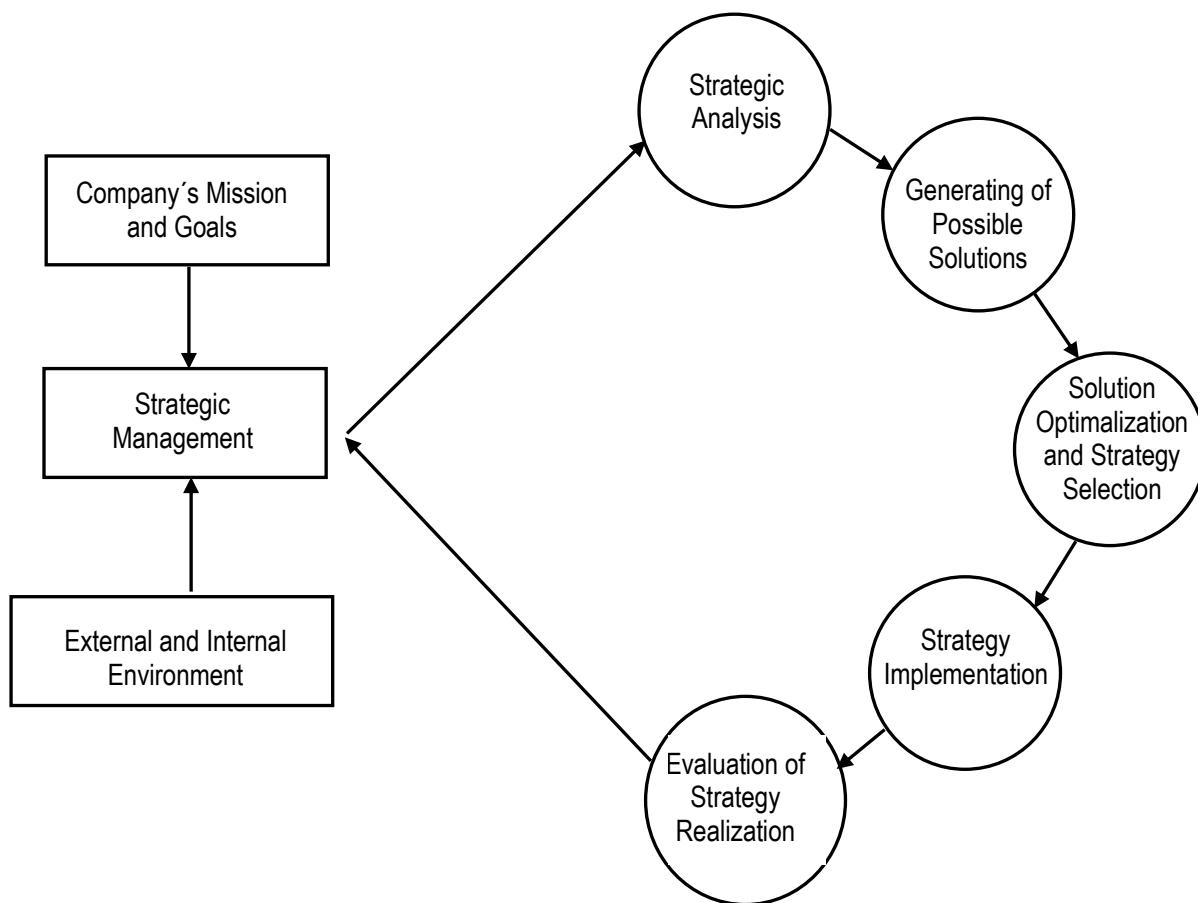
Figure 4: The concept of strategic management process according to Košťan and Šuleř



### 3.5. The concept of strategic management process according to Hanzelková, Keřkovský and Vykypěl

Hanzelková and col. (Hanzelková, Keřkovský & Vykypěl, 2017) start the whole process of strategic management (see Figure 5) with strategic analysis. Emphasis is placed, among other things, on the decision-making phase (generating possible solutions, selecting a suitable strategy). The formulation of the mission and company goals as well as the influence of the external and internal environment are excluded from the cycle itself. These are factors that are a permanent part of all phases of the strategic management process.

Figure 5: The concept of strategic management process according to Hanzelková, Keřkovský and Vykypěl



### 4. Turbulences as a source of threats, risks and opportunities

Today's top manager must operate in an environment whose variability is many times higher than at any time in the past. Not only in a turbulent economic environment, a company faces a large number of risks. Systematic risks, which include, for example, political, general economic risks, inflation risk or risk arising from unexpected events, have an increasing influence on the future development of the company. (Kislingerová, 2010) Crisis are a natural part of business cycle. Necessity-driven entrepreneurship is ineffective during recessions. Therefore, innovation and opportunity recognition are more relevant as success factors during periods of recession than during periods of prosperity. (Devece, Peris-Ortiz & Rueda-Armengot, 2016). Dependence on customer behaviour, suppliers and unstable markets may lead to increased difficulties in maintaining the company activities in the face of the crisis. In this context, many companies suffered in the time of crisis from demand shock. (Bourletidis & Triantafyllopoulos, 2014) But there

are also researching works that shows that some organisations take a positive effect of the economic crisis. As a rule, organisations with a lower level of financial strength or with an unprocessed strategy will not survive the economic crisis. On the contrary, healthy companies with a sophisticated strategy tend to emerge stronger from the crisis. (Gregory et al., 2002; Asel & Speckbacher, 2011)

Strategic management is characterized by decision-making in an environment of unique effects and situations. As already mentioned, their occurrence and course in the future is very difficult to predict. Most of the information for strategic decision-making comes from the external environment. Thus, the basic precondition for the sustainable development of a company cannot be a rigid adherence to the already formulated strategy, but, on the contrary, the pursuit of its maximum flexibility and resilience. This can be achieved by formulating the strategy in variants based on variants of the development of key factors influencing the success of the strategy. The second precondition for the successful development of the company and its ability to overcome the pitfalls of the turbulent period is constant supply of information about the market, political situation, economic or technological development and other factors and their subsequent evaluation. Therefore, the following requirements for the company's strategy emerge from the above:

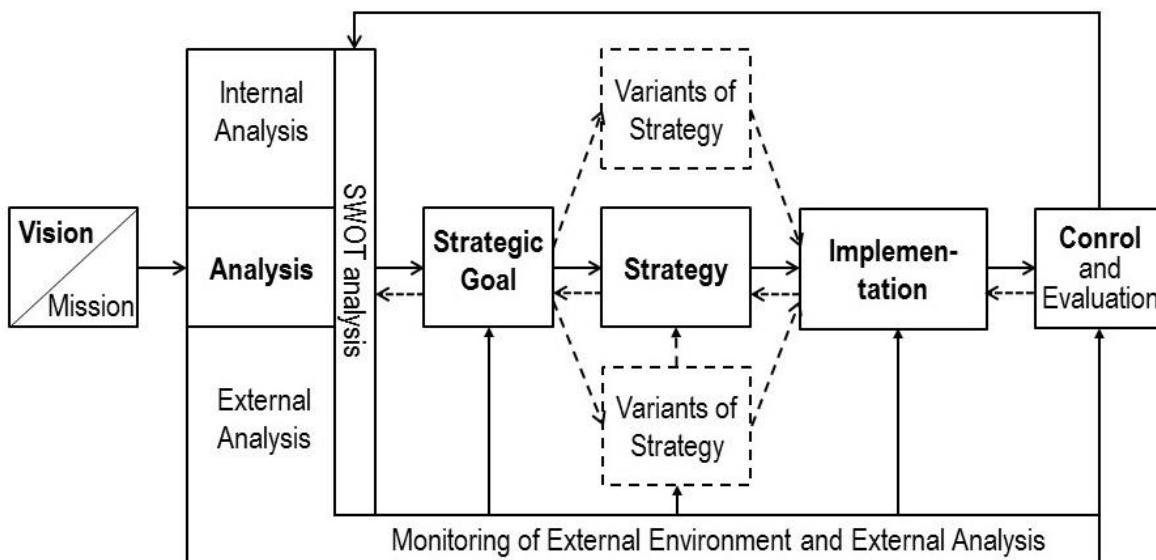
1. The flexibility of the strategy enabling immediate responses to changing key success factors.
2. Permanent monitoring of the external environment.

## 5. Paper results

A number of common elements can be found in the strategic management process models presented above. Everyone perceives strategic management as a continuous, permanent, never-ending process. All these models emphasize the role of strategic analyses of the internal and external environment in the whole process. As follows from the characteristics of the economic crisis, its causes can be found mainly in the external environment of the organization. The ability to read and anticipate trends in consumer behaviour, but also to identify in time factors that may alert an organization's top management to an impending crisis, is proving to be an absolutely key factor for the organization's future success. From point of view of a turbulent time, knowledge of the internal environment seems to be an absolute necessity, without which no organization can operate on the market for a long time. Therefore, the analysis of the internal environment does not need special emphasis – it becomes a matter of course. On the other hand, the emphasis on constant, continuous monitoring of the external environment and thorough analysis of key environmental factors appears to be an essential element of the strategic management process and as such must be emphasized in the process model. The phases of monitoring and analysis of the external environment must continuously and unconditionally interfere with all other phases of the strategic management process. Top management must determine the key factors from the external environment that are crucial to the formulated strategy. For each of these factors, it is then necessary to develop several variants of development based on sophisticated forecasts of experts. It follows that the subsequently formulated strategy must be created in several mutually compatible variants. Only thanks to permanent monitoring of the external environment and the variability of the strategy can the organization succeed in turbulent times. Unfortunately, neither of the presented models of the strategic management process fulfils these two fundamental points of the process.

For this reason, a new model needs to be developed (see Figure 6) that meets the needs of the current turbulent times in all its aspects. The proposed model of the strategic management process is partly based on the concept of David or Robbins and Coulter, but is supplemented by the variability of the strategy and permanent monitoring of the external environment with a thorough analysis of key factors of the external environment.

Figure 6: Model of strategic management process as a tool of management in turbulence time



## 6. Discussion

Every organization must have its goal, where it wants to go, a set way to further development. We are talking about setting strategy, strategic goals, and partial strategic operations. Without meeting this requirement, the organization only operatively solves the problems, only responds to stimuli, instead of actively creating them itself. The organizations' strategies are never static. Therefore, the organizations must constantly adjust their strategies and plans based on external opportunities and threats (Cokins, 2017). The strategy sets the long-term direction of the organization. In the changing environment of an organization, thanks to the efficient arrangement of its resources and at the same time the ability to meet market needs, it gains an advantage and meets the expectations of its stakeholders. (Whittington et al., 2019). On the contrary, organizations that adhere to the principles of strategic management are usually characterized by long-term sustainable growth (Grant, 2016). However, strategy alone is not enough. It is necessary to establish a certain mechanism in the organization, through which top management can monitor and evaluate the fulfilment of partial strategic tasks.

As shown above, strategic management is the most complex, the most difficult and at the same time the riskiest task of a top manager. There is no one-size-fits-all guide to creating the right strategy. The success of any organization is based on its strategy.

This paper has significance for both researchers and organizations. Organizations can use the model of strategic management process as a management tool. Researchers can use this study as a basis for their research work about strategic management, competitiveness, or strategic thinking.

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## RESEARCH OF COST BEHAVIOR AND COST BEHAVIOR MODELS DESIGN FOR MORE EFFICIENT COST MANAGEMENT

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### **Abstract:**

Cost management is one of the most important issue of company financial management and company performance. This paper deals with the issue of management of overheads in terms of their behavior and variability of cost groups in manufacturing companies in the Czech Republic. It summarizes the quantitative and qualitative research results. The main aim was to analyse the current approach of manufacturing companies to management of overheads and how companies reflect new knowledge and approaches of cost behavior in the management and cost systems used and thus contribute to deepening the knowledge of behavior of overhead costs depending on selected factors. Quantitative research focused on the style and level of cost management in manufacturing companies with the accent on overheads, their monitoring, perception and assessment. Subsequently, the qualitative research was carried out using case studies in selected manufacturing companies. It was aimed at exploring and determining the cost behavior dependency and checking the variability of overheads, including their regression modelling, according to various factors and beyond the standard production volume. The partial objective was also to test a cost survey model to determine whether the overheads are rigid and show signs of asymmetric behavior towards changing factors.

The research focused on looking for ways to assess asymmetric cost behavior that could be described by cost models and that could be used to verify the causal relationships of cost rise as well as for the purpose of forecasting and cost planning. This research introduces new and not yet extended approaches to cost management and cost assessment in the Czech Republic.

The main findings of the research confirmed the persisting traditional approach to managing and assessing cost variability, reflecting the production volume as the only factor. There were tested multiple regression analyses to design regression models within specific case studies, and dependencies of different overhead cost groups on defined factors were identified. This confirms that cost behavior can also be judged from the view of non-traditional factors. At the same time, the asymmetric behavior was demonstrated for some groups of costs in relation to the factors considered.

Based on this work, it will be possible to continue with further research of overhead costs behavior. However, it will also be possible to look for and assess other factors influencing the source and behavior of overheads.

### **Key words:**

Overheads, fixed costs, asymmetric cost behavior cost management, multilinear regression models, decision-making proces

**JEL: C02, M10, M21, M41**

## 1. Introduction: Heading for the introductory chapter

The cost management could be considered as one of the core activities in economic practice of manufacturing enterprises. As how in recent decades the structure of the economy, manufacturing, operations and customer requirements has changed, so it has also to change the view on cost management.

Traditional cost theory classifies costs in two groups, depending on the way costs in the overall amount react to the change of activity volume: fixed and variable costs. Besides these two basic groups, there is also the third one – mixed costs which, due to the effects of economies of scale, learning curves and the like, show characteristics of both previous groups. However, these extensions continue to assume a mechanistic relation between cost driver quantities and costs, leaving no room for deliberate managerial decisions motivated by various economic constraints, incentives, and biases (Banker et al., 2018, 192-193). Upon categorizing costs to fixed and variable ones it is necessary to bear in mind that this classification is conditioned by a relevant range of activities, and it was done in relation to the time period being observed. This does not apply for a long time that the vast majority of costs in enterprises can be considered as direct (variable). The structure of activities is changing due the increasing customer demands for product modification, increasing research, development and innovation activities. With this is also related to a significant change in cost structure, which resulted in a rising share of overhead costs up to about 35-40% (Novák & Popesko, 2014).

The issue of the costing systems, methods and techniques represents a key area of measuring the company performance. Especially cost classification in cost analysis, i.e. costs are placed into defined categories according to their given characteristics is highly important. It is appropriate to mention that standard and traditional assessment of cost behavior, gauged merely by volume of production or sales, would not seem up to the job of meeting the current needs of (manufacturing) enterprises.

Managers are interested in estimating past cost behavior patterns, since this information can expedite more accurate cost predictions concerning planning and decision-making (Pichetkun & Panmanee, 2012). Key information may also be obtained by examining the dependence of costs and their behavior on various factors, from which can be derived predictive models useful for cost estimates. In fact, ignorance of cost behavior and cost dependence can force errors in judgment, from minor to major in scope.

This is why there exists an increased pressure on the research of the variability of costs (especially of overheads) and how them project into costing systems, resulting in the eventual price of a product.

The main aim of the paper is present the main findings of the research of the current approach of manufacturing companies to management of overheads and how companies reflect new knowledge and approaches of cost behavior in the management and cost systems used and thus contribute to deepening the knowledge of behavior of overhead costs depending on selected factors. The qualitative research was carried out using case studies in selected manufacturing companies. It was aimed at exploring and determining the cost behavior dependency and checking the variability of overheads, including their regression modelling, according to various factors and beyond the standard production volume. The partial objective is also present results of testing a cost survey model to determine whether the overheads are rigid and show signs of asymmetric behavior towards changing factors.

## 2. Literature review

Knowing how costs change with activity output changes is an essential part of planning, controlling, and decision making (Hansen et al, 2009). Ways to proceed with the assessment of costs and their analysis are numerous. Financial accounting uses a method of cost classification in financial statements. Such classification sorts natural types of costs by the form of the input consumed. However, in managerial accounting, the term cost is applied in numerous ways. For example, Drury (2012) as a selected author states the main division of costs and designates them as direct and indirect costs. Direct costs primarily comprise

direct materials and labour, representing those easily and accurately identified with a particular cost object. Therefore, indirect costs cannot be determined specifically and exclusively with a given cost object Drury, 2012; Hansen & Mowen, 2015). This form of cost classification is fundamental in cost allocation procedures, whereby costs are assigned to particular cost objects, with the intention of further utilization in cost management. Circumstances under which there is a high instance of indirect costs disallow use of simple cost assignment procedures, also undermining application of more sophisticated allocation techniques that would otherwise provide accurate cost assignment.

Issues related to an increasing proportion of overhead costs and any subsequent impact on cost management were defined by Nimocs (Nimocs et al., 2005) such difficulties consequently triggering contemporary trends to reduce such overhead costs or make cuts. Indeed, Hansen (2009) further comment that cost assignment is a key process within a cost accounting system. Studies have shown that up to 80% of enterprises continue to use (or have switched back to) traditional product-costing methods, despite the fact that many accountants within these enterprises express dissatisfaction with relying on the outputs of such cost accounting systems for decision-making purposes (Sharman, 2003)]. Knowledge of cost behavior is very important, especially for decision-making. As Banker & Byzalov (2014) stated, understanding cost behavior is a fundamental issue in cost accounting. For each decision taken, the management of a company requires estimates of costs and revenues at different levels of activity for alternative courses of action. Meanwhile the behavior of the costs and any subsequent decision depends on the cost driver. For instance, Popesko goes even further and states that criticism of standard traditional cost models is also evident in other areas of cost management, e.g. in budgeting. Such opinions resulted in new methods being introduced, such as activity-based budgeting and beyond budgeting (Popesko & Šocová, 2016)

A traditional model of cost behavior separates costs into fixed and variable components. The latter are modified in proportion with changes that occur in performance volume, but fixed costs remain unaltered as volume changes within a relevant range (Hilton et al., 2008). Another business model deals with the issue of direct and indirect costs. In practice, it is necessary to distinguish between these sets of costs. Indeed, the narrative can be about purely variable costs, as well as completely fixed, semi-variable and semi-fixed ones (Drury, 2012).

As Banker & Byzalov (2014) stated, understanding the cost behavior is a fundamental issue in cost accounting. Uncertainty over demand is likely to affect commitments of managers regarding “fixed” activity resources, which are selected before actual demand is realized. Therefore, demand uncertainty is likely to affect their resource commitments, hence also influencing the combination of fixed and variable costs in the short-term cost structure of the firm. Fixed and variable costs are short-term concepts, but “in the long run, all costs are variable” in the sense that all resources are subject to managerial discretion over the long term (Hansen et al, 2009; Norren & Soderstrom, 1997; Weil & Maher, 2005).

Costs are caused by resources. Behavior of costs then reflects resource adjustment in response to activity changes. Some resources, such as indirect skilled labour, are costly to adjust in the short term so are predisposed to generating fixed costs (Hansen et al., 2009; Banker & Byzalov, 2014). Also ask whether firms that face greater demand uncertainty tend to possess a less rigid cost structure with lower fixed costs and higher variable costs, or a more rigid cost structure with higher fixed and lower variable costs. Their results, which are based on less formal analysis of the issue, are contrary to widely held opinions (Banker & Byzalov, 2014).

The traditional approach of cost behavior postulates that the cost of activities change proportionately with the volume of activity and that the considered variable costs are directly altered in adherence with alteration in the activity driver. In contrast, cost accounting and management operate also with asymmetric costs (Anderson & Lanen, 2009; Anderson, Banker & Janakiraman, 2003; Via & Perego, 2014). “Asymmetric cost” is a phenomenon in which the response to decline in cost is either less or greater than a response to the rising costs of an operation.

That's why some empirical studies showed that costs do not act symmetrically, as traditional theory claims. The results of these studies pointed to the fact that costs react more to the increase than to equivalent decrease of the activity volume. If demand exceeds the available capacity of existing resources, it will lead to the increase of capacity by acquiring additional resources, which is aimed at absorbing greater demand. Because managers will not acquire unneeded resources, costs will reflect resource requirements conditional on current sales (Banker & Byzalov, 2014). However, in case unused capacities exist, some committed resources will not be utilized unless managers make the deliberate decision to remove them (Anderson et al. 2003).

The first empirical confirmation of this idea comes from the research of Noreen & Soderstrom (1997). The authors showed that costs adjust more difficultly to the fall than to the increase of the activity volume, pointing to a different pattern of cost behavior as determined by the direction of the change of the activity. Also, Hamermesh & Pfann (1996) stressed there is no necessary reason why the marginal cost of increasing activity would be the same as that of an equal-size decrease.

However, this idea gains importance by publishing the research of Anderson et al. (2003) which opened 'the black box' about the cost behavior. Authors used the sample of 7,629 industrial companies, observing the period of 20 years (1979 – 1998) and showed that sales, general and administrative costs act asymmetrically. In other words, these costs grow by 0,55% on average upon the increase of sales by 1%, and on average they decrease by only 0.35% in case of 1% fall in sales. This kind of cost behavior is named „sticky” by the authors. Costs are sticky if the magnitude of the increase in costs associated with an increase in volume is greater than the magnitude of the decrease in costs associated with an equivalent decrease in volume (Anderson et al., 2003).

Anderson et al. (2003) consider deliberate decision making on resource adjustments as the primary cause of stickiness in the cost behavior. Cost stickiness is just one of many manifestations of managerial decisions affecting cost behavior (Banker et al., 2018). Numerous researches also highlight the importance of the managers' characteristics and behavior for cost stickiness (Kama & Weiss, 2010, Chen et al. 2012, Dierynck et al. 2012, Qin et al. 2015, Salamah & Abulezz, 2017). The cost behavior issue is deeply investigated also by authors Banker. They argue that with more uncertain demand, unusually high realizations of demand become more likely. Evidence strongly supports their hypothesis that firms facing higher demand uncertainty have a more rigid short-run cost structure with higher fixed and lower variable costs (Banker et al., 2014). Such cost behavior is referred to as rigid or fast-moving (Abu-Serdaneh, 2014).

For instance, Grolms (2011) discusses this issue, describing the concept of "Kostenremanenz" in Germany, and states that this problem appeared in the first half of the 20th century. The importance of this issue is also the subject of a study by Japanese authors (Pichetkun & Panmanee, 2012), who utilized regression analysis for the behavior of costs and their explanation of the causes of sticky costs. And as Weiss (2010) highlights, results indicate that firms with stickier cost behaviour have less accurate analysts' earnings forecasts than firms with less sticky cost behaviour. The issue of sticky cost is engaged in a very detailed for example by Balakrishnan et al. in their publications (Balakrishnan & Gruca, 2008). Another view on the issue of sticky costs outlines for example (Uy, 2011), which incidentally refers to the authors, which exclude the existence of sticky cost. According to him, literature notes that the cost may not be linear and proportional to the level of activity.

But as a first main study of this issue of asymmetric costs (they called them Sticky cost), was presented by Anderson, Banker & Janakiraman (2003) and lately by Anderson & Lanen (2009), whose study introduced the concept of cost stickiness, explained their choice of measurement that lacked large datasets on activity levels and total costs. While Anderson & Lanen (2009) warned that changes in sales do not express an exogenous regressors; this is because sales are not only dependent on volume, but also prices that are set by management. Furthermore, Anderson & Lanen (2009) highlight that classifying costs is subject to managerial choice, and that selling, general, and administrative costs (hereafter "SG&A") represent merely 30% of total cost. Consequently, these create measurement problems when investigating cost behavior.

Anderson et al. (2004) presented an empirical study measured cost stickiness using the sticky cost regression model that enables measurement of the SG&A response to contemporaneous changes in sales revenue and discriminates between periods when revenue increase and revenue decreases Anderson, Banker & Janakiraman (2003). It should be correctly noted that most case studies and researches of this topic rely on the work of Anderson, Banker & Janakiraman (2003) (ABJ model), who confirmed their hypotheses and claims using an empirical model that measures the cost response (SG&A) to current changes in revenue and distinguishes periods when sales increase and decrease. Interaction variables, the value of the so-called dummy variable, indicating a decrease in costs, take the value 1 when sales revenues decrease between the periods t-1 and t, otherwise they take the value 0. The presented model was based on the relationship:

$$\log \left[ \frac{\text{SG\&A}_{i,t}}{\text{SG\&A}_{i,t-1}} \right] = \beta_0 + \beta_1 \log \left[ \frac{\text{Sales}_{i,t}}{\text{Sales}_{i,t-1}} \right] + \beta_2 * \text{decrease\_Dummy}_{i,t} * \log \left[ \frac{\text{Sales}_{i,t}}{\text{Sales}_{i,t-1}} \right] + \varepsilon_{i,t} \quad (1)$$

Abu-Serdaneh (2014) also presented something comparable in his study, when he discovered anti-sticky cost behavior for the costs of goods sold (CGS) and selling expenses, while the cost behavior for SG&A and administration costs was found to be symmetrical. The CGS model shows an increased degree of stickiness for companies with high asset intensity, whereas a lesser degree of stickiness was discerned for free cash flow.

Cost stickiness becomes a phenomenon of present time. Research by Yasukata & Kajiwara (2011) revealed that the difference in cost stickiness even larger when managers are more optimistic about the future sales even when sales decline; hence the reason to keep slack resources for future use. When analysing the level of individual stickiness between SG&A costs and the costs of goods sold (hereafter "COGS"), they found that SG&A costs were stickier than those for COGS. Another survey was performed by Brüggenn & Zehnder (2014). They found out and confirmed, that when applying textbook methods that are based on the traditional model of cost behavior, e.g. flexible budgeting or cost-plus pricing, it is necessary to consider that costs do not necessarily behave mechanistically, but might be sticky. As evidenced by the analysis in this study, cost behavior is sensitive to incentives provided to the manager (Brüggenn & Zehnder, 2014; Soleymani & Khattri, 2012). Another survey was presented by Uy (2014), when he stated, that competitive advantage is not only measured by the revenues and profits but also by how firms operate efficiently (costs).

Directly contrary to the studies mentioned above, Via & Perego (2014) presented a paper that investigated whether cost stickiness occurred in small and medium sized companies using a sample of Italian listed and unlisted firms during the period 1999–2008. Their findings show that cost stickiness only emerges for the total cost of labour and not for SG&A costs, the cost of goods sold and operating costs. Stickiness of operating costs is only detected in a sample of listed companies.

These and other studies clearly demonstrate the need to explore, make comparisons and verify this issue. Therefore, a qualitative research was conducted within selected manufacturing companies in the Czech Republic, where this issue was researched and analysed in detail.

### 3. Methods

The case study investigating the behavior of overhead costs and their variability at specific manufacturing companies shall be presented in this paper. As first will there be presented a detailed case study of a selected company. This will then be supplemented by findings from other researched companies.

The first company is ranked under the industrial classification of EU-NACE 22.11 – the manufacture of rubber tires and tubes, retreading and remolding rubber tires. The company produces a great many tires of different types, especially for agricultural machinery. Such production has the advantage that all the tires are

very similar as regards the manufacturing process utilized, hence they primarily differ in the quantity of material used and of the length of the vulcanization process applied; consequently, the firm's products can be measured not only by the number of units produced, but also by weight). The period of two years was chosen as the time for researching the behavior and development of the company's overheads. This provided data for 24 consecutive months. The data acquired on costs was subsequently categorized as variable costs, total overhead costs (TOC), "influenceable" overhead costs (IOC) and "(un)influenceable" overhead costs (UOC).

Dividing up the costs this way enabled dependence on various factors to be examined. Five factors were adopted as the defaults for the study, which were considered as independent variables; the assumption being that they could exert an influence on overhead cost occurrence and movement. These factors comprised:

- The number of orders entering the manufacturing process (NoO)
- The number of batches of vulcanized tires (NoB)
- Production volume in numbers of pieces (units) of tires (Qpcs)
- Production volume in kg (Qkg)
- Total production time in min. (TPT)

### 3.1. Statistical Analysis

Statistical analysis was performed with the aid of software (SAS, Windows, version 9.13; SAS, Cary, NC). Hypothesis tests on the effects of given factors on the dependent variables were performed at the significance level 0.05. Analytical data consisted of 24 numbered observations, each one representing a calendar month. The three dependent variables constituted total overheads (TOC), influenceable overheads (IOC) and (un)influenceable overhead costs (UOC) as examined over each month.

**Table 1: Descriptive statistical data**

Variable	Mean	Standard Dev.	Minimum	Maximum
TOC (CZK)	9,739,207	1,178,801	8,107,421	12,688,198
UOC (CZK)	6,481,688	647,769	5,540,035	8,414,488
IOC (CZK)	3,257,519	828,227	1,998,593	5,762,106
NoO (pcs)	3,890	802	2,166	4,889
NoB (pcs)	173	28	132	234
Qpcs (pcs)	26,134	5,886	12,853	33,429
Qkg (kg)	3,029,394	670,835	1,514,087	3,926,410
TPT (min.)	3,714,723	808,527	1,805,855	4,669,531

Source: own

These data were analyzed as three separate time series, and then investigation was made of the effect of independent covariates on the costs. The independent variables were represented by the five aforementioned factors, i.e. NoO, NoB, Qpcs, Qkg, and TPT. For UOC, the authors also researched a transformed ABJ model, inspired by Anderson et al.'s "sticky" cost regression model for investigating asymmetry in cost responses. The data are represented as mean and standard deviation (SD) for the given covariates (see Table 1).

Regression analysis of model incorporating autoregressive errors capability was used to observe the effect of the covariates, and the Durbin-Watson test was utilized to examine any autocorrelation. In estimating the parameters, a first-degree of autocorrelation was assumed.

### **3.2. Main Research Objectives and problem solution**

- To create a model of the dependence of overheads on the above-mentioned factors. At this stage, this can be considered a basic outcome of conducting partial research. The statistical method of regression analysis with autoregressive errors was utilized.
- To carry out the investigation on the basis of findings indicating whether the costs' behavior is affected due to changes in prior periods. The aim is to create a model for the time lag of dependencies over one period (month).
- Finally, to create a prediction model for the development of overheads that could be utilized in managerial decision-making. In the model, the dependent variable is represented by overheads under three categories (total overheads, and "influenceable" and "(un)influenceable" overheads). Furthermore, the effect exerted by continuous variables (individually defined factors) on such overhead costs is modeled in a given month.

In accordance with these research objectives, several research questions were identified, i.e. prerequisites. For verification of the same, it was necessary to design appropriate models. The research assumptions were as follows:

- A. There exists a dependence of the overhead costs behavior on selected defined factors.
- B. The authors assume in accordance with theoretical starting points that the behavior of the overhead costs primarily depends on factors unrelated to volume of production. Especially, factors such as "number of orders" and "number of batches" can significantly influence any rise or fall in overhead costs (whether "influenceable" or "uninfluenceable").
- C. Finally, it is assumed that overhead costs may vary depending on changes in the factors examined, and these stem from changes in prior periods (i.e. the periods t-1, t-2, etc.).

## **4. Results**

In summary, four regression models were developed, one of which has been transformed. The three basic models are based on the following relationship (1):

$$Y_t = \beta_0 + \beta_1 * NoO_t + \beta_2 * NoB_t + \beta_3 * Qpcs_t + \beta_4 * Qkg_t + \beta_5 * TPT_t + \varepsilon_t \quad (1)$$

The explanatory variables are represented by continuous variables of NoO in a given period (Mean=3,890 per month, SD=801), NoB (Mean=173, SD=28), Qpcs (Mean=26,134 per month, SD=5,886), Qkg (Mean=3,029,394 per month, SD=670,835), and TPT (Mean=3,714,723 per month, SD=808,527). Overheads act as dependent variables in Model #1, and these are "total overheads" (TOC) (Mean=9,739,207 CZK per month, SD=1,178,801 CZK). In Model #2, these comprise "uninfluenceable overheads" (UOC) (Mean=6,481,688 CZK per month, SD=648,769 CZK).

Extreme values appear in the time series for "influenceable" overhead costs (IOC and IOCm). The results show that a statistically significant effect is exerted on (un)influenceable overheads only by the factors Qkg and TPT (see Table 2).

**Table 2: Parameter Estimates for Model #2 with dependent variable UOC; Durbin-Watson=1.368; p=0.0951; R2=0.45**

Parameter Estimates			
Variable	Estimate	t - Value	Approx Pr >  t
<b>Intercept</b>	5,824,940	6.52	<.0001
<b>NoO</b>	-481.87	-1.30	0.2090
<b>NoB</b>	13,403	1.81	0.0875
<b>Qpcs</b>	-280.63	-1.31	0.2069
<b>Qkg</b>	7.39	3.09	0.0063
<b>TPT</b>	-3.99	-3.59	0.0021

Source: own

Estimates for the regression coefficients show that “(un)influenceable” overheads fluctuate, rising upwards (growth of about 7.39, p = 0.0063) in line with increase in the quantity of kilograms manufactured, and dropping (decrease of about 3.99, p = 0.0021) in parallel with the number of production minutes. The results for Model #2 are detailed in Table 2. Both factors “production in kg” and “total production time in min.” are significant at the level of 0.05. This means that Qkg and TPT are potentially important predictors of a dependent variable. Further work is based on identifying the possible predictors that should cause significant impact to predicted variables.

The final function of the regression model for development UOC, arising out of Table 2, is as follows:

$$Uoc=5,824,940 - 481.87*NoO + 13,403*NoB - 280.63*Qpcs+7.39*Qkg -3.99*TPT$$

Performing an investigation (see Table 3) revealed that a statistically significant effect on “total overheads” is applied by the factor of TPT (p = 0.0478), when these overheads experience a total decrease of 4.69 concurrently with increase in production time. One explanation for this could be better utilization of production capacity with lesser frequency of the origination of intermediate manufacturing operations, inducing growth in overheads.

Out of the detailed results of Model #1 it can be seen that a factor yet closer to the limit of significance (p = 0.1051) is that of Qkg, which causes a rise growth in overheads of 8.1065, relative to an increase in production by 1 kg.

**Table 3: Parameter estimates for Model #1 with dependent variable TOC; Durbin-Watson=0.9753; p=0.173; R2=0.34**

Parameter Estimates			
Variable	Estimate	t - Value	Approx Pr >  t
<b>Intercept</b>	10,602,694	5.97	<.0001
<b>NoO</b>	-792.88	-1.08	0.2946
<b>NoB</b>	-3,662	-0.25	0.8065
<b>Qpcs</b>	-163.66	-0.38	0.7052
<b>Qkg</b>	8.10	1.71	0.1051
<b>TPT</b>	-4.69	-2.12	0.0478

Source: own

The third model was created to investigate the dependence of “influenceable” overheads. However, contrary to previous assumptions, a statistically significant effect by the variables on Influenceable overheads was not proven (see Model #3 in Table 4).

**Tab. 4: Parameter estimates for Model #3 with dependent variable IOC; Durbin-Watson=-0.334; p=0.371; R2=0.28**

Parameter Estimates			
Variable	Estimate	t - Value	Approx Pr >  t
<b>Intercept</b>	4,777,754	3.67	0.0017
<b>NoO</b>	-311.01	-0.58	0.5706
<b>NoB</b>	-17,066	-1.58	0.1314
<b>Qpcs</b>	116.98	0.37	0.7121
<b>Qkg</b>	0.71	0.21	0.8389
<b>TPT</b>	-0.70	-0.43	0.6720

Source: own

It is apparent from Table 4 that none of the other factors provable showed any statistically significant effect on IOC. The only factor to actually border on formal significance ( $p = 0.1314$ ) was Qkg, from the parameters of which it can be concluded that rise in volume in production batches triggers a corresponding decrease in “influenceable” overhead costs by about 17,066.

The fourth and final model addressed change in costs by a shift in time of about one month. This model can be used to examine costs affected by a shift in time concerning a limited period (e.g. months); thus it is possible to prove the cost asymmetric behavior referred to as “sticky costs”. Herein, a shift was applied of just one month due to the limited period over which data was observed (months). The model adapted according to ABJ did not feature the dummy variable, which represents a decline or increase in this model, although the model was maintained as clearly transformed and assembled, meaning that the only variables remaining were those with a statistically significant effect on the dependent variable. Model #4 as assembled is given below:

$$\text{Log} \left( \frac{UOC_{t-1}}{UOC_t} \right) = \beta_0 + \beta_1 * \text{Log} \left( \frac{Qkg_{t-1}}{Qkg_t} \right) + \beta_2 * \text{Log} \left( \frac{TPT_{t-1}}{TPT_t} \right) + \varepsilon \quad (2)$$

Based on the transformed model, the authors obtained estimates for the regression coefficients, as shown in Table 5, and it was observed that these influenced “development UOC”.

**Table 5: Model #4 – a transformed model; Durbin-Watson=0.349; p=0.366; R2=0.23**

Parameter Estimates			
Variable	Estimate	t - Value	Approx Pr >  t
<b>Intercept</b>	0.0046	0.24	0.8116
<b>delta TPT</b>	-1.18	-2.22	0.0383
<b>delta Qkg</b>	1.12	2.09	0.0495

Source: own

The results given by Model #4, as well as those of Model #2, clearly show that UOC is significantly influenced by production volume in kg (Qkg, 1.12 times, p = 0.0494), and by the duration (minutes) of production (TPT, -1.18 times, p = 0.0383). The model has a statistically significant, absolute regression coefficient that is close to zero. This model can then be modified as follows:

$$\text{Log} \left( \frac{UOC_{t-1}}{UOC_t} \right) = \text{Log}(1) + \text{Log} \left( \frac{Qkg_{t-1}}{Qkg_t} \right)^{1.12} + \text{Log} \left( \frac{TPT_{t-1}}{TPT_t} \right)^{-1.18} + \varepsilon \quad (3)$$

$$\text{Log} \left( \frac{UOC_{t-1}}{UOC_t} \right) = \text{Log} \left( 1 * \left( \frac{Qkg_{t-1}}{Qkg_t} \right)^{1.12} * \left( \frac{TPT_t}{TPT_{t-1}} \right)^{1.18} \right) + \varepsilon \quad (4)$$

$$\text{Log} \left( \frac{UOC_{t-1}}{UOC_t} \right) = \text{Log} \frac{\frac{Qkg_{t-1}^{1.12}}{TPT_{t-1}^{1.18}}}{\frac{Qkg_t^{1.12}}{TPT_t^{1.18}}} + \varepsilon \quad (5)$$

From the above, following adjustment (relations (4) and (5)), if the aim is to remove fluctuations in overhead costs, it is necessary to stabilize the proportion of kilograms and duration (minutes) of production.

This cost model was verified on **further case studies** of manufacturing companies for **different cost categories** and the individual results were analyzed in detail. For example, in the case of the next examined company, within the detailed analysis of available data, it was possible to find and compile only one significant regression model, even though there was used detailed data about: overheads, administrative overheads, sales overheads, total overheads, and total overheads and administrative overheads with the exclusion of personnel costs that could have a negative effect on the results of regression models due to their volatility. The following factors then were defined as independent factors (and variables): Sales volume in CZK (SCZK), Number of standard machines hours (NSMH) , Number of customers (NoC), Number of orders (NoO), Number of items in orders (NIO) and Number of invoices issued (NII).

This only one significant regression model of cost dependence was namely for the cost group of "total overhead costs without personnel costs (TO\_PC)". After individual steps of regression analysis, when the least significant independent variables (Production volume in CZK, Number of customers and Number of issued invoices) were eliminated in individual steps due to the overall insignificance of the obtained model, it was possible to compile the final regression equation of the model with linear function as follows:

$$TO\_PC = 4\,150\,166 + 164 \times NSMH - 2545 \times NoOO - 559,6 \times NIO \quad (6)$$

From the result of the regression analysis, a statistically significant regression model was found and compiled (p-value = 0.043 < 0.05), which showed a strong dependence of these costs on a only one factor – Number of standard machines hours (NSMH). At the same time, the constant of the model in the amount of CZK 4,150,166 proved to be statistically significant, which can be described as a fixed component of this equation, while the number of standard machine hours of as a significant variable component of this model.

As in the previous cases, even though there are 2 factors in the model for which the statistical significance was not proven (Number of Orders and Number of items in the order – p-value > 0.05), it must remain included in the regression model, because in their removal would reduce the significance of the whole model.

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## 5. Discussion and conclusion

The hope is that the methodology for cost analysis proposed above may give rise to fresh information and insight invaluable for making managerial decisions. The traditional approach for cost management merely considers dependence on production volume. The proposed models herein bring a new perspective to the dependence of costs. This is despite the fact that it did not prove possible to demonstrate the significance of some factors in their application in each case, such as the number of orders. Indeed, another factor – number of batches - is merely significant as close to the level of confidence ( $\alpha = 10\%$ ). On the contrary, in different cases, the dependence of different costs on a number of factors as established variables has been demonstrated. As examples could be stated factors like the number of standard machines hours (NSMH), factor or the order size (OS) or number of invoices issued (NII), etc.

Nevertheless, these models can be seen as means to further explore the behavior of overheads in connection with their dependence. The following conclusions arose from applying said models. The authors showed that a correlation exists between the overhead costs' behavior on certain factors, thereby was confirmed this assumption. Somewhat surprisingly, the most significant difference was demonstrated for the group of overheads that can be described as "uninfluenceable" (e.g. depreciation in value of machinery, costs related to machining tools, tools, and so on). Dependence was demonstrated for factors relating to the nature of production; these dependence factors comprised production in kg and total production time in minutes for the manufacturing process. Consequently, assumption "B" was disproven for any possible dependence by factors unrelated to production in kg.

Implementing the models revealed that it is not possible to separate volume of production and the total time given over to the production process. Thus, if faced with making managerial decisions, it may be beneficial to optimize and stabilize overheads as approximately constant values. In order to avoid large fluctuations, it is necessary to optimize the ratio of total production time for the manufacturing process with the amount of production in kg. All of this takes place under conditions of maintaining a stable degree of rationality in production and stability in productivity. Another aim is to ensure an optimal future ratio between these two factors.

According to the model for ABJ regression models (Anderson et al., 2003), a transformation model was proposed that respected the significant dependence of significantly factors. Applying this model (Model #4, Table 5) showed that changes in overhead costs (herein pertaining to alteration in UOC) are affected by the volume of these factors from the previous period (month), which confirms assumption no 3. The changes from the previous period may be explored to evince more consecutive previous periods. This means that it is possible to identify the so-called asymmetric behavior of costs, which not only results from the development of significant factors of the period, but also the occurrence of costs affected by previous periods, which was confirmed in all investigations. In this context, it should be seen as a restrictive number concerning the act of observation, one which subsequently determines the scope of the previous period and which may be used for statistical examination.

For the sake of completeness, it is necessary to mention the limits of these models. When applying them, a few aspects have to be considered. One of the first is the need to characterize the quality of the input data, although actual practice in business is somewhat different. It is possible to often encounter a variety of irregularities in accounting that may affect the input data and thus also the final results. For example, accounting costs could be improperly assigned during a period (a month, quarter), which the entity later corrects in the following seasons. Such conduct may artificially cause fluctuations in costs, affecting

deduction of their real evolution, and possibly diverging from reported values for certain factors in the given periods of time. It is worth noting that some fluctuations in overheads as identified by the entity could stem from inconsistency in the results of the regression model, so the inherent value of these might be diminished from an information standpoint. In relation to this, it is necessary to mention the seasonality of production itself as well as the creation of overhead costs denoted as extraordinary or impact costs (e.g. exceptional purchase of machinery or equipment, or extraordinary fines, fees, personnel expenses such as bonus 13th or 14th monthly salary payments, etc.). Hence, adjusting the data would be advisable, involving such things as dissolution of extraordinary or impact costs from all the calendar months of the year (as they relate to the entire fiscal year, although they are only charged during a single month). Another possibility would constitute statistical adjustment of the time series. As a notable error in the system appears to be the scope and length of the examined period (that under observation), a larger range of samples may better serve these regression models for additional future periods.

In conclusion, it can be stated that in contrast to other presented studies, such as from Anderson et al. (2003), Banker et al. (2011), Banker and Byzalov (2013), etc., it has been shown in our research that different groups of costs (not only sales, administration and general SG&A costs) can be taken into account, but that there are also connections and relationships to different factors and not only to production volume (sales). It is possible to say that the results agree with the critical study and opinions of eg Anderson and Lanen (2009) and also confirm the conclusions of Villierse et al. (2013), who also examined dependencies and asymmetric behavior of cost groups other than SG&A alone.

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## SPECIFICS OF MUNICIPAL ORGANIZATIONS IN THE APPROACH TO THE CONCEPT OF CSR

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### **Abstract:**

The implementation of the CSR concept is an important part of business of each organization irrespective of the type and size of the organization. The CSR index is a tool for determining the level of CSR in an organization. Each type of organization has different conditions for the implementation of CSR. The aim of this paper is to identify the specifics of municipal organizations different from other types of organizations (profit-making organizations, non-profit organizations) in relation to the CSR concept. The approach to the CSR concept in individual types of organizations was determined via the EAT CSR Index questionnaire developed at the Moravian Business College (Moravská vysoká škola Olomouc, o.p.s. - MVŠO), which was applied to all types of organizations of the MMSP size and their results were evaluated and mutually compared using quantitative and qualitative approaches. It was determined that with municipalities, the interpretation of the CSR concept is related to the obligations set by the legislation. The CSR concept implemented in the approach of voluntary activities beyond the scope of legal obligations was significantly dependent on the person of the highest representative of the municipality.

### **Key word:**

types of organizations, municipality, CSR, interview, Eta Index 2019 questionnaire

**JEL: M14**

### **1. Corporate Social Responsibility (CSR)**

The World Business Council for Sustainable Development says „**Social Responsibility of companies**“ is an ongoing commitment of companies to behave ethically and contribute to economic development and improve the quality of life of workers and their families as well as local communities and society in general“ (GAEA, 2012). Classical representatives of the CSR theory Caroll a Buchholtz (2010) characterize CSR as a commitment of organizations capable of making procedures and decisions consistent with the goals and values of society. The main features of the CSR concept are, in particular, voluntariness, an ethical approach and interest in a harmony of the company activities with interests of the outside world. Social responsibility is the attitude of organizations reflected in their strategy, activities, namely based on own decision and not within the law. The requirement for a responsible approach for all organizations is already formulated by the European Commission in the renewed EU strategy 2014 for Corporate Social Responsibility Communication. This defines the responsibility of companies for their impact on society (COM,

2011). Complementary regulatory measures are intended to implement CSR in the management and practice of individual organizations at the supranational, national and regional levels. The current practice used mainly in profitable sector<sup>1</sup> shows the growing importance of the CSR concept. The picture, which the organization evokes in customers, employees, business partners and other subjects begins to play a key role in global politics. Customers want to buy products from reliable companies. They want to cooperate with business partners they can rely on, employees want to work for the companies which deserve respect, investors want to support the socially responsible companies; further, the non-profit and nongovernmental organizations want to cooperate with the companies having similar goals (Holátová, Doležalová, et.al., 2014).

The authors usually do not specify whether the concept applies to all types of organizations or to profitable subjects only. „Corporate“ refers to social responsibility in relations to the organizations. The CSR concept can be applied to all types of organizations; it means to profitable organizations, non-profit organizations and municipalities (Pokorná, 2012, Bernardová in Ivanová, Bernardová, 2018) of all sizes.

The content of the CSR concept is defined as the management of three areas. These areas were defined by John Elkington in 1995 (in Henriques, Richardson, 2004) as the principle of permanent sustainability. The so-called Triple-bottom line principle consists of three „P“. Profit, planet and people. Thus, CSR can be understood as a business having its economic, social and environmental areas also referred to as three pillars of CSR (Pokorná 2009, Kašparová, Kunz 2013, Dalíková, 2015 et al. quotation according to Bernardová, Kubicová, Ivanová 2017). Only under the conditions of application and adherence to the principles of all three areas, permanent sustainability can be achieved. Achieving sustainable development is possible, if the company approaches its business more comprehensively, beyond the scope of its legal obligations.

The vertical description of CSR consists of three level of implementation which, in real practice, creates an interconnected whole. The macro level represents the CSR solution from the point of view of the social and economic system as a whole; it deals with the creation of general conditions for responsible behaviour of organizations. The intermediate level represents the solution of CSR issues at the level of the organization. At the intermediate level, the CSR concept focuses on the strategy and activities of individual organizations in relation to its internal and external environment<sup>2</sup>. The micro level represents the solution of CSR questions at the level of decision-making of an individual. Every employee is an individual but key managers make decision on strategic activities and the culture of the organization (Pokorná, 2012).

When looking at CSR as a process, taking place in practice in the environment of a particular organization, then CSR is used on the axis: values – ethical reflection – decisions of the organization's management – particular activities – the success of the organization. The continuum is based on personal values of managers, employees and other stakeholders. There takes place in the organization an ethical reflection of reality, when the values are reflected in the internal environment and in the decisions of the company management on the company's strategy, corporate culture and implementation of particular activities. The completion of the entire continuum should result in the subsequent success of the organization (Pokorná, 2009).

<sup>1</sup> According to the research of the KPMG company up to 78 % of the 250 largest world companies include in their financial reports the information on CSR. It is supposed that these companies believe that this information is helpful and important to their investors. Up to 67 % of these companies use the findings on their social responsibility from the reports made by the third independent party. (KPMG, 2017).

<sup>2</sup> The content of the CSR concept is also described in the valid CSR questionnaire of the European Commission (available on: <https://ec.europa.eu/docsroom/documents/11863?locale=en>), which became inspiration to the following research part of this paper.

## 2. Municipal organization and CSR

A municipality can be considered a village or town. At the same time, it is a defined territory with corporate personality and competency of local self-administration. It is an institution administering self-governing territory within the state. Each institution or administrative unit has an elected council and a mayor. In the Czech Republic, according to the Constitution of the Czech Republic (<https://www.psp.cz/docs/laws/constitution.html>), self-administration has a two-tier system: a municipality or local self-government and regions or higher administrative units<sup>3</sup>. The legal regulation of the municipal establishment can be found in Act no. 128/2000 Coll., on Municipalities, as amended. It is a legal entity. When meeting the criteria stipulated by the Act, municipalities can be declared: Town, Township, Statutory City.

Right with municipalities, behaviour in the context of CSR should be completely natural because the mission of regions and municipalities is to take care of the development of their territory. The main principle of CSR is to pay attention to this development with the aim of long-term sustainability. At present, only manuals (CSR Handbook for Public Administration or How to Behave in Socially Responsible Ways, 2016) are the main source available in this area, only scientific articles in isolated cases. The discussion on CSR in municipalities is mostly initiated by the Quality Council of the Czech Republic<sup>4</sup> within the Ministry of Industry and Trade (MIT). Part of the National Action Plan of the CSR Development in the CR represents support to the application of this concept in public administration (<https://www.databaze-strategie.cz/cz/mpo/co-kdo-dela/mpo-rk-cr>). In the scope of the National Quality Policy<sup>5</sup> for 2020, there is also mentioned the area of certification according to the National Programme, the conformity assessment of social responsibility management system intended for public administration and municipalities. In the Czech Republic, several programmes related to social responsibility and municipalities have been implemented: the National Award of the Czech Republic and the National Award of the Czech Republic for Social Responsibility and Sustainable Development, the competition for the Social Responsibility Award, both, at the regional level, and the national level (Quality Council, 2015).

In the business sector, the organizations make effort to apply the principles set by the CSR concept, primarily to strengthen their position on the market, stabilize profits, increase employees productivity and their motivation, gain public interest and good reputation. Such characteristic then becomes a key for achieving permanently sustainable development of the company (Bernardová, Kubicová, Ivanová, 2017). Here, we can probably find the greatest motivation to implement the social responsibility concept in cities and villages. There is no exception even in case of cities and villages when they try to ensure their own permanently sustainable development (Kašparová, 2009). According to the Methodology of Strategic Management of Municipalities (2015), the contributions of CSR to the cities or villages are as follows: *media interest, the possibility of presenting the title of social responsibility, better cooperation between cities or villages and local non-profit organizations and new relationships, better environment, greater interest of citizens in the state and development of a town or village, keeping educated young generation in the village, attracting new investors, restoring or preserving traditions, preventing protests, transparent decision-making and behaviour in case of contracts, stable population, better “neighbourhood” relationships with*

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<sup>3</sup> Existence of this two-level system is given by the Constitution of the CR. However, the precise report and obligations of municipalities and their specification are regulated by Act no. 128/2000 Coll., on Municipalities; Act no. 129/2000 Coll., on Regions and Act no. 131/2000 Coll., on Capital City of Prague.

<sup>4</sup>The Quality Council of the Czech Republic (hereinafter referred to as the "Council") is a consultative, initiatory and coordinative body of the Government of the Czech Republic (hereinafter referred to as the "Government"), focused on a support to management development and the application of the National Quality Policy in the Czech Republic in compliance with the European Quality Support Policy.

<sup>5</sup>The National Quality Policy is a summary of the intention, goals, methods and tools to affect the quality of products, services and activities in the scope of national economy and public administration.

*surroundings, strengthening image and credibility, more efficient use of public funds, increased employee engagement.*

It is a question of how municipalities cope with the CSR concept, what is the form of the CSR concept implementation in municipalities.

### 3. Methodology:

The aim of the submitted survey is to identify the specifics of organizations such as municipalities in the approach to the CSR concept. The goal of the project survey was operationalized in two research questions (RQ):

**RQ1: What are the differences in the CSR concept according to the type of organizations?** The aim is to find out, who is a bearer of information and at which workplace the information is traceable. We ask this question mainly because it is not clear who deals with the CSR issue in organizations, whether such person/position/role is really a bearer of knowledge of the CSR concept in the organization.

**RQ2: How is the CSR concept understood in individual types of municipalities?** The aim is to find out what the representatives of municipalities imagine under the individual topics of CSR in particular. What is their interpretation of CSR topics in the municipal environment.

As the method of data collection there was used a controlled interview conducted according to the questionnaire created by the Moravian Business College in the scope of the project TAČR – ETA Index 2019(<https://www.mvso.cz/files/1231-index-so.pdf>).<sup>6</sup> The questionnaire contains all the key topics related to the CSR and is a part of the upcoming CSR index for profitable organizations, non-profit organizations and municipalities. A qualitative research approach was chosen for both research questions and two types of controlled interviews were conducted in the survey. In case of the first research question, controlled interviews were held with the representatives of randomly selected organizations<sup>7</sup>. We addressed one employee in each approached administrative role authorized to complete the ETA Index 2019 questionnaire. During the interview, we followed up where an employee of their organization would search for the information needed for the questionnaire completion. We recorded the answers. In the survey, the records from two types of municipalities are analysed. Of all 38 respondents we chose just two municipalities which meet all typical indicators of non-profit organization while are the most accurate. We chose those municipalities for forming hypothesis of qualitative research. We used grounded theory<sup>8</sup>. With the second research question, controlled interviews were held with the representatives of the organizations of municipality type. The interviews were conducted with the highest representatives of three main types of municipalities at the level

<sup>6</sup> The questionnaire was made of the basis of respected methodologies of the CSR identification: GRI, Sustainability reporting Standards, Global Peace Index ([http://static.visionofhumanity.org/sites/default/files/GPI%202016%20Report\\_2.pdf](http://static.visionofhumanity.org/sites/default/files/GPI%202016%20Report_2.pdf)), Charity navigator [www.charitynavigator.org](http://www.charitynavigator.org), EUROPA - Enterprise - Corporate Social Responsibility, CSR, CSR for SMEs. Questionnaire to raise SME awareness of CSR [https://ec.europa.eu/search/?queryText=Ref.+Ares%282015%292099534+-+20%2F05%2F2015&query\\_source=europa\\_default&filterSource=europa\\_default&sLang=en&more\\_options\\_language=en&more\\_options\\_formats=&more\\_options\\_date](https://ec.europa.eu/search/?queryText=Ref.+Ares%282015%292099534+-+20%2F05%2F2015&query_source=europa_default&filterSource=europa_default&sLang=en&more_options_language=en&more_options_formats=&more_options_date)

<sup>7</sup> The research group created 38 respondents. There were processed 38 questionnaires/interviews in total: 33 from profitable organizations, two from municipality type organizations and three from non-profit organizations. The records from interviews were transcribed; the answers were processed in the table using MS Excel and subsequently prepared in the qualitative analysis. The representation of individual types of organizations in the group was affected by the interest of the representatives to realize the interview during personal contact at the period of pandemic of Covid-19. All tables and data are available from the authors of the paper.

<sup>8</sup>The researcher using grounded theory have to sort, examine and code the data. The coding proces is using own criteria for marking semantic units (Miovský, 2006). First we examine the phenomenon and let the important things float to the surface without preconditions (Strauss & Corbinová, 1999). In grounded theory research question are focusing on progress and process. (Strauss & Corbinová, 1999). Based on repeated analyzes we can re-value and remodel the categories. For the grounded theory is typical continuous sample expansion and data creation through the whole process. By capturing the variability of categories and the relations between them we specify the theory. The proces ends when new data do not bring any new informations.

of villages as the results from the first interviews show that the situation in CSR at the village level is unclear and information from the CSR concept concentrates at the municipal level with the highest representative of the given organization/municipality<sup>9</sup>. The interviews were conducted in the form of dialogue on the individual questions of the ETA Index 2019 questionnaire. The answers were recorded in full and all interviews were conducted by the MVŠO students.

The questionnaire contains the entire spectrum of activities fulfilling the CSR concept. There are four areas: 1/ permanent sustainability strategy – contains the sub-areas of organization value, reporting and certification, CSR policy; 2/ economic part – contains the sub-areas of organization administration and management, relationship to suppliers, relationship to customers/clients and marketing; 3/ social area – contains the sub-area of dealing with employees, relationship to the local community beyond legal obligations; 4/ environmental area.

#### 4. Results<sup>10</sup>:

**The first research – two controlled interviews. Aim: who is a bearer of the information on the CSR concept implementation in the given organization.**

1. Regional office, from the point of view of the strategy department officer: In the area of Sustainability Strategy, the sub-area of Organization Values – the respondent addresses exclusively the personnel department, regional development department, information technology department, marketing department and legal department. In the sub-area of Reporting and Certifications, the respondent addresses the marketing department and quality and service department. In the area of CSR policy, the respondent searches for the information in personnel and marketing departments. In the Economic part, the sub-area of Administration and Management of the Organization – the respondent addresses the company management, marketing department, information technologies department and an owner. According to the respondent, relationship with suppliers is looked after by the dispatching department, the department of customer communications, a company director, personnel and commercial departments. The relationship to the customers/clients is looked after by the department of external relations, inspection department, commercial and marketing departments and a sales representative. In case of Marketing, the respondent addresses the marketing department, legal and inspection departments. In the Social Area, the sub-area of Dealing with Employees is looked after by the personnel department, a company director, payroll and economic departments. Relationship with the local community beyond the scope of legal obligations is dealt with by the company management, HR and legal departments. The Environmental area is looked after by the environmental manager, economic administration department and research and development department, marketing department and sustainable development departments.

2. Local authority from the point of view of the clerk: In the area of Strategic Development, the sub-area of Values and Organization, the respondent addresses the municipality mayor, the deputy mayor of the municipality, or a person involved in hiring staff. In the sub-area of Reporting and Certification, the respondent addresses the municipality management and municipality websites. In the CSR policy area, the respondent searches for the information at the municipality management. According to the respondent, the municipality mayor or directly the respondent deals with organization administration and management because they work with the population register. The mayor himself or the respondent deal with relationship with suppliers. The same applies to the case of the relationship with customers/clients. Marketing is dealt with by the deputy mayor. Negotiations with employees and the relationship with the local community beyond the scope of legal

<sup>9</sup> The research was carried out in the form of semi-structured interview with the representatives of individual types of municipalities, namely village, township, town and statutory city.

<sup>10</sup> Data source documents for all represented interviews are available in the full and evaluated form with the researchers – USV (Department of Social Science) of MVŠO o.p.s.

obligations belong to the municipality mayor. According to the respondent, the municipality mayor takes care of the Environmental Area.

Conclusion: there is a huge difference between the level of the region and the local municipality. At the level of the region, it is possible to follow the solution to the CSR concept across the entire office, including the expert on the CSR concept. This approach is adequate for a large organization in the profitable sector. At the level of local municipalities, the knowledge and implementation are concentrated on the role of the mayor or so-called local authority management. This approach is adequate for micro, small and medium organizations in the profitable sector. The difference between regional offices and small municipalities from the perspective of the organization size according to the number of employees are also confirmed by the available data<sup>11</sup>. The average number of employees per one local municipality office amounts to 13 employees, which corresponds to the type of the small organization of up to 50 employees. The average number of employees per one regional office amounts to 596 employees, which corresponds to the large organization according to the number of employees over 250<sup>12</sup>.

**The second research – three partially controlled interviews. Aim: what the bearers of information on the implementation of the CSR concept in the given organization imagine under the individual topics of CSR.**

1. Local municipality secretary: the secretary knows the term CSR and has the strategic plan of development done. The municipality takes into account the SDG goals, however, does not perform the measurement of social responsibility. Each month, the municipality issues a monthly magazine containing all social events and is published on the municipality website. The municipality has no worker who would deal with the CSR concept. In the scope of its normal activity, the municipality is actively engaged in the environmental area (weatherproofing of buildings, sorted waste containers, collection vehicle, construction of chargers for electrical bicycles...).
2. Municipality mayor – township: The mayor does not know the term CSR. The mayor acknowledges no competitions and motivation events related to municipalities and CSR. The municipality has no worker who would deal with the CSR concept; everything in this area is dealt with by the mayor. The municipality does not deal with the activities focused on the prevention or activities beyond the scope of its obligations at all. In its basic activity, the municipality is actively engaged in the environmental area.
3. Municipality mayor – town: The employee knows the term CSR. Due to its basic activities, the office participates in the town development (social services, education...), it does not perform social responsibility measurement of the organization. The town does not use anti-corruption measures. The town is actively engaged in the environmental area.
4. Mayor – statutory city: The fourth interview was carried out with the statutory city mayor. The city knows the term CSR and has the strategic plan with the CSR principles done. In 2019, the city won the competition called Green for information. The city also provides the employees with many benefits. The city organizes charitable events (food collection ...) and also cooperates with the university and the agency for social inclusion. The city is actively engaged in the environmental area.

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<sup>11</sup> According to the available data valid for 2019 <https://www.czso.cz/csu/czso/maly-lexikon-obci-ceske-republiky-2018-42hnx5qxcd.pdf> a <https://www.czso.cz/documents/10180/92010910/32019919003.pdf/3013631d-7727-4f05-b271-fcf0bb0251a?version=1.1> there were as at 01/01/ 2019: **6257** municipalities (without Prague), 13 regions (without Prague). A number of municipality employees amounted during the year to: 83,546. A number of regional offices employees amounted to: 7755. The average number of employees per one municipality: 83,546/6,257= **13.352**; the average of employees per one region: 7,755/13= **596.538**.

<sup>12</sup> Within the MMPS category, a distinction is made between micro-enterprises, small-enterprises and medium-enterprises. A micro-enterprise employs less than 10 persons, a small-enterprise has less than 50 persons and a medium-enterprise employs less than 250 persons. (Eur-lex 52013IP0050,2016)

5. In the scope of the research, the fifth interview was carried out with the municipality mayor containing the one-word answers YES/NO only.

Conclusion: CSR activities are replaced with the basic activity of the municipality with three respondents; one respondent did not consider important to think about CSR activities and describe them, one respondent implements CSR activities. At the level of small municipalities, the CSR activity depends on the mayor's personality (management).

## 5. Discussion:

The research showed that the implementation of the CSR concept in municipalities (contrary to profitable and non-profit organizations) also substantially differs according to the level of the given municipality – region, small local municipality. The regional level shows, that in the scope of the internal structure, the requirements of the CSR concept are also implemented and the departments across the entire office participate in its implementation (as well as in case of profitable and non-profit organizations where the implementation and the knowledge of the CSR concept is dispersed amongst several workplaces, including the top management); the level of small local municipalities does not show the concept for the CSR implementation, their implementers are managers/mayors. Distinguishing of the basic activity of municipalities in favour of administered territorial units from voluntary activities within the CSR concept is not simple and it does not work. The mayors tend to make both activities identical.

The role of municipalities (also in the CSR area) is irreplaceable in the regions of its effect. The role of key types of organizations in the regions is expressed by the Triple Helix model (<https://www.leydesdorff.net/th12/th12.pdf>). The regional development depends on the interconnection between knowledge-based/academic field, business field and public administration in the model of knowledge-based economy. This concept is based on the “penetrating communication” of those three, to the certain extent different subsystems. The engagement of organizations in the life of the region is necessary for the development of the regions themselves (Etzkowitz, Leydesdorff, 2000, Leydesdorff 2012). However, the institutions of public administration and state administration must play an active role.

In practice, it is necessary to pay attention to the issue of knowledge of the CSR concept in municipalities, to proper understanding and seizing of the concept, and to provide both, the mayors and employees of municipalities with educational instruments so that CSR activities are delegated in the scope of individual municipalities. The appropriate instrument can be ETA Index CSR 2019, which is prepared for this purpose (<http://ijci.wcci-international.org/index.php/IJCI/article/view/331/123>).

The implementation tools, evaluation and reporting of CSR in municipalities must be also set according to the organizations of MMSP type. Szczanowicz, Saniuk (2016) deal with the research of MMSP. Based on the MMSP specifics, they designed the models of CSR evaluation and reporting. They show that for the development of CSR in the practice of MMSP, the special stress must be placed on the effectiveness and sustainable development and on the development of CSR as a competitive advantage. According to them, the new approach is based on the flexible instruments for evaluation and reporting of CSR, which can also act as a reference model for improving responsible business. Also Džupina, Mišún (2014) make an appeal to respecting the specifics of MMSP, the selection of suitable strategy proportionate to their possibilities. The authors state that there exist the lack of studies dealing with CSR at MMSP mainly because MMSP have not enough time, sources and knowledge to perform social measurements and plans.

Another research of specifics and the method of the CSR concept implementation in the organizations of municipality type must be focused on the field examination using quantitative method of research; to follow the specifics of fulfilling the CSR concept in individual areas/pillars of CSR, to obtain know-how for MMPS. It will be possible to complete the processed methodology ETA Index SR 2019 with the instructions for processing the index in municipalities and the index result take into account with other comparable types of organizations by scales.

As one of the ways of globally enforced sustainable development, the CSR becomes the trend of management and the way, how to get a competitive advantage. According to Werther and Chandler (2011), it is necessary for achieving this goal the social responsibility to penetrate and affect all the aspects of company activities. Therefore, according to Spence (2016), the awareness of the specificity of MMSP is important; it is also important to pay attention to the empiric research of MMSP and develop the theories, which would be at the main stream of the CSR research. The research outputs should become a basis for the regional policy for MMSP, scientific base for more investigation and the basis for good practice in CSR strategies. Jonkutė, Staniškis, Dukauskaitė (2011) state that the success of CSR strategies depends on the quality of the performance of employees in this area, which is associated to a great extent to the quality of education in CSR. With regard to the fact that there is a lack of know-how and experience to support the systematic integration of CSR procedures in the process of MMSP management, it is necessary to have new specific educational materials and tools to be adjusted to that they correspond with the needs and expectations of MMSP.

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# THE PROGNOSIS OF CORONAVIRUS EPIDEMY OPPORTUNITIES IN THE YEAR 2021

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## **Abstract:**

The paper is dedicated to prognosis of coronavirus epidemic positive factors, opportunities, and expectations in the year 2021. The motivation behind this paper is to predict simply with the usage of scientific method few basic visions concepts regarding Covid pandemic in near future with accent on plus sides of the situation. The aim of the paper is to answer three formulated research questions and find best consensus in expert opinions. The expert group of 8 bachelor graduates of MBCO from distance master course professionally focused on water treatment was questioned during the winter semester 2020. The one lap simple Delphi method was utilized. Three research question were formulated. The results have been analyzed, synthesized, and discussed. Most important conclusions have been derived; they emphasize experts common focus on following topic in connection with Covid disaster: development on e-shops and e-commerce, vaccination, and more time for family.

## **Key words:**

Delphi, Covid19, forecasting

**JEL: I12, I15, O**

## **1. Introduction**

Current world socio-geographic situation is very unpredictable. There is more than year since the beginning of Covid19 pandemic. The pandemic changed substantially many aspects of ordinary human life in Czech Republic as well as worldwide. Nobody really knows how the situation will develop, but even that successful entrepreneurs need to predict. Why not try with the help of scientific method Delphi?

## **2. Theoretical background**

The chapter introduces basic theoretical concepts regarding topic of the paper as forecasting, Delphi method and its applications. Further the chapter discusses, with recent scientific literature, application of Delphi method in connection with COVID-19 pandemic.

### **2.1. Forecasting**

Forecasting deals with predicting the future development of an organization, society, economy, industry, environment, etc. The aim is to get an idea of the future state, which is based on rational ways of forecasting.

The obtained forecasts are of great importance for strategic management, risk management and planning. Forecasting uses a variety of forecasting methods and forecasting techniques, which fall into roughly three basic groups: (I) statistical methods and techniques, (II) expert and qualitative forecasting methods, (III) scenario-based methods (citation).

## 2.2. Delphi and its applications

The Delphi method is a procedure for determining an expert estimate of future development or condition using a group of experts. It is a technique that uses the subjective opinions of the members of the expert group in order to obtain an overall consensus of opinions. Simply put, the Delphi technique is a kind of brainstorming with clear rules. The Delphi method is one of the expert and qualitative prognostic methods (Crawford et al, 2016).

Delphi is used to predict future developments based on consensus among experts. It is one of the methods of expert estimation. It is widely used in qualitative risk analysis, but also in project management and a number of other areas where a group of experts needs to estimate future developments or status. Like brainstorming, it is used to generate new, fresh ideas. In the process, experts express their views individually and anonymously, while having access to the opinions of other experts. They can confront their different opinions and also change them in individual rounds (Milevska-Kostova et al, 2010).

Procedure and main features of the Delphi method:

1. Participates a group of independent experts (usually 8-12).
2. The anonymity of the experts is preserved (this removes the psychological barrier of mutual influence).
3. Questions should be formulated in such a way that they can be answered qualitatively.
4. Experts can change their answers in individual rounds.
5. Experts should justify their answers.
6. The expert estimate is specified in several rounds of questioning, always with feedback on the previous round.
7. The results are statistically processed.

The most recent contributions from the Web of Science database dealing with the use of the Delphi method and Covid in the last 2 years involves mostly health care/medical applications and are as follows:

Sintevi et al (2020) publish the expert consensus in times of COVID-19 health applications of the Delphi method. Moustakas et al (2020) foresight the fitness sector and presents results from a European Delphi study and discuss its relevance in the time of COVID-19. They found that so-called soft skills such as communication or customer service, along with digital technology skills, are becoming increasingly important. Recommendations for Welcoming Back Nursing Home visitors during the COVID-19 pandemic results of a Delphi panel has been presented by Bergman et al (2020). Kapplinger et al (2020) explain that and how lockdown of physical co-operation touches the heart of adult education using Delphi study on immediate and expected effects of COVID-19. Rajhans et al (2020) adopt a modified Delphi technique for revisiting the curriculum: a useful approach during the COVID-19 pandemic. The paper highlights the feasibility and utility of adopting a participatory approach during COVID-19 outbreak. Errett et al (2020) explain an environmental health sciences COVID-19 research agenda: results from the NIEHS disaster research response (DR2) work group's modified Delphi method. Allan et al (2020) publish COVID-19 research priorities in surgery (PRODUCE study) using a modified Delphi process. Triaging advanced GI endoscopy procedures during the COVID-19 pandemic based on consensus recommendations using the Delphi method are described by Sawhney et al (2020). Griffin (2020) offers an invited commentary on international surgical guidance for

COVID-19 and its validation using an international Delphi process. Pouwels et al (2020) present the first modified Delphi consensus statement for resuming bariatric and metabolic surgery in the COVID-19 times.

### 3. Method and data collection

Goal of the paper is to answer following three questions and to evaluate them:

1. What good / positive does Covid bring to you?
2. What new business opportunities does Covid bring?
3. How will the situation around Covid develop in 2021? and to answer formulated research questions.

The forecast and data collection has been conducted with following characteristics:

- Method: Simple single-round Delphi method
- Number of respondents = 8. Delphi method is primarily qualitative with some simple quantification. There is no aimed to attain statistical generalizability. Experts' narrative opinions rather brings quick first view on the topic, which can be sometimes surprisingly accurate.
- Structure of respondents: students of combined course of MBCO, subject Small and medium entrepreneurship
- Date of data collection: 21.11.2020
- Place of data collection: Prague
- Profession/ branch of respondents: Water Management

### 4. Results

Following chapter describes most important results from performed research – answers of experts on the formulated research questions.

#### 4.1. What good / positive does Covid bring to you?

##### #1

I would divide the "Covid" period according to the waves that hit us. In the first wave, I returned on holiday and immediately started working from home. Because I was abroad on vacation, I was automatically considered positive and the fear of some people outweighed the real reality. The opportunity to work from home was not tested at all and from day to day we had to manage the department and work activities remotely. Fortunately, we managed to provide remote access for office workers within a few days. The situation when the only means of communication was a telephone was not easy. After the commissioning of remote access, it was then possible to communicate in bulk via email. Another way that spread in the following weeks was Microsoft Teams. Although the second wave was expected to come, the closure and separation of the people was a surprise. The importance of communication can be seen in the course of both waves. On the positive side, I can see that even if there are some obstacles, people are still looking for and finding ways to communicate further. Since the second society lockdown has been going on for more than a month, the need to communicate and look for a way to share information can be seen. I feel like there is more time to stop and communicate.

##### #2

The most significant change in the advent of the pandemic was the intervention in the daily life of an ordinary citizen. If you have a family, you are used to following an experienced, well-functioning schedule,

which is logically prepared so that, in addition to employment, the household and education of children is ensured, including what is beyond, various interest groups including transport back and forth. Life goes by the fingers and parents solve only questions like: "What are we going to cook? Who will pick up the children? Who will take them? Who will go shopping? "Etc. The most fundamental question: "When will we finally meet as a family? "Remains postponed for the weekend. As a result of the government's decree, virtually everything beyond basic education has ceased to exist (although this has been severely limited). The embarrassment of how to use the newly acquired free time and concerns about children's intelligence have taken place in many families, however, man is a creature adaptable and thanks to all measures, families can engage in joint activities, playing games and discovering nature long ago smudges behind the car window. The coronavirus, despite bringing a lot of the negative, brought families and the nation closer together when, in the absence of protective equipment, he began sewing veils and people who were not currently employed volunteered to support medical staff. Another clear change is the reduction in demand for air tickets and thus the reduction of air traffic, which has a positive effect on the atmosphere, CO2 emissions have been reduced by several million tons.

### #3

Thanks to the whole situation, I find that people are not indifferent to each other. Charitable associations focused on walking dogs for seniors, shopping and social services for seniors are established. People are closer to this situation. Although they cannot get closer, certain age groups distance themselves from others, but the paradox is that the wave of solidarity brings people closer together. It's not like the v1 wave of C19, but thanks to the situation, people have started to pay more attention. To be interested in possible pitfalls for given groups, eg seniors, children, etc. Furthermore, it is - from my point of view - a pleasant finding out what restaurants, cafes, antiquarians I have around. Many smaller companies do not present themselves, but now they make themselves known and, thanks to that, I pay more attention to them. They use more social networks in an effort to draw attention.

### #4

- Lessons for the future - we all felt threatened, untouchable, we did not accept the risks of any pandemic and it was underestimated.
- Change of perspective - many things that have been common so far have stopped working or are forbidden, and only thanks to a pandemic have we become aware of their existence and perhaps importance, human needs are being reassessed, we have more time for family and loved ones, work-life balance. we are more aware of the importance of personal and group health.
- Globally, economic growth is being regulated - the pursuit of economic prosperity also brings a number of negative aspects (destruction of the environment, stress, overwork, deepening class differences).
- Improving the environment - stagnation of air and shipping.

### #5

For me, Covid 19 brings the only positive thing in that one can slow down a bit and, for example, pay more attention to one's loved ones. Furthermore, I think it brings a positive for the environment, because many factories around the world have been forced to reduce production and thus reduce pollution.

### #6

The situation in 2020 showed an abysmal difference in the understanding of the pandemic between the Western world (Europe, USA, South America) and between Asia (China, Japan, South Korea, Taiwan),

regardless of whether it is communist China or democratic Japan. I see the lesson of mistakes and much better preparation for a possible global pandemic, which would have, for example, greater mortality or the virus would attack children, as positive.

- Another benefit is environmental. Less CO<sub>2</sub>, NOX emissions from transport and industry.
- Return of historic city centres to the original purpose of housing.

## #7

- More time for the family - my children - the more I get to know my children - their needs.
- We get to know more nature - because we can go into the forest as much as possible.
- Improving hygiene - we have not washed our hands that often and we will certainly be better prepared for the next wave, but also for other flu or viruses.
- In the case of business closures, of course, air pollution has also decreased, as has the fact that people do not travel as much - a decrease in emissions.
- At this time, we will also find out what we can do without and what can be done remotely, and thus companies will be more accommodating home-office.
- Remote resolution of official matters.
- We are humbled - better spiritual growth - we are not surrounded by futility.
- More solidarity - banks offer deferral of repayments.

## #8

Possibility to spend more time with a partner (family). Great pressure to work online innovation technical company equipment.

### 4.2. What new business opportunities does Covid bring?

#### #1

There are few industries that Covid does not affect. It will be shown what a stable company is, which even the current situation will not shake up and will maintain a stable operation. There are companies, especially manufacturing, that in the current situation do not have a simple and recording a decline in demand. There will also be companies that will disappear completely. What's new in the Covid is the faster acceleration of the fourth industrial revolution. Digitization and the effort to connect the real world with the virtual world is clear. The main role today is data. The opportunity is to process the data that surrounds us as easily as possible and extract it for the benefit of the cause. For example, data on the number of hospitalized will help focus the production of devices, beds or tests and optimize production at the highest speeds.

#### #2

During the coronavirus crisis, most of the planned meetings moved online, so in the future it would be appropriate to consider whether it is necessary to travel for a working meeting and contribute emissions to pollution of the planet, when I can at least reduce business trips and conduct meetings in my office or even warm home. At the same time, the time spent on the road could be used to create other values. Despite the fact that many companies are endangered by a pandemic and many of them are on the verge of existence, there are also many flexible ideas on how to respond to the market situation, such as restaurants delivered to the house, newly created e-shops and expanding with a network of dispensing points, or even the use of

modern technologies, such as 3D printers for the production of shields, drapes or even practical staples, which make the wearing of drapes easier and relieve medical staff from ear pain.

### #3

Development of companies such as Košík c.z, Rohlík c.z. Delivery services are now experiencing a big boom. The current situation favors the development of e-shops. Even small second-hand bookstores and small booksellers have made a living on platforms that are free, for example, web nodes, websites and e-shops. They are not so well thought out, but they fulfill their purpose. At least you can order books exactly, and you can then pick them up and pay at the window of the antiquarian bookshop, etc. Companies with 3D printers are also on bankruptcy. Cottons and tailors, who fought for survival, are now experiencing a rebirth. There is a greater demand for culture (albeit, only in the form of "online broadcasts of theaters or small scenes"). Everything that is denied to people arouses desire. I believe that C19 has started a business with many companies.

### #4

- Development and growth of the E-commerce segment (E-shops, Market place).
- Development and growth of the segment of home education, entertainment and sports (the need to learn self-education, books, electronics, games, bicycles, exercise equipment and tools).
- Development and growth of the segment of medical needs and aids (veils, disinfection, hospital equipment).
- Development and rise of domestic tourism (new cycle paths, footpaths, infrastructure connected with it).

### #5

In my opinion, it is mainly in deliveries and food and food deliveries. Also sales of electronics and computers. Online services, e-shops, online courses, sewing veils, disinfection production.

### #6

- Development of all sales and services over the Internet (E-Shops, mail order, delivery, E-banks, Entertainment)
- Pressure to accelerate the Internet and the transition to 5th generation networks.
- Greater share of automation and robotics in production.
- Expansion and improvement of E-learning in the education system.
- The transition from a global economy to a more locally focused one.

### #7

- Moving business to the online world - online sales, using mainly social networks
- Restaurant - the possibility of food delivery either directly from its own operation or through services such as damejidlo.cz
- The crown has hit tourism the most - unfortunately there is no such alternative as in gastronomy - change of communication with customers - interesting stays in advance for the summer and require advances for loss of income
- Online courses - video conferences, webinars - everything can be done online and various fitness exercises, personal consultations, etc.

- Take advantage of the increased demand for disinfection and hygiene needs
- Focus on contactlessness - such as contactless payments, online communication, online shopping, events in the virtual world (eg concerts), application development

## #8

Transfer part of the business to the online world, streamline sales procedures, marketing. Great opportunity for manufacturers of protective equipment.

### 4.3. How will the situation around Covid develop in 2021?

#### #1

If we had this answer, the course of the next wave would certainly be less problematic than it happened. In my opinion, in 2021 a vaccine will be available to fight this disease. The vaccine will allow the vaccination of the most vulnerable group of the population and will provide sufficient medical capacity to fight a possible next wave. The disease will certainly not go away. It is unlikely to be a seasonal disease and focal spread will continue to occur. I believe that we will have a clear plan on how to proceed with the spread of the disease and what restrictions will be applied when the specific values of those infected, hospitalized and dying with sCovid-19 change. This plan should include not only the binding of restrictions, but also loosening with respect to the measured data.

#### #2

The pandemic has brought the nation closer together, but at the same time it has pitted it against the government, and it can be assumed that the duration of the state of emergency due to the pressure of the citizens to cancel it and loosen the measures will not take long. The year 2021 will be the year when we will continue to fight through crust and snooze until we feel relieved that we can effectively build up sickness by vaccination. Although I am not in favor of a vaccine that has not been proven in the long term, I think it is essential for the older generation and seriously ill patients to save their lives. The fear of illness will hopefully subside and we will be able to deal with the practical consequences, such as the economic impact on small and medium-sized enterprises in the areas of retail, services and tourism. After each war, which is essentially one of the most serious crises, the economy has boosted and flourished, as has the crisis in the mortgage market in 2008-2009. downstairs, we can start climbing again.

#### #3

In reality, I think that 1/4 in 2021, C19 will still be significantly marked. It will also be noticeable in the area of administration. I assume that taxes and their returns will be postponed again. Many companies also apply for tax relief, drawing state contributions or subsidies. All this will be reflected in the tax returns, the submission of which will have to be postponed. Otherwise, everything cannot be processed properly. Another impact will be on hospitality. During the end of the year, most restaurants earn money for a "thinner" period, which is undoubtedly what the new year is like. Thanks to government measures and the closure of restaurants and cultural facilities, corporate, Christmas parties, banquets and other events cannot always take place, which have always meant creating a financial cushion for the sector. From 2/4 year, the economy could pick up. Thanks to C19 (unless they underestimated the situation and made themselves known through windows, fb and other social networks), restaurants and cafes created a network of customers who, thanks to the whole situation, found out how many such facilities they have in their surroundings and start visiting them a lot. The start of the economy, but it will be gradual. People will be more careful in investing money,

shopping and participating in cultural events. The second half of 2021 will be at the usual pace as in previous years.

#### #4

Covid will become a part of our lives, it will never disappear again. In 2021, vaccination will begin at the global level. There will be several vaccines available. At the same time, there will be a third spring and a weaker autumn wave. In 2021, we will start to take stock, losses will begin to add up, and all the consequences and consequences from the beginning of the pandemic will also have a hard time. There will be a noticeable decline in living standards, an increase in unemployment, indebtedness of public budgets, the decline in GDP will gradually stop, but at the end of 2021 it will still fall. This year's losses will definitely not be made up during 2021. A common recovery strategy at EU level will be sought. There is a danger that the crisis will lead to a serious distortion of the single market and to the emergence of permanent economic, financial and social disparities between euro area Member States. There is also a risk that a pandemic will trigger a more radical and lasting change in attitudes towards global value chains and international cooperation, which would have an impact on a highly open and interconnected European economy. A pandemic could also have lasting consequences in the form of bankruptcies and long-term damage to the labor market. However, consumer prices should fall due to falling demand and falling oil prices. In any case, the world, and therefore Europe, will perhaps not return to normal until 2024. On a global scale, following the Covid pandemic, the issue of famine in third countries comes to the fore. There is even talk of a famine of biblical proportions. Unfortunately, the global effort to eradicate extreme poverty by 2030 is no longer viable due to the pandemic. Financial resources earmarked to combat poverty in third world countries will be used to repay the debts of the world's economies.

#### #5

The economy in the Czech Republic will be very affected and it will certainly take a long time to recover, and as far as Covid is concerned, in my opinion, if a larger part of the population in the Czech Republic is vaccinated, the situation should calm down. My guess is that Covid won't start fading until Spring 2021.

#### #6

In the first half of 2021, there will be a gradual vaccination of the health care provider and the elderly, and at the same time the virus will gradually lose its strength by saving the majority of the population. He thinks there will be a cubic recovery of the economy. Deferred consumption is reflected in full force. The tourism segment will return to normal more slowly. Unemployment (in the Czech Republic) will increase only slightly (by a maximum of 2.5%).

#### #7

- Given that there is already talk openly about the third wave of Covid, I do not see the future positively
- A large demise of companies and an increase in unemployment are expected - there will be a crisis - also due to the fact that taxes have been reduced, so there will be no investment from regions, municipalities, etc.
- People will continue to save, tourism will still be hit hard
- Big questions for concert organizers - they are now in great uncertainty

#### #8

Depending on the development of the vaccine, the situation is likely to calm down. Businesses that streamline their operations (online) will benefit from these innovations and will have competition advantage.

## 5. Discussion

The chapter summarizes and discusses answers to the research questions and opinions of experts. Following synthetic table 1 summarizes predicted phenomena with minimal consensus of three experts. There were formulated 16 phenomena with consensus at least 3 experts (37,5 %), 9 phenomena with consensus at least 4 experts (50 %), 6 phenomena with consensus at least 5 experts (62,5 %), 2 phenomena with consensus at least 6 experts (75 %) and 1 phenomenon with consensus 7 experts (87,5 %),

Most agreed phenomenon as an answer on research question 2 is that Covid brings new business opportunities generally in the sphere of e-shops and e-commerce. Agree 87,5 % of experts.

Second most agreed phenomenon as an answer on research question 3 is invention and application of vaccination, probably in more variants during the year 2021 as a way to solve the pandemic spread. Agree 75 % of experts.

Third to sixth most agreed phenomena are more time for spending with the family, improvement of environment and decrease of CO<sub>2</sub> emissions in connection with decline of production and traffic as positives that Covid brings (research question 1). As a new business opportunity that Covid offers, experts consider increase in adaptability and adjustment of industry to new quickly changing conditions connected with economic fall and more or less slow recovery in the year 2021. Agree 62,5 % of experts.

**Table 6: Synthetic table of obtained answers with the accent on maximal mutual consensus**  
(Source: own processing)

#	Question	Phenomenon	#1	#2	#3	#4	#5	#6	#7	#8	Total
22	Q2	e-shops, e-commerce development		1	1	1	1	1	1	1	7
28	Q3	vaccination	1	1		1	1	1		1	6
2	Q1	more time for family	1		1	1		1	1		5
6	Q1	decrease of CO <sub>2</sub> emissions, improvement of environment	1		1	1	1	1			5
20	Q2	adjustment of industry to new conditions, adaptability	1	1			1		1	1	5
31	Q3	economic fall and slow recovery		1	1	1	1	1			5
18	Q2	market cleansing (bankruptcy of weak)	1		1	1			1		4
21	Q2	delivery services		1	1		1		1		4
25	Q2	e-learning, home education, entertainment and sport				1	1	1	1		4
1	Q1	new ways and better communication, e-government	1		1				1		3
4	Q1	volunteering, solidarity		1	1				1		3
5	Q1	decrease of air traffic, less travel		1		1			1		3
13	Q1	improving of hygiene				1			1	1	3
15	Q1	more home-office	1						1	1	3
24	Q2	on-line culture				1	1		1		3
29	Q3	C19 would not disappear	1	1		1					3

Fifty percent of experts also see as a business opportunity the effects of cleansing of the market (bankruptcy of weak, unadaptable firms) and development of delivery services as well as e-learning, home education, entertainment and sports.

As a positive of Covid epidemic 37,5 % of experts consider appearance of new ways improving communication and improving of electronic government, increase in volunteering and general citizen solidarity. As a positive is also considered less travel and decrease of air traffic with its positive environmental impact. Experts appreciate improving of hygiene and wider application of home-office regime. As a business opportunity the experts consider online culture and unfortunately 37,5 % of experts expect that Covid will not disappear during the year 2021.

## 6. Conclusions

The research goal of the paper has been fulfilled. Added value of the paper is both scholar and practical. Scholar value brings an example of application of Delphi method in college conditions and practical and inspiring can be the results of the Delphi questioning. Most significant shortcomings of research are based in only one-round of the Delphi method. As the usage of Delphi method in connection with Covid pandemic is already documented author suggest future research with 2-3 rounds, more precisely specified research questions and more specifically selected expert panel. The method application can bring many interesting results.

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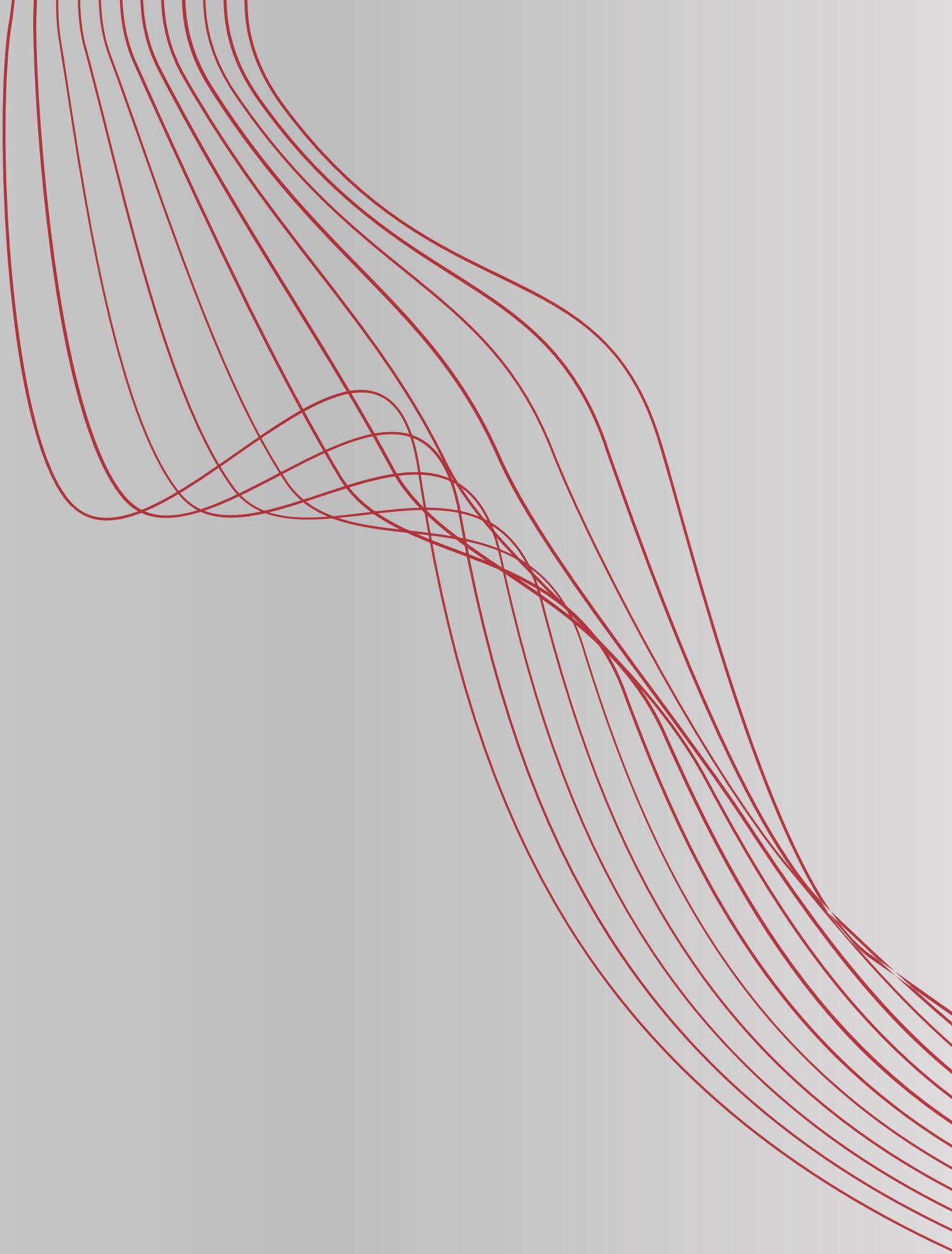


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