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–
more than Economic Phenomena

Business Cycles – more than Economic Phenomena

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CONTENT

List of Sessions:

Foreword

The international scientific conference INPROFORUM is a traditional event held by the Faculty of Economics, the University of South Bohemia in České Budějovice since 2007. The conference aimed to respond to the symptoms in the current phase of the business cycle, not only economy. The discussion was led to possible causes and impacts of fluctuations in all fields, for example, economic, business, social, legal, spatial, institutional, environmental, etc. It is served as a platform to give academics, students, and practicing economists the opportunity to share their thoughts, debate issues, and exchange knowledge on relevant topics. The conference INPROFORUM 2020 has been organized under the auspices of Dagmar Škodová Parmová, Dean of the Faculty of Economics, the University of South Bohemia in České Budějovice.

The theme of the 14th Anniversary International Conference INPROFORUM 2020 has been "Business Cycles – more than Economic Phenomena", which has concluded the following topics:

- Circular Economy – the Chance Not Only for Region

- Economics of Agriculture

- Economic Impacts of Changes and Policies in the Fields of Finance, Accounting, and Taxation

- Management of Small and Medium-Sized Enterprises in Times of Turbulent Changes

- Market Research and Sustainable Marketing in Trade and Tourism

- Mathematical-Statistical Modelling and Optimization in Practice

- The Updated View of Business Cycles Causes and Impacts

Jaroslav Sixta (University of Economics, Prague) and Michael Wenz (Northeastern Illinois University, Chicago) opened the conference as keynote speakers, then about 90 participants could visit about 55 contributed talks.

We would like to thank all the conference participants, the members of the conference committee, keynote speakers, and organization staff. We also would like to express our thanks to the reviewers for valuable feedback for the authors.

On behalf of organizing committee

Jana Klicnarová and Nikola Soukupová

Circular Economy – the Chance Not Only for Region

Tigers´ Stolen (Wild)Life: When Circularity Triggers a Misery

Nikola Sagapova[1]

Abstract: Although tiger (*Panthera tigris*) is listed as endangered animal in the wild, some tiger subspecies are nowadays being recognized as critically endangered, moreover probably extinct in the wild, or even extinct. The demand for products made of tiger bodies and their parts triggers the illegal trade and poaching, while the legal trade is prohibited as all tiger subspecies are listed in CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) Appendix I. One of the key element triggering the illegal activities is the fact that every part of the tiger body may be converted into a valuable product, presenting an untraditional example of circularity, but regrettably tiger needs to be dead in order to gain the maximum profit available. Unfortunately, illegal activities connected with tigers´ misery are not the domain of Asian countries only, where tigers have their natural habitats, but the Czech Republic plays its role as well, and not only on the consumption side, as one could suppose, but also on the supply side. This review paper intends to bring a generic overview on the issue of illegal trade in tigers, their parts and products, as well as the wider context regarding wildlife trade in endangered species itself.

1 Introduction

This epoch is a period of unprecedented loss of biodiversity induced by various human activities. Biodiversity loss is increasing with the acceleration of the growth of human population and its consumption, accompanied by the pressure on natural resources (Primack, Kindlmann and Jersáková, 2011). Many authors reffer this period as sixth mass extinction (e.g. Barnosky et al., 2011; Dirzo et al., 2014; Ceballos et al., 2015). Biodiversity includes all aspects of diversity between individuals, populations, species, communities, and ecosystems with emphasis to the genetic diversity (CBD, 2001). Endangered species are species with so few individuals in their population they could soon become extinct in the wild, so they might also symbolize the success or failure of the attempts to conserve biodiversity (Maczulak, 2010).

There are different tools and approaches to conserve biodiversity including legislation (Karr, 1990), economical incentives (Emerton, 2000), or reserves system and protected areas system (Margules and Pressey, 2000; Saout et al., 2013). The economic dimension of biodiversity conservation, as well as the economic role of legal and illegal wildlife trade is not negligible. Conservation planning problems may be formulated as optimization problems (Sarkar et al., 2006), where the conservation goals, namely representation and persistence shall be achieved at a minimum cost (Margules and Pressey, 2000). Wildlife trade plays a very important role in biodiversity conservation and sustainable development providing an income for people and a considerable revenue on the national level (Nijman, 2010). A proactive management of trade in endangered wildlife can be an efficient tool in sense of conservation, rather than trade bans that might, despite the assumptions, increase trading activity (Rivalan et al., 2007). Wildlife crime, more precisely poaching in combination with illegal trade, can be marked as an example of the tragedy of commons where species are overexploited to gain short-term profits while endangering and eliminating this natural resource (Pires and Moreto, 2011). Therefore, a question arises, is wildlife trade a conserver or exploiter (Bowles, 1996)?

2 Methods

The present paper neither a comprehensive nor a systematic review. The author attempts to give a generic overview on issues associated with wildlife trade, focused on the tiger trade, to point out various issues triggering this mostly illegal economic activity, as well as the issues connected to the conservation efforts connected with endangered species trade. The data were collected mainly through searching scientific literature (Science Direct, Scopus, WoS, Google Scholar), but involved also some sources, especially databases (Species+, IUCN Red List) and reports on wildlife trade related issues. The methodological approach to this review took steps to identify:

- Background for wildlife trade and CITES. The phenomena of wildlife trade, factors and consequences affecting such trade, and trade its regulation, when it comes to endangered species.

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- Stolen Wildlife. The demand and consumption side triggering poaching and illegal trade of endangered species.

- Tigers. Conservation status and threats for the wildlife populations, revealing traded tigers´products, and the role of the Czech Republic in such trade.

3 Understanding tiger´s misery

3.1 Background for wildlife trade

Biological resource use is one of the key threats trigerring biodiversity loss (Joppa et al., 2016), and wildlife trade represents one of the major causes of depletion of living natural resources underlying overall biodiversity loss (Broad, Mulliken and Roe, 2003). There are often different factors or their combinations in the background for wildlife trade, amongst these we migh higlight economic, sociological, cultural or ecological ones. Many households depend on the income from sales of wildlife products in various forms including living ornamental plants, pets, or a wide range of collector items, decorations, medicines, food, manufacturing and construction materials (Roe et al., 2002), but the effect on the local livelihoods of the poor in developing countries depending on harvesting wildlife species as well as the effect on biological diversity conservation might be both positive or negative (Cooney et al., 2015).

In Asia the unsustainable wildlife trade is one of the main conservation issues and challenges (Nijman, 2010), and the situation is quite similar in Africa, where additionally the wildlife authority budgets are strongly inadequate, and there is a high potential of cascading negative impacts of COVID-19 on conservation related to budgets reduction and increase in poaching (Lindsey et al., 2020). It is actually the recent global pandemic that has made a wildlife consumption and trade more visible due to the global struggle over the origin of the disease often linked with Wuhan wet market or bat soup. Nevertheless the wildlife trade and consumption have been deeply integrated into Chinese culture and history (Zhu and Zhu, 2020) even though many authors have been pointing out the risk of wildlife trade regarding the emergence of infectious diseases (e.g. Swift et al., 2007; Karesh et al., 2005; Smith et al., 2017), deadly pathogens (e.g. Can, D´Cruze and Macdonald, 2019; Travis, Watson and Tauer, 2011; Gratwicke et al., 2009), and epidemics or pandemics (Chomel, Belotto and Meslin, 2007; Bell, Roberton and Hunter, 2004; Liu, Rohr and Li, 2013; Aguirre et al., 2020). However, wildlife trade pose a biological risk considering not only the spread of various pathogens and diseases, but biological invasions as well (García-Díaz et al., 2015). Introduced invasive species can have a major impact on ecosystems and biodiversity loss as they are one of major causes of extinctions (Gurevitch and Padilla, 2004; Molnar et al., 2008; Paini et al., 2016). The general flow of wildlife trade is from developing to developed countries, most significant exporters are some of the poorest countries and some of the countries richest in biodiversity resources. Major exporters are Brazil, China (which is also important importer), India, Indonesia, Malaysia and Thailand, while major importers are United States, European Union and Japan (Roe et al., 2002).

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) regulates the international wildlife trade to protect species from overharvesting through system of permits imposed on the species traded or potentially threatened by trade (Harfoot et al., 2018). CITES permits are granted only when scientific authority claims that such trade will not be detrimental to the survival of that species, and a management authority is satisfied regarding the protection of such species regarding not only the conditions its safety and health in case of living species, but regarding the protection of fauna and flora as well. Endangered species are listed in 3 Appendices, according to the level of protection needed. Appendix I covers all species threatened with extinction that are or might be affected by trade, and international trade is prohibited except when the purpose of such trade is not commercial, but for instance scientific research or conservation breeding programs. Appendix II covers all species that are not currently threatened with extinction but may become unless trade is controlled, so such trade is regulated for conservation reasons. Appendix III covers species at the request of a party to meet the need to regulate such trade to prevent unsustainable or illegal exploitation (CITES, 1973). Although European countries are parties of the Convention, the EU regulates international and, to some extent, intra-EU trade in CITES listed specimens in uniform manner on the basis of Council Regulation No. 338/97 and Commission Regulation No. 865/2006. The EU rules are in many respects stricter than the Convention and species are listed in Annexes A, B, C and D in order to regulate trade in species protected by European directives on the conservation of wild birds and the protection of natural habitats, or to protect the populations in the countries of origin, or due to high mortality during transport, or to prevent introduction of invasive species that could endanger native European species. When Czech Republic joined the EU, Act No. 100/2004 Coll., on the Conservation of Nature and Landscape which covers trade and other protection measures of wild fauna and flora, entered into force. In Czech Republic, there is also an obligation to keep records of breeding and trade implied on breeders or keepers of specimens from Annex A or B, and an obligation to register held or bred CITES species listed as mandatory registered CITES species (AOPK, 2020). The main control body in the Czech Republic responsible for controls and compliance with laws in the area of CITES is the Czech Environmental Inspectorate which may impose measures and fines for violating the law (ČIŽP, 2010).

3.2 Stolen Wildlife

Despite all efforts to regulate wildlife trade, the global illegal wildlife trade is still widespread. Illegal wildlife trade is a multi-billion dollar industry which threatens biodiversity and poses as a potential path for invasive species and disease spread potentially cascading the further biodiversity loss (Rossen and Smith, 2010; Primack, Kindlmann and Jersáková, 2011). Illegal trade covers also huge economic lossess connected not only with the black market of such producs, but it affects also economic losses due to unintended diseases outbreaks (Pearl, 2004), or for instance inflicting on nature-based tourism economies (Naidoo et al., 2016). Widlife ranks from the second to the fourth place of illegally traded goods (Zimmerman, 2003; Sung and Fong, 2018). Since there is no standardization in wildlife and wildlife products considerable price variation may occur, and valuing of such products might be very challenging. For the buyers and sellers, three types of transactional costs occur. There are coordination costs in order to realize and complete the sale, motivation costs which may be attributed to suspection of the other party, or information assymetry, and evasion costs associated with evading arrest or prosecution and may include even the costs of the product loss due to law enforcement or any criminal sanctions (Moyle, 2014). However there exist no standardized formula to calculate the costs of both legal or illegal revenues, but the trade in endangered species must be excesively lucrative as it ranks high among illegally traded goods. The wildlife loss also extends largely beyond monetary values, wildlife trade gives traders the opportunity to earn vast amounts of money while staying less visible to authorities than in the case of drug trade, and finally there is an incentive given by the limitations on the legal wildlife trade that drives illegal markets to develop and to bypass the legal trade regulations (Schneider, 2008). Although street markets were frequently pointed out as hotspots of wildlife trade and significant wildlife sinks (Regueira and Bernard, 2012), the internet and social media have currently emerged as important trending platforms for such trade (Sung and Fong, 2018). However, there is still lack of information about real scale of the global illegal wildlife trade (Hansen et al., 2012). For instance in Southeast Asia´s wild ornamental plants illegal international trade is orders of magnitude larger than reported in CITES statistics, particularly due to the effort to tackle trade of charismatic fauna with a little concern of flora trade (Phelps and Webb, 2015). The very same problem actually happens in the Czech Republic as well, where we perceive lack of botanists in the field of trade tackling being able to recognize and seize CITES listed species of plants (Říhová, 2019, personal communication). Eventhough CITES authorities control the trade, and are in charge to monitor the trade and seize the specimens, and provide the largest public dataset regarding international wildlife trade (Harfoot et al., 2018; Berec and Šetlíková, 2018), the use of unofficial sources including online websites as news sites and social networks presents a novel source of intelligence of monitoring and collecting data on wildlife trade (Hansen et al., 2012). Good cooperation of CITES authorities with police, INTERPOL and the World Customs Organization is important for tackling illegal trade in endangered species (Parr, 2011).

One of the problems is the fact that when the demand of a biological resource increases, locals are often inspired to get more of such resource to sell more of it. Once the biological resource becomes more scarce, its price increases, creating another stimulus for locals to overharvesting. Later on the market chooses another biological resource to be exploited (Primack, Kindlmann and Jersáková, 2011). This illustrates the force of the demand side, which is crucial. For instance during the period of one year unofficial sources of online websites were used to monitor illegal wildlife trade which identified India, US, South Africa, China and Vietnam as countries with highest number of reports, whereas amongst the most traded or poached animals elephants, rhinoceros, tigers, leopards and pangolins were witnessed (Hansen et al., 2012). Education and raising awareness about wildlife trade and consumption as well as wildlife conservation seems to be a practical tool confronting the problem (Alves, Lima and Araujo, 2013; Sumrall, 2009; Zhang, Hua and Sun, 2008). The Czech Republic launched the first campaign focused on illegal wildlife trade called Stolen Wildlife based on experience of Pavla Říhová, the Head of he Czech Environmental Inspectorate Department of International Biodiversity Protection and CITES to raise awareness about wildlife trade and consumption highlighting particular issues and bringing campaign exhibitions and photos to the general public. Amongst important issues within this campaign, elephants, rhinos, tigers, primates, bears, parrots, reptiles, pangolins and some other species are presented as well as some topics such as medicine, food, souvenirs and decorations, trophies, skins and furs and animal breeding in captivity. One of the most important mottos of this campaign states: „Do you buy? You have blood on your hands!" (Stolen Wildlife, 2020a). Many Czech and Slovak zoos joined this campaign by setting exbitions within their area, but the exhibition has suceeded even in an international photography contest. The campaign was joined by other conservation organizations including Czech Society for Ornithology, but also international ones, such as: WildAid, Global Tiger Forum, TRAFFIC, or Vulture Conservation Foundation (Vulture Conservation Foundation, 2020).

3.3 Tigers

Tigers are the biggest cats on this planet (DuTemple, 1996). The first cats evolved in Asia a million years ago, and they are well adapted to diverse Asian habitats. Tigers can be found in very diverse types of habitats including coniferous and broad-leaved temperate forests in Siberia, dense, tropical, wet evergreen forests in Thailand, Indo-China, Malaysia, India, and Indonesia, subtropical woodlands in China, mangrove swamps in India, Banhladesh and Java, peat swamps in Sumatra, or reed beds in the Caspian region (Belsare, 2011). This species need large habitats with presence and density of medium to large-sized natural prey, where the availability of prey, not habitat parameters, is the key factor for an individual´s home range (Lovari et al., 2014; Miquele et al., 1999). Both sexes are teritorial with a little overlap of male and tigers territories. The mean female home range is 70 to 84 km^2, while the mean home range of male tigers is 267 to 294

km^2. All tigers are highly threatened and continue to decline across all their area, and actions to restore and conserve population are needed (Simcharoen et al., 2014). All tigers are categorized as Endangered on the IUCN Red List, and some subspecies are categorized as Critically Engangered, or even probably Extinct in Wild or already Extinct, see Table 1. Tiger is listed in CITES Appendix I and Annex A as a species directly endangered by extinction (Species+, 2020). The population is declining as only about one half of cubs in the wild become adults, where some of them are eaten by predators or by adult male tigers. All tigers populations are shrinking because of habitat destruction from illegal and commercial logging, land grabbing for human purposes, forest fires, pioneer farming,oil palm production, mining operations, and pollution of waters and lands. Amongst other threats for tigers we may include poaching for domestic and international markets, prey depletion from human hunting, disturbances from recreational activities and tourism, or tiger attacks and military exercises in some cases (Kalman, 2004; Linkie et al., 2003; IUCN Red List, 2015). Despite the attacks on humans of large carnivores of the genus *Panthera* are rare, compared to domesti animals depredation, these attacks and conflicts undermine the efforts for wildlife conservation (Packer et al., 2019). Tiger attacks often result in negative attitudes towards tigers by locals, reuduction of the support for tiger conservation as well as increased mortality and removal of tigers from the wild (Goodrich, 2010). Conflicts between humans and tigers occur for instance in Sumatra, India, Bangladesh or Nepal. In the area Sundarbans in Bangladesh, tigers have shaped the social ecology of the region as well as they influenced the life-style of people, who often stated that if they were attacked by tigers, it was their fate, and the also believe that the area is an ideal habitat for tigers. They did not see tigers as an enemy and they also wanted to conserve the species (Reza, Feeroz and Islam, 2002). Despite tiger attacks in the buffer zone of Bardia National Park in Nepal, local people usually had a positive attitude towards tigers and their conservation, and were able to tolerate loss of livestock, which might be mitigated by education, monetary compensations and tigers monitoring (Bhattarai and Fischer, 2014). In Nepal and India the tiger attacks were more common in residential woodlands or in mixed settlements (Packer et al., 2019). Similarly, in Sumatra, it was found that the conflicts occured less in protected areas, but were more common in intermediate disturbance places, where both tigers and humans were living. The tolerance of local people for tigers is related to their attitudes, emotions, but also norms and spiritual beliefs (Nyhus and Tilson, 2004; Struebig et al., 2018). Although several tigers still remain in the wild, the situation as really critical as all tigers can be considered an ecologically extinct species, because it occurs in such low numbers that its impact on other species in the association is negligible (Primack, Kindlmann and Jersáková, 2011). Illustrated by the case of *Panthera tigris* ssp. *virgata*, its extinction is not only attributed to human hunting of tigers and their prey, habitat loss and conversion of habitats but also to increased vulnerability of small populations (Sunquist, Karanth and Sunquist, 1999).

Table 1 Wild *Panthera tigris* subspecies characteristics updated to the date 1. 2. 2020

Supspecies	Number	IUCN	Threats	Area
P. t. corbetti	421-1100*	EN	illegal trade, habitat loss	Myanmar, Laos, Cambodia, Vietnam, Thailand
P. t. jacksoni	80-120**	CR	illegal trade, habitat loss, tiger attacs	Malaysia
P. t. tigris[2]	up to 3 159*	EN	poaching, illegal trade, habitat loss, tiger attacks	India, Bangladesh, Bhutan, Myanmar, Nepal, Russia
P. t. sumatrae	441-679*	CR	illegal trade, habitat loss	Sumatera
P. t. amoyensis	unknown	CR (probably EW)	illegal trade, habitat loss	China
P. t. balica	0	EX	-	(Bali)
P. t. sondaica	0	EX	-	(Indonesia)
P. t. virgata	0	EX	-	(Turkey, Iran, Central Asia, China)

Source: IUCN Red List, own processing
*Estimated population size based on older data. **Number of mature individuals.
IUCN categories: EN – endangered; CR – critically endangered; EW – extinct in the wild; EX – extinct.

Tigers are valuable biological resources, a kind of resource that can be completely utilized with no waste left. The trade of live tigers, or tiger parts and products continues despite the ban on trade. For instance, in Vietnam mainly live tigers, or their parts or product are available to buy. As for the parts and products the demand includes tiger bones, bone glue, teeth, claws, skin or pendants with teeth (Indenbaum, 2018). In China, the illegal trade in tiger parts flourish from the traditional cultural belive that tiger presents strength, power and status, which can be derived from its body parts used in the practice of traditional Chinese medicine that uses not only herbal medicine, but also mineral substances and animal products (Wong, 2015; Leung, 2015). Tiger parts can be also used for household decorative items, fashion accessories or food (Wong, 2015). China and Vietnam are the biggest consumers of tigers. In the traditional Chinese culture tiger´s tail, penis, bones, claws, fat, bile, eyeballs, teeth, nose leather, whiskers, brain, gallstones, testicles, stomach, heart, ribs, flesh, have its place to heal various diseases and problems like tootache, lazines, acne, insomnia, nauzea, malaria,

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[2] *Panthera tigris altaica* was lumped into *Panthera tigris* in 2019, following taxonomic changes adopted at CoP18 (Species+, 2020).

bites, stomach pain, epilepsy, burns, rheumatism, leprosy, meningitis, hemorrhoids, scalp diseases, skin diseases, nervousness or fevers in children convulsions and cataracts, asthma, rabies, penis sores, weakness, but also as an aphrodiasic or an amulet for good luck. Tiger products also serve to show one´s social status and prestige. Products like tiger soup or tiger wine are also popular and frequently trafficked (Caixin Global, 2018; Today Online, 2020; Stolen Wildlife, 2020b). In Vietnam, tiger products consumers stated they choose and buy the product on the basis of product quality, genuineness, and price. Tiger products are definetely more affordable than rhino horns. For urban Vietnamese tiger products are quite achievable possibly because of the persistence of tiger farms, low levels of wildlife enforcement and government´s weak approach to manage these facilities, but also due to fakes circulating. For instance, the Nhan Ecological Conservation Centre in Nghe An got a license and was allowed to import 9 tigers from the Czech Republic, despite the centre owner´s husband was previously twice convicted of tiger trafficking and laundering through the facility. China has tiger farming facilities as well (Davis et al., 2020; Environmental Investigation Agency, 2019). Amongst the tiger range countries most seizures between 2000 and 2015 were reported in India, China, Nepal, Indonesia and Vietnam (Stoner et al., 2016).

Although Czech Environmental tried to draw attention of the European Commision and the CITES Secretariat, it was thought that black trade with tigers mainly happens in Asia countries. In 2013, tiger claws, teeth and bones were seized on Ruzyně Airport on the way to Vietnam. Later that year a complete tiger skeleton was found by customs officers in a car of Vienamese man (Ministerstvo životního prostředí, 2018). One of the final controls of the Czech Environmental Inspectorate focused on tigers bred in captivity, and revealed numerous violation of laws considering doubts concerning tiger records, disappeared animals, mismatched documents, high reported mortality etc., which indicated the organised trade of tiger products. During spring of the same year a joint operation „Tiger Eye" at the Václav Havel Airport, former Ruzyně Airport, confirmed smuggling of tiger and other wildlife products (Czech Environmental Inspectorate, 2016). The Customs Administration of the Czech Republic and the Czech Environmental Inspectorate uncovered illegal trade in tiger while conducting the TROPHY (TROFI) Operation. They fouded organized group of Czech and Vietnamese nationals, and seized a body of a killed tiger, four skins, tiger claws, tiger bouillon cubes, tiger wine, and also the equipment used in the production of traditional Asian medicines based on tiger parts. This kind of medicines is very popular within the Vietnamese community, and it is easily sold not only in the Czech Republic or Vietnam, but also other EU and Asian countries (Customs Administration of the Czech Republic, 2018). Amogst the products seized during the operations Tiger Eye and TROPHY were various containers, masses, cubes of bouillons in non-original packaging. These suspicious products were put on genetic analysis that confirmed their origin from various endangered animals, not only tigers, but also lions and leopards. During the interrogations in SAPA, detailed description and recipe for cooking tiger was obtained. Tigers used for trade came from legal breeds, part of them from circuses. Problems are also the zoocorners, when children may pet or take a picture with tiger kitten, which are possible source of tigers once they reach the carcass age (Ministerstvo životního prostředí, 2018). Organized crime in tigers within the Czech Republic was revealed, and it included tiger breeders, intermediaries, processors and preparers as well as Vietnamese dealer. Prices of some tiger products were detected. The price of tiger bouillon reached about 1500 CZK/g, the price of tiger skin reached about 60 000 CZK – 100 000 CZK, the price of one claw was 2 500 CZK. One killed tiger can provide approximately 10 kg of bouillon (Říhová, 2018). One kilogram of tiger bones reached about 2 000 USD, one liter of tiger wine amounts to approximately 100 USD. The reason of the higher volume of illegal trade in tigers in the Czech Republic might be connected to the fact that the Vietnamese community in the Czech Republic is the second largest in Europe (Customs Administration of the Czech Republic, 2018). Reflecting the illegal trade in tigers in the Czech Republic, CITES has adopted a precautionary measure to suspend issuing CITES permits for (re-)export of live captive bred tigers from the Czech Republic to non-EU countries for commercial purposes. Only export of tigers for breeding in zoos in third countries can be permitted (CITES, 2018).

Considering the legal trade within the European Union and other countries, the most imported into and (re-)exported commodity between 2013 and 2017 was live tigers, and Thailand and Vietnam were the largest importer, while live tigers, tiger parts and products were sent to Thailand, Vietnam, China, Singapore, Russia, Turkey and Taiwan. Taking the illegal trade within the European Union in the same period, most seizures were reported by United Kingdom, Austria, Germany, Netherlands and Spain. The lack of traceability systems and monitoring of tigers held in circuses, travelling exhibitions and private facilities is a serious problem when it comes to ensuring reliable information and ensuring these tigers and their parts or products do not enter illegal trade (Musing, 2020). The Czech Environmental Inspectorate has been currently working on the project Tigris ID which shall help to develop novel tools for DNA based identification of Panthera Tigris to be able to analyse the genetic material from tigers even in heavy-processed materials, but also for the individual identifications of tigers, and to create a database of samples. Individual tiger identifications could be the only way to trace the source animals and producers of tiger products (Říhová and Daněk, n. d.).

4 Conclusions

Wildlife trade is one of the major factors of biodiversity loss. Illegal wildlife trade threatens populations that are protected by laws and CITES, and present a multi-billion dollar industry, thus poses tremendous economic losses. Tigers presents one of the species that is trafficked internationally. The trade consists of live tigers, but also parts of their body and products. Main demand is triggered by China and Vietnam, but even the Czech Republic is involved in illegal activities connected with processing, and trade of tiger products, probably because of the Vietnamese community which is the second largest in whole Europe. CITES had adopted precautionary measure for the Czech Republic in the form of not issuing CITES permits for export of live tigers from the Czech Republic to non-EU countries except the tigers for breeding in zoo´s. This can be not sufficient as tigers can be trafficked to other EU countries and afterthat to third countries, when not live specimens, but their products are traded. The Czech project Tigris ID should help with individual as well as species identifications of tigers and their products even in heavy-processed materials which could help better traceability and monitoring for the purposes of controls and law enforcement.

Acknowledgement

References

Aguirre, A. A., Catherina, R., Frye, H. & Shelley, L. (2020). Illicit Wildlife Trade, Wet Markets, and COVID-19: Preveting Future Pandemics. *World Medical & Health Policy*, DOI: 10.1002/wmh3.348.

Alves, R. R. N., Lima, J. R. de F. & Araujo, H. F. P. (2013). The live bird trade in Brazil and its conservation implications: an overview. *Bird Conservation International*, 23(1), 53-65.

AOPK (2020). CITES v Evropské unii a České republice. Retrieved from: https://www.ochranaprirody.cz/cites/cites-v-eu-a-cr/

Barnosky, A. D., Matzke, N., Tomiya, S., Wogan, G. O. U., Swartz, B., Quental, T. B., Marshall, C., MacGuire, J. L., Lindsey, E. L., Maguire, K. C., Mersey, B. & Ferrer, E. A. (2011). Has the Earth´s sixth mass extinction already arrived? *Nature*, 471(7336), 51-57.

Bell, D., Roberton, S. & Hunter, P. R. (2004). Animal origins of SARS coronavirus: possible links with the international trade in small carnivores. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 359(1447), 1107-1114.

Belsare, D. K. (2011). Vanishing Rar of Bengal Tigers. Pittsburg: RoseDog Books.

Berec, M. & Šetlíková, I. (2018). Important step to understanding the CITES Trade Database: A reply to Pavitt et al. *Biological Conservation*, 230, 197-198.

Bhattarai, B. R. & Fischer, K. (2014). Human-tiger *Panthera tigris* conflict and its perception in Bardia National Park, Nepal. *Oryx*, 48(4), 522-528.

Bowles, D. (1996). Wildlife trade – a conserver or exploiter? In: Taylor, V. J. & Dunstone, N. (Eds.) The Exploitation of Mammal Populations. Dordrecht: Springer.

Broad, S., Mulliken, T. & Roe, D. (2003). The nature and extent of legal and illegal trade in wildlife. In: Oldfield, S. (Ed.) The Trade in Wildlife: Regulation for Conservation. UK and USA: Earthscan Publications Ltd.

Caixin Global (2018). Loosening Ban on Trade in Tiger, Rhino Parts Sparks Furor. Retrieved from: https://www.caixinglobal.com/2018-10-31/loosening-ban-on-tiger-rhino-parts-sparks-furor-101341190.html

Can, Ö. E., D´Cruze, N. & Macdonald, D. W. (2019). Dealing in deadly pathogens: Taking stock of the legal trade in live wildlife and potential risks to human health. *Global Ecology and Conservation*, 17, e00515.

CBD (2001). Global Biodiversity Outlook. Montreal: Secretariat of the Convention on Biological Diversity.

Ceballos, G., Ehrlich, P. R, Barnosky, A. D., Garcia, A., Pringe, R. M., Palmer & T. M. (2015). Accelerated modern human-induced species losses: Entering the sixth mass extinction. *Science Advances*, 1(5), e1400253.

Chomel, B. B., Belotto, A. & Meslin F.-X. (2007). Wildlife, Exotic Pets, and Emerging Zoonoses. *Emerging Infectious Diseases*, 13(1), 6-11.

CITES (1973). Convention on International Trade in Endangered Species of Wild Fauna and Flora: Text of the Convention. Washington.

CITES (2018). Report on the Implementation of Measures Taken to Combat Illegal Trade in Tigers (*Panthera Tigris*) – Czech Republic. Seventieth meeting of the Standing Committee Rosa Khutor, Sochi (Russian Federation), 1-5 October 2018, 1-3.

ČIŽP (2010). Kontrola a možné sankce. Retrieved from: http://www.cizp.cz/Kontrola-a-mozne-sankce

Cooney, R., Kasterine, A., Macmillan, D., Milledge, S., Nossal, K., Roe, D. & S.,'T SAS-ROLFES, M., 2015. The trade in wildlife: a framework to improve biodiversity and livelihood outcomes. Geneva: International Trade Centre, 1-29. SC-15-311.E.

Customs Administration of the Czech Republic (2018). Joint Press Release of the Customs Administration of the Czech Republic and the Czech Environmental Inspectorate (CEI): While conducting the TROPHY Operation (TROFI) Customs Officers and Officials of the CEI have uncovered illegal Trade in Tigers. Prage: General Directorate of Customs.

Czech Environmental Inspectorate (2016). Annual Report 2016. Praha: Czech Environmental Inspectorate.

Davis, E. O., Willemsen, M., Dang, V., O´Connor, F., Glikman, J. A. (2020). An updated analysis of the consumption of tiger products in urban Vietnam. *Global Ecology and Conservation*, 22, e00960.

Dirzo, R., Young, H. S., Galetti, M., Ceballos, G., Isaac, N. J. B. & Collen, B. (2014). Defaunation in the Anthropocene. *Science*, 345(6195), 401-406.

DuTemple, L. A. (1996). Tigers. Minneapolis: Larner Publications Company.

Emerton, L. (2000). Using Economic Incentives for Biodiversity Conservation. Gland: IUCN.

Environmental Investigation Agency (2019). Running Out of Time: Wildlife Crime Justice Failures in Vietnam. UK: Environmental Investigation Agency UK.

García-Díaz, P., Ross, J. V., Ayres, C. & Cassey, P. (2015). Understanding the biological invasion risk posed by the global wildlife trade: propagule pressure drives the introduction and establishment of Nearctic turtles. *Global Change Biology*, 21(3), 1078-1091.

Goodrich, J. M. (2010). Human-tiger conflict: A review and call for comprehensive plans. *Integrative Zoology*, 5, 300-312.

Gratwicke, B., Evans, M. J., Jenkins, P. T., Kusrini, M. D., Moore, R. D., Sevin, J. & Wildt, D. E. (2009). Is the international frog legs trade a potential vector for deadly amphibian pathogens? *Frontiers in Ecology and the Environment*, 8(8), 438-442.

Gurevitch, J. & Padilla D. K. (2004). Are invasive species a major cause of extinctions? *Trends in Ecology & Evolution*, 19(9), 470-474.

Hansen, A. L. S., Li, A., Joly, D., Mekaru, S. & Brownstein, J. S. (2012). Digital Surveillance: A Novel Approach to Monitoring the Illegal Wildlife Trade. *Plos one*, 7(12), e51156.

Harfoot, M., Glaser, S. A. M., Tittensor, D. P., Britten, G. L., McLardy, C., Malsch, K. & Burgess, N. D. (2018). Unveiling the patterns and trends in 40 years of global trade in CITES-listed wildlife. *Biological Conservation*, 223, 47–57.

Indenbaum, R. A. (2018). A rapid assessment of the tiger trade in Viet Nam. *TRAFFIC Bulletin*, 30(1), 33-36.

IUCN Red List (2015). Malayan Tiger: *Pathera tigris* ssp. *jacksoni*. Retrieved from: https://www.iucnredlist.org/species/136893/50665029#population

Joppa, L., O'Connor, B., Visconti, P., Smith, C., Geldmann, J., Hoffmann, M., Watson, J. E. M., Butchart, S. H. M., Virah-Sawmy, M., Halpern, B. S., Ahmed, S. E., Balmford, A., Sutherland, W. J., Harfoot, M., Hilton-Taylor, C., Foden, W., Di Minin, E., Pagad, S., Genovesi, P., Hutton, J. & Burgess, N. D. (2016). Filling in biodiversity threats gaps. *Science*, 80(353), 416–418.

Kalman, B. (2004). Endangered Tigers. New York, Ontario, Oxford, Melbourne: Crabtree Publishing Company.

Karesh, W. B., Cook, R. A., Bennett, E. L. & Newcomb, J. (2005). Wildlife Trade and Global Disease Emergence. *Emerging Infectious Diseases*, 11(7), 1000-1002.

Karr, J. R. (1990). Biological Integrity and the Goal of Environmental Legislation: Lessons for Conservation Biology. *Conservation Biology*, 4(3), 244-250.

Leung, P.-CH. (2015). A comprehensive Guide to Chinese Medicine. Singapore: World Scientific Publishing.

Lindsey, P., Allan, J., Brehony, P., Dickman A. Robson, A., Begg, C., Bhammar, H., Blanken, L., Breuer, T., Fitzgerald, K., Flyman, M., Gandiwa, P., Giva, N., Kaelo, D., Nampindo, S., Nyambe, N., Steiner, K., Parker, A., Roe, D., Thomson, P,, Trimble, M., Caron A. & Tyrell, P. (2020). Conserving Africa´s wildlife and wildlands through the COVID-19 crisis and beyond. *Nature Ecology & Evolution*, DOI:10.1038/s41559-020-1275-6.

Linkie, M., Martyr, D. J., Holden, J., Yanuar, A., Hartana, A. T., Sugardjito, J. & Leader-Williams, N. (2003). Habitat destruction and poaching threaten the Sumatran tiger in Kerinci Seblat National Park, Sumatra. *Oryx*, 37(1), 41-48.

Liu, X, Rohr, J. R. & Li, Y. (2013). Climate, vegetation, introduced hosts and trade shape a global wildlife pandemic. *Proceedings of the Roya Society B: Biological Sciences*, 280(1753), 20122506.

Lovari, S., Pokheral, C. P., Jnawali, S. R., Fusani, L. & Ferretti, F. (2014). Coexistence of the tiger and the common leopard in prey-rich area: the role of prey partitioning. *Journal of Zoology*, 295(2), 122-131.

Maczulak, A. E. (2010). Biodiversity: Conserving Endangered Species. New York: Facts on File, Inc.

Margules, C. R. & Pressey, R. L. (2000). Systematic Conservation Planning. *Nature*, 405, 242-253.

Ministerstvo životního prostředí (2018). Pavla Říhová: Viděli jsme živého tygra, který měl být podle záznamů už rok mrtvý. *Zpravodaj Ministerstva životního prostředí*, 3, 22-25.

Miquelle, D., Smirnov, E. N., Merrill, T. W., Myslenkov, A. E., Quigley, H. B., Hornocker, M. G. & Schleyer, B. (1999). Hierarchical spatial analysis of Amur tiger relationships to habitat and prey. In Siedensticker, J., Christie, S. & Jackson, P. (Eds). Riding the tiger: tiger conservation in humandominated landscapes. Cambridge: Cambridge University Press.

Molnar, J. L., Gamboa, R. L., Revenga, C. & Spalding, M. D. (2008). Assessing the global threat of invasive species to marine biodiversity. *Frontiers in Ecology and the Environment*, 6(9), 485-492.

Moyle, B. (2014). The black market in China for tiger products. *Global Crime,* 10(1-2), 124-143.

Musing, L. (2020). Falling through the system: The role of the European Union captive tiger population in the trade in tigers. A TRAFFIC and WWF report. Cambridge: TRAFFIC and WWF.

Naidoo, R., Fisher, B., Manica, A. & Balmford, A. (2016). Estimating economic losses to tourism in Africa from the illegal killing of elephants. *Nature Communications*, 7, 13379.

Nijman, V. (2010). An overview of international wildlife trade from Southeast Asia. *Biodiversity and Conservation*, 19, 1101-1114.

Nyhus, P. J. & Tilson, R. (2004). Characterizing human-tiger conflict in Sumatra, Indonesia: implications for conservation. *Oryx*, 38(1), 68-74.

Packer, C., Shivakumar, S., Athreya, V., Craft, M. E. Dhanwatey, H., Dhanwatey, P., Gurung, B., Joshi, A., Kushnir, H., Linnell, J. D. C. & Fountain-Jones, N. M. (2019). Species-specific spatiotemporal patterns of leopard, lion and tiger attacks on humans. *Journal of Applied Ecology*, 56(3), 585-593.

Paini, D. R., Sheppard, A. W., Cook, D. C., De Barro, P. J., Worner, S. P. & Thomas, M. B. (2016). Global threat to agriculture from invasive species. *Proceedings of the National Academy of Sciences of the United States of America*, 113(27), 7575-7579.

Parr, J. (2011). Illegal wildlife trade: a need for institutional mapping – A response to Bennett. *Oryx*, 45(4), 480-481.

Pearl, M. C. (2004). Widllife Trade: Threat to Global Health. *EcoHealth*, 1, 111-112.

Phelps, J. & Webb, E. L. (2015). "Invisible" wildlife trades: Southeast Asia´s undocumented illegal trade in wild ornamental plants. *Biological Conservation*, 186, 296-305.

Pires, S. & Moreto, W. (2011). Preventing Wildlife Crimes: Solutions That Can Overcome the "Tragedy of the Commons". *European Journal of Criminal Policy and Research*, 17(2), 101-123.

Primack, R. B., Kindlmann, P. & Jersáková, J. (2011). Úvod do biologie ochrany přírody. Praha: Portál.

Regueira, R. F. S. & Bernard, E. (2012). Wildlife sinks: Quantifying the impact of illegal bird trade in street markets in Brazil. *Biological Conservation*, 149(1), 16-22.

Reza, A. H. M. A., Feeroz, M. M. & Islam, M. A. (2002). Man-tiger interaction in the Bangladesh Sundarbans. *Bangladesh Journal of Life Sciences*, 14(1&2), 75-82.

Rivalan, P., Delmas, V., Angulo, E., Bull, L. S., Hall, R. J., Courchamp, F., Rosser, A. M. & Leader-Williams, N. (2007). Can bans stimulate wildlife trade? *Nature*, 447, 529-530.

Roe, D., Mulliken, T., Milledge, S., Mremi, J., Mosha, S & Grieg-Gran, M. (2002). Making a Killing or Making a Living: Wildlife Trade, Trade Controls and rural livelihoods. Biodiversity and Livelihoods Issues No. 6. London: IIED.

Rosen, G. E. & Smith, K. F. (2010). Summarizing the Evidence on the International Trade in Illegal Wildlife. *EcoHealth*, 7, 24-32.

Říhová, P. (2018). Zpráva kontrolních CITES orgánů ČR, zkompilovaná Českou inspekcí životního prostředí. ČIŽP Praha, 16 s. In Ucová, S., Říhová, P., Šafář, J. & Plesník, J. (2019). Ochrana tygrů a Česká republika. *Ochrana přírody*, 1, 29-32.

Říhová, P. & Vaněk, D. (n. d.). Tiger genetics: Development of Diagnostic Tools for DNA Analysis Based on Individual Identifications and Species Identification in Processed Products.

Saout, S. L., Hoffmann, M., Shi, Y., Hughes, A., Bernard, C., Brooks, T. M., Bertzky, B., Butchart, S. H. M., Stuart, S. N., Badman, T., Rodrigues, A. S. L. (2013). Protected Areas and Effective Biodiversity Conservation. *Science*, 342(6160), 803-805.

Sarkar, S., Pressey, R. L., Faith, D. P., Margules, CH. R., Fuller, T., Stroms, D. M., Moffett, A., Wilson, K. A., Williams, K. J., Williams, P. H. & Andelman, S. (2006). Biodiversity Conservation Planning Tools: Present Status and Challenges for the Future. *Annual Review of Environment and Resources*, 31, 123-159.

Schneider, J. (2008). Reducing the Illicit Trade in Endangered Wildlife: The Market Reduction Approach. *Journal of Contemporary Criminal Justice*, 24, 274-295.

Simcharoen, A., Savini, T., Gale, G. A., Simcharoen, S., Duangchantrasiri, S., Pakpien, S. & Smith, J. J. D. (2014). Female Tiger Panthera Tigris Home Range Size and Prey Abundance: Important Metrics for Management. Cambridge: Cambridge University Press.

Smith, K. M., Zambrana-Torrelio, C., White, A., Asmussen, M., Machalaba, C., Kennedy, S., Lopez, K., Wolf, T. M., Daszak, P., Travis, D. A. & Karesh, W. B. (2017). Summarizing US Wildlife Trade with an Eye Toward Assessing the Risk of Infectious Disease Introduction. *EcoHealth*, 14, 29-39.

Species+ (2020). *Panthera tigris*. Retrieved from: https://www.speciesplus.net/#/taxon_concepts/6047/legal

Stolen Widlife (2020b). Why are tigers being killed? Retrieved from: http://www.stolenwildlife.org/tigers.html

Stolen Wildlife (2020a). Stolen Wildlife: Are wild animals from the whole world trafficked in Europe? Retrieved from: http://www.stolenwildlife.org/#goto-anchor-1500825481289

Stoner, S., Krishnasamy, K., Wittmann, T., Delean, S. & Cassey, P. (2016). Reduced to skin and bones re-examined: Full analysis. An analysis of Tiger seizures from 13 range countries from 2000-2015. Malaysia: TRAFFIC.

Struebig, M. J., Linkie, M., Deere, N. J., Martyr, D. J., Millyanawati, B., Faulkner, S. C., Le Comber, S. C., Mangunjaya, F. M., Leader- Williams, N., McKay, J. E. & John, F. A. V. St. (2018) Addressing human-tiger conflict using socio-ecological information on tolerance and risk. *Nature Communications*, 9, 3455.

Sumrall, K. A. (2009). Confronting Illegal Wildlife Trade in Vietnam: The Experience of Education for Nature-Vietnam. University of Michigan.

Sunquist, M. E., Karanth, K. U. & Sunquist, F. (1999). Ecology, behaviour and resilience of the tiger and its conservation needs. In Seidensticker, J., Christie, S. & Jackson, P. (Eds.). Riding the Tiger: Tiger conservation in human-dominated landscapes. Cambridge: Cambridge University Press.

Sung, Y.-H. & Fong, J. J. (2018). Assessing consumer tredns and illegal activity by monitoring the online wildlife trade. *Biological Conservation*, 227, 219-225.

Swift, L., Hunter, P. R., Lees, A. C. & Bell, D. J. (2007). Wildlife Trade and the Emergence of Infectious Diseases. *EcoHealth*, 4, 25.

Today Online (2020). Tiger´s dusk. Retrieved from: https://www.todayonline.com/tigers-dusk-charting-declining-numbers

Travis, D. A., Watson, R. P. & Tauer, A. (2011). The spread of pathogens through trade in wildlife. *Rev. sci. tech. - Off. int. épizoot.*, 30(1), 219-239.

Vulture Conservation Foundation (2020). The Stolen Wildlife Campaign just released the second series of awareness photographs. Retrieved from: https://www.4vultures.org/stolen-wildlife-campaign-second-series-awareness-photographs/

Wong, R. W. Y. (2015). The organization of the illegal tiger parts trade in China. *British Journal of Criminology Advance Access*, DOI: 10.1093/bjc/azv080.

Zimmerman, M. E. (2003). The black market for wildlife: Combating transnational organized crime in the illegal wildlife trade. *Vanderbilt Journal of Transnational Law*, 36, 1657-1689.

Zhang, L., Hua, N. & Sun, S. (2008). Wildlife trade, consumption and conservation awareness in southwest China. *Biodivesity Conservation*, 17, 1493-1516.

Zhu, A. & Zhu, G. (2020). Understanding China´s wildlife markets: Trade and tradition in an age of pandemic. *World Development*, 136, 105108.

Sharing economy participation: a resource provider perspective in a developing country

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Abstract: The sharing economy has demonstrated substantial traction due to its reputed economic, social, and sustainability implications. However, evidence on its growth and public uptake are largely confined in advanced economies despite its promising opportunities when properly taken advantage in less developed countries. Hence, the study explores the resource owners' sharing intentions, a less explored area in the sharing economy literature. A web-based survey was carried-out from June to August 2020, particularly in the Philippines. A total of 401 responses were used and analyzed by employing descriptive statistics and non-parametric statistical tests. The findings mainly present the promising propensity of Filipinos to share-out idle resources in sharing economy platforms. Yet, their willingness to share is largely confined to low-cost and readily accessible resources. Majority of the respondents express affirmative perceptions on economic, social, environmental sustainability, trust and altruistic attributes associated to the sharing economy. Positive and significant relationships are likewise observed between the aforementioned perceptions and future sharing intentions. Meanwhile, in course of Covid19 pandemic, respondents' awareness to personal hygiene is considerably high and is found to be positively associated to their future sharing intentions. Both theoretical and practical implications are articulated.

1 Introduction

In a nutshell, the sharing economy involves the sharing of underutilized resources in digital platforms (Frenken, 2017). Belk (2010) claims that it is grounded on the ancient concept of sharing and is brought to a new plane owing to the existence of the internet and Web 2.0. Basically, sharing activities is limited to members within closely-knit communities (Belk, 2010), however, technological advances has brought new forms of sharing where it features a new paradigm of trust when personally unacquainted individuals are granting each other access to unused resources (PriceWaterhouseCoopers, 2015). It is analogously labeled as "collaborative consumption" (Möhlmann, 2015) and acclaimed of its social and sustainability implications (Böcker & Meelen, 2017). Belk (2010) points out that sharing resources allows people to advance social interaction and exploit economic advantages. They also claim that the efforts involved in achieving efficiency in resource utilization and waste minimization are opportunities to offset the adverse consequences of traditional consumerism (i.e. overproduction and overconsumption). Its sustainability-related inclination is attributed to its presumed influence in relieving the rapid depletion of scarce natural resources. On a similar note, Katrini (2018) mentions that sharing is an alternative that satisfies consumers' need while considering the matters of sustainability, resourcefulness and social interaction.

The concept has substantially gained sturdy traction as pioneering start-ups have grown into global firms such as Airbnb and Uber. Likewise, new start-ups continually emerge, extending offerings from the typical accommodation and transportation services to retail and consumer goods, human resources, finance and energy sharing. However, evidence on the growth, success and explicit consumer uptake in the sharing economy are largely confined in advanced economies (Bakker & Twining-Ward, 2018; Mont et al., 2020). Remarkably, Retamal & Dominish (2017) claim that exploiting the sharing economy in developing countries can offer opportunities leading to sustainable consumption, economic and entrepreneurial development.

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Nielsen (2014) global survey reports that consumers in the Asia-Pacific region posted the highest willingness to participate in online-based sharing communities. Philippines ranks fourth in terms of the likelihood to use products and services in collaborative economy. Nevertheless, little is known on their intentions to share-out own resources to others. As a matter of fact, Mont et al. (2020) review suggests supplemental studies on sharing economy behavior, especially, from the resource owner perspective. It is equally important to understand the viability of any sharing economy model as it operates in a two-sided markets involving the resource user and resource provider (Hawlitschek et al., 2018). It is necessary that the supply of resources matches to the demand of the users to ensure the sustainability of the economic model. Therefore, the study intends to capture the resource sharing propensities in a developing country – The Philippines. In view of this, the following research questions are put forward:

i. Does majority of the respondents have experience in sharing out resources in digital platforms?
ii. Does majority of the respondents willing to grant temporary access to idle resources in the future? What resources are they willing to share?

1.1. Sharing-out motivations in digital platforms

The existing literature offers an extensive array of factors driving sharing economy participation, nevertheless, the attributes of economic, social, hedonic environmental sustainability, trust and altruism are predominantly cited. Botsman & Rogers (2010) and Tussyadiah (2015) advocate the economic advantage attached to access-based consumption. Chun et al. (2019) claim that it dismisses purchase, storage and maintenance burdens arising from ownership-based consumption. As more start-ups adopt the profit-seeking sharing model, resource suppliers are able to take advantage of economic gains in granting access to their underutilized resources. Meanwhile, as resources are effectively used through sharing, it is presumed to induce sustainable consumption and consequently reduce environmental degradation (Hamari et al., 2016). Botsman & Rogers (2010) and Belk (2014) claim that the concept provides the participants the opportunity to interact and deepen their experiences with other people outside familial and community ties. As these acts are manifested, Tran et al. (2019) point out that it engenders fun and enjoyment and is found to be more appealing to younger generations (Godelnik, 2017). Notably, trust in sharing communities is likewise important for its success (Nielsen, 2014). Trust towards product quality and hygiene is a crucial element on rental commerce of electronic products (Fota et al., 2019). Sharing through digital platforms is a manifestation of altruistic behavior as claimed by (Schreiner et al., 2018). Millon et al. (2003) define altruism as an act that benefits other people more than oneself. They added that altruistic acts revolve around sharing, cooperation and in extending help and comfort to others. Roos & Hahn (2017) pinpoint that one's sharing behavior and altruistic orientation are mutually related and can be simultaneously nurtured over time.

iii. To what extent do respondents perceive the economic, social, sustainability, trust and altruistic aspects of sharing in digital platform? Do these perceptions relate to their sharing intentions in the future?

Furthermore, the unprecedented global health crisis entrained by COVID 19 pandemic and its devastating economic impacts may induce or discourage sharing activities in the future. Early contentions suggest that the emergence and growth of the sharing economy have begun following the global financial crisis in 2008 (Belk, 2014; Jiang & Tian, 2018). It has turned consumers to be mindful on their finances which subsequently contoured their sustainable consumption behaviors (i.e. efficient resource utilization, asset access over ownership). The loss in income and the arising concerns of inflation, pollution and global warming likewise urged consumers to explore possibilities for efficient resource utilization (Belk, 2014). Nevertheless, the fear of viral contagion that may be acquired in sharing of goods and services may curb peoples' future sharing propensities after the pandemic. Statistics as of April 2020 reveal an immense decline in sharing economy usage in the United States following the Covid19 outbreak when restrictions and measures against further spread of the virus remain in place (Statista Research Department, 2020). Hence, as the world continues to face the adverse impacts of the crisis and as people confronts the "new normal", the study inquires the following:

iv. Do respondents' personal hygiene awareness matter to their sharing propensities?

2 Methods

A web-based survey was carried-out from June to August 2020. Due to Covid19 restrictions in the Philippines, the web survey was the only feasible alternative to gather data from respondents. A survey questionnaire was developed and was structured as follows: i) demographic characteristics, ii) online sharing experience, iii) future sharing intention and the resources they are willing to share and iv) perceptions towards in online-based sharing platform. A short background of the survey and a brief definition of the sharing economy in general are also provided in the survey landing page. Measurement statements pertaining to consumers' economic, social, sustainability, trust and altruistic perceptions associated to sharing economy participation were adapted from extant literature and used a 5-point Likert scale (i.e. 1- strongly disagree to 5 – strongly agree) to measure the aforementioned perceptions. A pre-test was implemented to 30 respondents

to resolve unclear questions and other problems in the questionnaire. After some modifications, the survey link was sent to connections in social networking sites like Facebook, Instagram and LinkedIn. Convenience sampling procedure was employed in a manner that accessibility is mainly considered in sample selection. It is noted that evidence concerning the specific consumer segment participating in the sharing economy in the Philippines is non-existent. Thus, the study is entirely exploratory in nature which merits the use of non-probability sampling procedure. Throughout the data collection period, 401 responses were considered valid and 30 samples were discarded due to response duplication and considerable missing responses. Furthermore, data were analyzed by mainly employing descriptive statistics and non-parametric tests (i.e. Mann-Whitney test, Kruskal-Wallis test and Spearman rho correlation tests) in IBM SPSS version 23. The demographic profile of respondents is presented in Table 1.

Table 1 Demographic profile of the respondents

		N	Percentage
Gender	Female	277	69.10%
	LGBTQ+	25	6.20%
	Male	99	24.70%
Educational Attainment	Less than High School Graduate	25	6.20%
	High School Graduate	79	19.70%
	Some College Degree	51	12.70%
	Bachelor's Degree	199	49.60%
	Graduate Degree	47	11.70%
Employment Status	Employed	168	41.90%
	Self-employed	48	12.00%
	Student	161	40.10%
	Unemployed	24	6.00%
Marital Status	Married	54	13.50%
	Single	347	86.50%
Age (average): 25 years old			

Source: Own processing of web-survey data collected from June-August 2020

3 Research results

3.1. Sharing-out experience and intention to share in digital platforms

Results show that only around 51.9% of respondents have experienced sharing out underutilized resources in digital platforms. Despite the percentage disparity in experience, majority (92.8%) of the respondents remain to express positive intentions to share out idle resources to other people via online platforms in the future. Most of them are female, single, with college level education and employed. Clothing, food, technical skills, household goods and electronic gadgets transcends on top of the list of resources that respondents across demographic characteristics are willing to share to others (Table 2). It is also noted that cost intensive resources are less likely to be shared than the inexpensive ones. Despite the popularity of for-profit sharing economy platforms such as Airbnb & Grab, this may not be all feasible to respondents. In developing countries, people usually have difficulty in acquiring ownership to capital intensive resources. Hence, respondents might have not possessed such resources. It is also observed that 40.10% of the respondents are students, thereby, may not have income sources at the moment. Nevertheless, respondents' enthusiasm in online sharing activities is maintained, but only with the resources that they currently possess and can easily acquire.

Table 2 Type of resources willing to share in the future

		n	%
Type of resources willing to share in the future* *multiple response	Clothes	267	72.20%
	Food	262	70.80%
	Technical skills and human resource related services	164	44.30%
	Household goods	141	38.10%
	Electronic Gadgets	104	28.10%
	Farm/gardening tools and equipment	88	23.80%
	Money	85	23.00%
	Accommodation	73	19.70%
	Working Space	49	13.20%
	Motorcycle	45	12.20%
	Bicycle	38	10.30%
	Car	35	9.50%

Source: Own processing of web-survey data collected from June-August 2020

3.2. Perceptions towards sharing idle resources in digital platforms

The study explores the perceptions of respondents towards the presumed drivers and supply intentions of idle resources in digital platforms. With reference to extant literature, the inquiry on perceptions centers on economic, social, environmental sustainability, trust and altruism that are theoretically supported to drive participation in the sharing economy. The study further bisects the perceptions between respondents with and without experience as suppliers in the sharing economy. Also, the association between the respondents' perceptions and their future sharing intentions were investigated.

As shown in Figure 1a, most respondents express positive perceptions on the economic value involved in sharing-out resources in their possession to others. It shows that among respondents with sharing economy experience, around 49.0% agreed and another 23.1% strongly agreed on the possibility of making money in sharing idle resources. Apparent to inexperienced respondents, 42.5% neither agree nor disagree on economic value involved in sharing. Using Mann-Whitney U test, results further confirms that economic value perceptions is higher among those with sharing experience (U= 14,227.699, $p < 0.01$). Meanwhile, it is observed that respondents' perception on the social incentives arising from sharing economy participation are mostly affirmative. More than the half percentage among the experienced (57.0%) and inexperienced (57.5%) respondents declare their agreement on the opportunity involved in meeting interesting people and secure unique social experience with them (Figure 1b). Likewise, environmental sustainability implication specifically in saving natural resources associated with sharing activities are mostly perceived positive among respondents (Figure 1c). Additionally, as sharing is fundamentally linked to prosocial behavior, the inquiry on respondents' altruistic perception shows compassion to others as a driver to set-off their sharing propensities is mostly positive. Figure 1e illustrates that altruism maintains an overwhelming percentage agreement among experienced (58.2%) and inexperienced (59.10%) respondents. As regards to trust, perceptions remain positive (see Figure 1d), nevertheless, it differs significantly between respondent groups. Those with experience have higher affirmative perception of trust towards sharing resources to others than those without experience. About 49.7% of respondents without digital sharing experience express indifference on trusting people using their own resources. This difference is made clearer in mean rank figures: w/ experience = 230.5, w/o experience = 169.70 (U= 14,030.50, $p < 0.01$). Finally, overall results reveal that respondents with experience sharing resources in digital platform significantly have higher perception on economic value, social incentive, environmental sustainability, trust and altruistic attributes associated to sharing economy participation (Table 3).

Further analysis is carried-out on the differences in respondents' perceptions across socio-demographic characteristics. Perceptions towards altruism and environmental sustainability associated to sharing-out resources differ across gender and employment status. In terms of altruism, the perception is higher among female than male respondents (H = 7.269, $p = 0.026$). This is revealed by a higher mean rank value for female (208.69) as compared to male (177.01) respondents. Meanwhile, the environmental sustainability implication associated to sharing resources significantly differ among employment status. Analysis shows that here is higher favorable perception among self-employed than unemployed ones (H = 10.059, $p = 0.018$).

Correlation analysis between the aforementioned respondents' perceptions and their sharing intentions was performed. Results indicate that the relationship among economic, social, environmental sustainability, altruism and trust perceptions towards future sharing intention is positively significant (Table 4). These imply that as the perceptions towards the driving factors progress positively, the higher the propensity that respondents will share-out underutilized resources in digital platforms in the future. Remarkably, among the driving attributes associated to sharing, altruism bear the strongest association with future sharing intentions. This paper highlights this result as extant studies have claimed the dominance of economic benefits as a driver for sharing economy participation. It would seem that sharing spare resources to others is a form of extending help to others especially for those adversely affected by the pandemic. This is likewise captured by Kuroishi & Sawada (2019) on the manifestation of pure altruism among Filipinos in the early post-disaster situations as a mechanism to address market and government failures. Meanwhile, the collectivistic culture among Filipinos (Hofstede Insights, 2019) may as well elicit empathy and compassion for others especially in times of crisis, thus, playing a greater role than the subsisting economic opportunities. All in all, the results resonate the original discourse of the sharing economy which is primarily anchored on traditional (pure) sharing initiatives.

On a final note, the impact of Covid19 pandemic and the engrossed risk of contagion is suspected to trigger changes in people's sharing behavior patterns. Thus, the study explores the consciousness of respondents about their personal hygiene in course of the pandemic. The findings indicate that respondents both with and without experience in digital sharing mostly agree that they are concerned to their personal hygiene. Subsequently, it shows that hygiene consciousness is positively correlated with sharing-out intentions (rho = 0.502, $p < 0.01$). This simply means that the higher hygiene consciousness, the higher their intention will be on sharing-out resources in a digital platform. Remarkably, the strength of the correlation is distinctly greater than the other previously indicated variable relationships. This is contrary to earlier contention that the pandemic may curb people's sharing propensities. Instead, it shows that it does not negatively affect

them, and that the more they are more conscious on their personal hygiene, the higher the likelihood that will share-out idle resources in the future, especially, in post-pandemic milieu.

Figure 1 Respondents perception of economic (a), social (b), sustainability (c), trust (d) and altruistic (e) drivers in sharing economy participation and their hygiene consciousness (f)
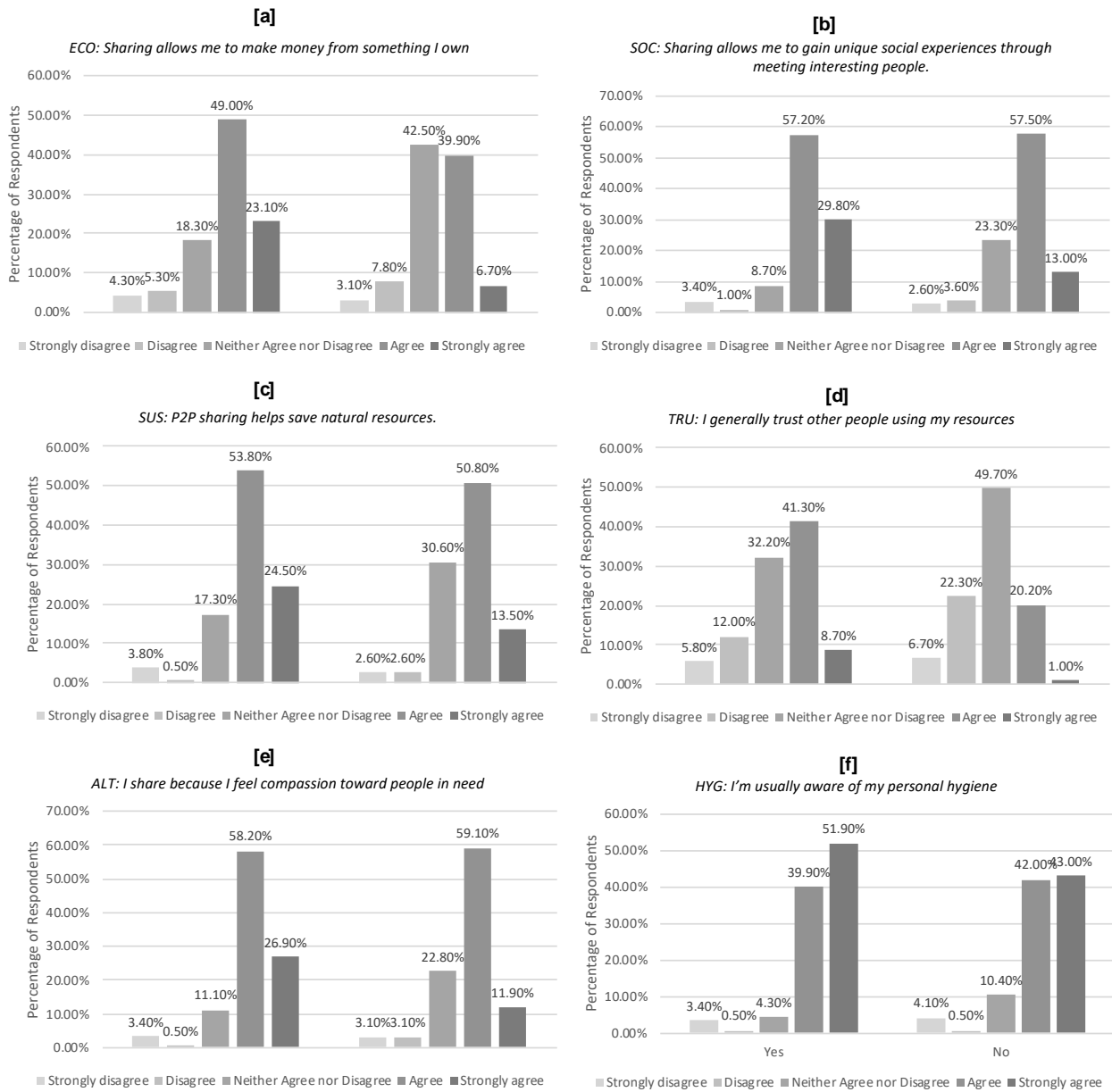
Source: Own processing

Table 3 Mann-Whitney's test mean rank results on economic, social, sustainability, altruism and trust perception between experienced and inexperienced respondents

		Mean Ranks					
		ECO	SOC	SUS	ALT	TRU	HYG
Experience	Yes	229.10	225.82	219.14	223.00	230.05	211.89
	No	170.72	174.25	181.45	177.28	169.70	189.26
	U	14,227.500	14,910.000	16,298.500	15,495.000	14,030.500	17,806.000
	p-value	0.000	0.000	0.000	0.000	0.000	.031

ECO – economic benefit, SOC – social incentive, SUS – environmental sustainability, ALT – altruism, TRU – trust, HYG – hygiene consciousness, INT – intention to share-out, U – Mann-Whitney U

Source: Own processing of web-survey data collected from June-August 2020

Table 4 Summary of Spearman rho correlation test results

	Variable Relationships					
	ECO → INT	SOC → INT	SUS → INT	ALT→ INT	TRU→ INT	HYG → INT
Correlation coefficient (rho)	0.436	0.465	0.393	0.469	0.318	0.502

p-value	0.000	0.000	0.000	0.000	0.000	0.000

ECO – economic benefit, SOC – social incentive, SUS – environmental sustainability, ALT – altruism, TRU – trust, HYG – hygiene consciousness, INT – intention to share-out

Source: Own processing of web-survey data collected from June-August 2020

4 Conclusions, Implications, Limitation and Future Research Directions

The study offers initial evidence on the peoples' propensity to share idle resources in a sharing economy platform, in the Philippines. It attempts to bridge the gap on the scanty information on sharing economy behavior from the perspective of resource suppliers in a developing country.

The results uncover that sharing-out resources in digital platform is not something new on over half of the total respondents. It shows that they already have supplied resources in sharing economy platforms before. Moreover, majority of the respondents expresses willingness to share-out idle resources in the near future. It is also noticed that cost intensive resources (e.g. accommodation and mobility) are less likely to be shared despite the evident possibility of earning revenues in established platforms like Airbnb and Grab. The elucidation could be due to the high cost ownership in possessing the resources and the large percentage students in the sample who may not have the capability to possess such resources yet. Hence, clothing, food, technical skills and human resource related services, households' goods and electronic gadgets are most likely to be shared.

Meanwhile, extant literature ascribes that sharing economy behavior is driven by economic, social, environmental sustainability, trust and altruistic factors. As the study determines the perception of respondents on the aforementioned factors, results indicate that perceptions are mostly affirmative. Perception of respondents with resource provision experience in the sharing economy are higher than those without experience. Results also show that the correlation between the perceptions and future sharing intentions are significantly positive. These suggest that the more affirmative the perceptions towards the drivers of sharing-out resources, the higher their propensity to share-out in the future. Moreover, the result opposes the previous claims that sharing out resources is dominantly motivated by economic reasons (Botsman & Rogers, 2010; Tussyadiah, 2015). Correlation analysis indicates that the strongest association to future sharing intention is the altruistic aspect of sharing. On the other hand, as the Covid19 pandemic passes, the study introduced hygiene consciousness and examine its influence on sharing-out intentions in the future. Findings reveal that majority of the respondents manifest positive awareness to personal hygiene and is accordingly found to be positively associated to their future sharing intentions.

The study roughly contributes to the literature by validating the significance of the identified factors of sharing economy participation from a less explored perspective of the resource providers in developing countries. It also highlights the relationship of hygiene consciousness in sharing economy behavior and uncovers sectors that remain unexplored particularly in the sharing of food and clothing. Practically, this presents an opportunity for start-ups to establish digital sharing platforms and incorporate the sharing of resources other than from accommodation and mobility sectors. It is also equally important for practitioners to engender positive perceptions towards sharing economy participation by means of promoting its economic, social, environmental sustainability, trust, altruistic attributes and hygiene-related measures among participants.

However, the study acknowledges some limitations. The study particularly shortfalls on the generalizability of its findings. It is suggested to improve sample representatives (e.g. consider older generation, with income streams) and apply a more robust sampling procedure. Similar studies can also be pursued in other geographical and cultural contexts. Meanwhile, the relationship of perceptions towards future sharing intentions is roughly determined by merely employing correlation tests. A more robust analytical approach is advised to closely analyze the causal relationships of the variables. Further studies can incorporate more measurement items to effectively measure the variables examined in the current study. Lastly, it is important to continually track peoples' sentiment and actual engagement in the sharing economy specially in post-pandemic era.

References

Bakker, M., & Twining-Ward, L. (2018). *Tourism and the Sharing Economy: Policy and Potential of Sustainable Peer-to-Peer Accommodation*. The World Bank Group. http://documents.worldbank.org/curated/en/161471537537641836/pdf/130054-REVISED-Tourism-and-the-Sharing-Economy-PDF.pdf

Belk, R. (2010). Sharing. *Journal of Consumer Research*, *36*(5), 715–734. https://doi.org/10.1086/612649

Belk, R. (2014). Sharing versus pseudo-sharing in web 2.0. *Anthropologist*, *18*(1), 7–23. https://doi.org/10.1080/09720073.2014.11891518

Böcker, L., & Meelen, T. (2017). Sharing for people, planet or profit? Analysing motivations for intended sharing economy participation. *Environmental Innovation and Societal Transitions*, *23*, 28–39. https://doi.org/10.1016/j.eist.2016.09.004

Botsman, R., & Rogers, R. (2010). *What's mine is yours: The rise of collaborative consumption*. Harper Business.

Chun, Y.-Y., Matsumoto, M., Tahara, K., Chinen, K., & Endo, H. (2019). Exploring Factors Affecting Car Sharing Use Intention in the Southeast-Asia Region: A Case Study in Java, Indonesia. *Sustainability*, *11*(18), 5103. https://doi.org/10.3390/su11185103

Fota, A., Wagner, K., & Schramm-Klein, H. (2019). Is renting the new buying? A quantitative investigation of the determinants of the rental-commerce intention. *The International Review of Retail, Distribution and Consumer Research*, *29*(5), 582–599. https://doi.org/10.1080/09593969.2019.1664616

Frenken, K. (2017). Political economies and environmental futures for the sharing economy. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *375*(2095), 20160367. https://doi.org/10.1098/rsta.2016.0367

Godelnik, R. (2017). Millennials and the sharing economy: Lessons from a 'buy nothing new, share everything month' project. *Environmental Innovation and Societal Transitions*, *23*, 40–52. https://doi.org/10.1016/j.eist.2017.02.002

Hamari, J., Sjöklint, M., & Ukkonen, A. (2016). The sharing economy: Why people participate in collaborative consumption. *Journal of the Association for Information Science and Technology*, *67*(9), 2047–2059. https://doi.org/10.1002/asi.23552

Hawlitschek, F., Teubner, T., & Gimpel, H. (2018). Consumer motives for peer-to-peer sharing. *Journal of Cleaner Production*, *204*, 144–157. https://doi.org/10.1016/j.jclepro.2018.08.326

Hofstede Insights. (2019). *Hofstede Insights: Compare Countries*. https://www.hofstede-insights.com/product/compare-countries/

Jiang, B., & Tian, L. (2018). Collaborative Consumption: Strategic and Economic Implications of Product Sharing. *Management Science*, *64*(3), 1171–1188. https://doi.org/10.1287/mnsc.2016.2647

Katrini, E. (2018). Sharing Culture: On definitions, values, and emergence. *The Sociological Review*, *66*(2), 425–446. https://doi.org/10.1177/0038026118758550

Kuroishi, Y., & Sawada, Y. (2019). Motivations behind prosocial behavior: Evidence from the Philippines. *Journal of Asian Economics*, *64*, 101127. https://doi.org/10.1016/j.asieco.2019.06.003

Millon, T., Lerner, M. J., & Weiner, I. B. (2003). *Handbook of Psychology: Vol. Volume 5*. John Wiley & Sons, Inc. https://is.muni.cz/el/1441/podzim2012/SZk1025a/um/Handbook_Of_Psychology_-_Personality_And_Social_Psychology__Malestrom_.pdf#page=486

Möhlmann, M. (2015). Collaborative consumption: Determinants of satisfaction and the likelihood of using a sharing economy option again: Collaborative consumption-determinants of satisfaction and the likelihood of using a sharing economy option again. *Journal of Consumer Behaviour*, *14*(3), 193–207. https://doi.org/10.1002/cb.1512

Mont, O., Palgan, Y. V., Bradley, K., & Zvolska, L. (2020). A decade of the sharing economy: Concepts, users, business and governance perspectives. *Journal of Cleaner Production*, *269*, 122215. https://doi.org/10.1016/j.jclepro.2020.122215

Nielsen. (2014). *Is sharing the new buying? Reputation and trust are emerging as new currencies*. The Nielsen Company. https://www.nielsen.com/wp-content/uploads/sites/3/2019/04/global-share-community-report-may-2014.pdf

PriceWaterhouseCoopers. (2015). *Sharing or paring? Growth of the sharing economy* (p. 32). https://www.pwc.com/hu/en/kiadvanyok/assets/pdf/sharing-economy-en.pdf

Retamal, M., & Dominish, E. (2017). *The Sharing Economy in Developing Countries*. Institute for Sustainable Futures at the University of Technology Sydney (UTS) for Tearfund UK. https://learn.tearfund.org/~/media/files/tilz/circular_economy/2017-tearfund-the-sharing-economy-in-developing-countries-en.pdf?la=en

Roos, D., & Hahn, R. (2017). Does shared consumption affect consumers' values, attitudes, and norms? A panel study. *Journal of Business Research*, *77*, 113–123. https://doi.org/10.1016/j.jbusres.2017.04.011

Schreiner, N., Pick, D., & Kenning, P. (2018). To share or not to share? Explaining willingness to share in the context of social distance. *Journal of Consumer Behaviour*, *17*(4), 366–378. https://doi.org/10.1002/cb.1717

Statista Research Department. (2020). *Impact of coronavirus on sharing economy services usage in the U.S. 2020*. Statista. https://www.statista.com/statistics/1110632/sharing-economy-services-united-states-covid19/

Tran, V., Zhao, S., Diop, E. B., & Song, W. (2019). Travelers' Acceptance of Electric Carsharing Systems in Developing Countries: The Case of China. *Sustainability*, *11*(19), 5348. https://doi.org/10.3390/su11195348

Tussyadiah, I. (2015). An Exploratory Study on Drivers and Deterrents of Collaborative Consumption in Travel Some of the authors of this publication are also working on these related projects: Innovation in Tourism and Hospitality View project Climate change visualisation and s. *Springer*, 817–830. https://doi.org/10.1007/978-3-319-14343-9_59

Perception of Environmental Education by Students of Economics

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Abstract: In order to achieve sustainability and application of the principles of circular economy, it was necessary to integrate environmental education in teaching at universities. The presented paper aims to describe by means of a pilot survey how students of economics perceive environmental education. The pilot survey consists of a series of interviews with students of the Faculty of Economics of the University of South Bohemia. Students' perceptions of environmental education were described in several sub-topics, which were created in accordance with the theory and practice of current scientific knowledge in this field.

Keywords: circular economy, environmental education, interviews, university students
JEL Classification: A29, Q57, Q59

1 Introduction

The society has long been aware of the negatives and dangers of the current prevailing linear economic growth. An important publication that drew attention to this fact was *The Limits to Growth*. The subject was a mathematical model of Earth's evolution that showed the global impact that could occur if resource consumption continued on such a scale (Meadows & Club of Rome, 1972). This work was followed by the publication *Our Common Future*, which defined the term sustainable development. It was written as a response to the over-exploitation of resources and disproportionate industrial development (World Commission on Environment and Development, 1987). The definition used in this publication became the most commonly used definition of all available. "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission on Environment and Development, 1987).

During the global economic crisis that began in 2008, the concept of a green economy was widely accepted. Its goal aimed to restart economic growth by using green technologies and based on renewables. One of the expected impacts of the application represents a significant reduction of environmental risks. At the operational level, these are investments in technologies aiming to reduce carbon emissions, raise energy efficiency as well as investments in measures that should prevent the loss of biodiversity and ecosystem services (Environmental Management Group & UN, 2011, p. 31). Cato (2009) defines the green economy as an alternative to the current economic paradigm. The newly conceived economy supports social justice. The green economy should serve as a global force that does not favor some nations over others.

However, this is not the only concept that is currently being applied globally. The roots of the concept of circular economy go back to the 80s of the last century (Lieder & Rashid, 2016), but its growing importance can be seen mostly in the present or in the last decade. A well-known definition of the concept is that from the Ellen Macarthur Foundation (2013): "A circular economy is an industrial system that is restorative or regenerative by intention and design".

UNESCO's Commitment to Sustainable Development (2011, pp. 8-9) presents an important characteristic of green societies, namely education as a means of eradicating poverty and establishing justice and inclusion. Furthermore, education in this direction leads to sustainable growth, improvement of health and livelihoods. The process itself must first and foremost be of good quality in relation to the content of the curriculum.

In order to achieve the transition of the society towards sustainability and the careful management of natural resources, the need arose to integrate environmental development issues into education as a means of training future professionals. Environmental education is also gaining in importance due to the general growing awareness and interest in the application of the principles of the concepts of green economy or circular economy.

In 2005, the *UNECE Strategy for Education for Sustainable Development* was adopted in Vilnius, which serves as a starting point for SD education for member states. In 2008, the Government of the Czech Republic adopted the document *Education Strategy for Sustainable Development in the Czech Republic 2008-2015*, which contains basic strategies and visions for this area of education. The relevant action plans then serve to implement these strategies. The working

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group on Education for Sustainable Development is composed of representatives of ministries, universities or other educational institutions. The Ministry of the Environment, together with the Ministry of Education, Youth and Sports, has a coordinating role. The objectives of the strategy are: the development of educators from the entire education system, a wide range of educational programs and the development of competencies of education recipients (Ministry of the Environment of the Czech Republic, 2008).

The Committee on Education for Sustainable Development recommended in 2015 to the Ministry of Education, Youth and Sports that a separate part be devoted to the education of sustainable development in the forthcoming *Long-term Plan for Education and the Development of the Education System of the Czech Republic for (2015-2020)*, as this document follows on from *Education Strategy for Sustainable Development in the Czech Republic 2008-2015* (Government of the Czech Republic, 2015).

In line with the provision of the Education Act (section 9, paragraph 1), the *Long-term Plan for Education and the Development of the Education System of the Czech Republic (2019–2023)* has been prepared (European Commission, 2020).

2 Theoretical background and formulation of research questions

2.1 Sustainability and ecological disaster

The basis of environmental education constitutes the concept of sustainable development, which was defined in the publication *Our Common Future* (World Commission on Environment and Development, 1987). The concept was preceded by an awareness of the dangers of a global ecological disaster, as pointed out for example by the model in *The Limits to Growth* (Meadows & Club of Rome, 1972). Partial concepts and topics that fall into environmental education are more or less part of the theory of sustainable development.

Research questions:

Are students aware of the dangers of environmental disaster?

According to the respondents, what is the role of sustainable development?

2.2 Environmental education and out-of-school forms of education

A number of studies can be found that focus on the impact of teaching environmental topics to students. These are researches that work with students' values and their overall attitude to environmental education. The methodological approach and the overall approach to the issue are very differentiated, but it can often be found that the teaching of environmental topics has an impact on students. Sharma & Kelly (2014) examine the impact of environmental education on students' knowledge, including how they perceive it. Environmental education is perceived positively and considered beneficial by most of the students who participated in the survey. The results also showed that environmentally oriented subjects had an impact on students' knowledge of sustainability in business practice. Zsoka et al. (2013) confirm a strong correlation between the intensity of environmental education and the environmental knowledge of high school and university students. They also provide two explanations of this phenomena. The first reason is the very intensity of environmental education. The second reason is the motivation of students who have chosen to study these environmentally oriented subjects. Motivation is usually connected with students' pro-environmental values. These are often measured by the NEP & HEP method of environmental sociology. Erdogan (2009) researched the pro-environmental value orientation of university students using this method. As a result, more than half of the local students have set values towards a new environmental paradigm.

Lozano et al. (2013) consider environmental education as something that should work on the basis of a unifying element of the entire curriculum and should be a paradigm of all courses. Annan-Diab & Molinari (2017) emphasize the need to link the environmentally oriented courses with mainstream teaching in order to prepare the individual for day-to-day decision-making concerning sustainability. Holm et al. (2017) described the relationship between the needs of the labor market for the green economy and the skills of school leavers in the Finnish environment. The results showed the need to supplement education at all levels in order to make the transition to a green economy possible.

The transdisciplinary and multidisciplinary approach in environmental education is an important accelerator of society's transformation (Lozano et al., 2013; Steiner & Posch, 2006). Case studies are intended to support a multidisciplinary and transdisciplinary approach in environmental education. The curriculum should be adapted to this form and the motivation of the employees involved should also be high (Steiner & Posch, 2006). Overall, it is necessary to experiment and

continuously monitor the positives and shortcomings in real time and constantly innovate the environmental education (Wiek et al., 2011).

The media and social networks also play an important role in an out-of-school form of education. Andresson & Öhman (2016) use young people's discussions on environmental issues on social networks as an input for their analysis. Their aim is to use this data to provide materials aiming to promote pluralism and a participatory approach to sustainability and environmental education. Important is the growing role of social networks alongside traditional media such as newspapers, magazines and television in the context of raising environmental awareness. (e.g. Ors, 2012; Gong et al., 2020). Environmental awareness can also be explained, for example, by the influence of the family (e.g. Grønhøj, 2012).

Research questions:

What role do students assign to environmental education during their studies?

What forms of out-of-school environmental education have they encountered?

What is the role of family and close friends in out-of-school environmental education?

Is there a difference between in-school and out-of-school knowledge?

2.3 Demand of companies for experts with environmental knowledge

Brekke & Nyborg (2008) address the ability of green companies to attract highly motivated employees through their corporate social responsibility strategy. In this case, the results showed that green companies can attract highly motivated and productive workers through their social responsibility. Comodi et al. (2019) work with companies' requirements for the expertise of graduates in the EU and Latin America. The results show that 70% of the companies surveyed would like to employ graduates with knowledge of renewable and sustainable forms of energy.

Research question:

How do students perceive their future employment in the labor market with regard to their environmental knowledge?

3 Methods

Theoretical sampling is typical for qualitative research. The file is not precisely characterized in advance and its scope is not specified. Surveys of rather smaller groups are common (Reichel, 2009). Data collection can be stopped when the researcher no longer learns anything new. Theoretical saturation occurs (Hendl, 2005; Reichel 2009).

The semi-structured interview was chosen as the main research method. There were predefined sub-areas of questions for semi-structured interview that were freely adapted during the interviews. A total of eight respondents participated. All respondents are students of the Faculty of Economics of the University of South Bohemia. They study the following fields of study: Structural policy of the EU and public management and Structural policy of the EU and rural development. These fields of study contain their syllabus subjects focused on environmental issues and sustainable development. Three of the students are studying for a bachelor's degree and five are studying for a master's degree. The gender distribution is as follows: two men, six women.

Due to the Covid 19 pandemic, interviews were conducted through online communication. The interviews took place in the spring of 2020. A combination of direct questioning using the snowball method was used.

4 Research results

The statements of the respondents were freely translated from Czech into English by the author. The results of the research were analyzed within the sub-topics that cover the issue of environmental education.

4.1 Ecological disaster

The approach to the inevitable ecological disaster towards which the planet Earth is heading as a result of the human behavior is very homogeneous among the respondents. Six out of eight respondents confirm the relationship between the variables: current developments – ecological disaster. The development is characterized as industrial. Respondents associate industry and its development with an ever-worsening situation. Furthermore, it is possible to follow up with the second phenomenon mentioned in the statements of the respondents – linearity. According to the respondents, current industrial development and economic growth can be understood in this way. Respondents also agree that an ecological disaster is inevitable. The difference can be found in the understanding of the time span within which this scenario will occur.

This comprises the basis for the statements of those respondents who do not believe in an inevitable environmental catastrophe. There is a minority of them in the examined sample. They agree that from the point of view of the time horizon, the ecological catastrophe is of little significance for today's society.

4.2 Sustainability

Seven out of eight respondents see the concept of sustainability as a means of avoiding environmental disaster. They see sustainability as a new direction that will change people's values and actions. They understand the role of natural capital which needs to be preserved for future generations, but at the same time underline that there still remains a need for development.

When asked whether the establishment of sustainable development is realistic, five respondents answered in the affirmative. Their statements intervened in topics such as the environmental management of companies, which is now widespread across industries. Furthermore, they underline the role of legislation and societal rules to establish sustainability. Related to this is environmental awareness, which has often been mentioned in connection with the transition to sustainability. Respondents who answered the interview question whether the establishment of sustainable development is realistic negatively base their reasons on a linear model of economic growth. Its dominance in today's world makes it difficult to apply the principles of sustainable development. According to them, it is a necessary step that must be preceded by a change in human values.

4.3 Environmental education

All respondents encountered environmental education while studying at university. This is mainly due to the content of the fields they studied. Five of them see environmental education as a unifying element that is part of a number of subjects. Furthermore, these subjects often encourage them to be further interested in the given topics outside the school environment. Six out of eight also commented on the absence of environmental topics at high schools, and some of them suggested further developing these topics earlier in the process of education, at lower levels of the system.

4.4 Out-of-school forms of education

Based on the interviews, the respondents encountered several forms of out-of-school education: publications and cultural events, family, close friends, social networks and the media. Respondents encountered these forms in various combinations. Five of them confirmed the role of publications and events for the general public. These are events that are held by various for-profit or non-profit organizations. They are often associated with a person or publication that is dealing with this issue. Related to this is the growing importance of the web and social networks, where five respondents also noticed environmental awareness. These include YouTube channels or social media initiatives that seek to reach the general public in this way. Six respondents experienced the role of the family in an out-of-school education and deem it crucial. According to them, the family provides basic information, for example on recycling and waste management, and thus creates the basic but key knowledge that is necessary for building the relationship between human and nature. Five respondents encountered the last form. It concerns the influence of close friends. Due to the fact that all respondents are university students from one faculty, their experience is quite similar. Mostly it is a group of university classmates who have a common interest in environmental topics. Within this close group, an intensive transfer of information on environmental issues can be observed.

4.5 Knowledge of environmental issues

All respondents believe that their knowledge of the environment can influence future economic development. According to them, human values and especially future job positions play an important role in this area. Respondents assigned to the knowledge acquired within the school system following characteristics/attributes: more scientific or based on the expertise of lecturers. Respondents then see the knowledge they acquire outside the school system as highly individual. In other words, there is a very significant individuality of each person who acquires such knowledge. They further emphasize that this knowledge is more difficult to acquire.

Half of the respondents also perceive the difference between this knowledge in terms of theory and practice. They characterize the knowledge acquired in the school system as theoretical, which must be supplemented by out-of-school knowledge, which is practical. The defined need for a combination of these sources of knowledge was confirmed by six respondents. They also underlined the role of the university and environmental education, which helps them to understand this knowledge and apply it in the future.

4.6 Demand of companies for experts with environmental knowledge

The answers of the respondents showed a different concept of the two types of companies. Independently, they divided these companies into two categories. The first category are companies which, according to the respondents, have a stable position in the market and are characterized by a low level of innovation. On the other hand, there are new modern green companies, often operating in new sectors such as the bioeconomy or applying the principles of the circular economy. According to the respondents, these companies are those that require experts with environmental knowledge. Virtually everyone addressed agreed on this statement. Companies are further characterized as follows. They often have a so-called green strategy or apply environmental management. They have an overview of the negative externalities they produce and try to partially or completely reduce them. Half of the respondents agreed that such a direction of the company is expensive and it is seen mostly in larger companies or companies that can afford it.

In conclusion, three respondents pointed out the discrepancy in the current labor market, which is caused by the fact that the offer of experts with environmental knowledge is rather an offer for the future. In their view, this discrepancy should change over time.

5 Discussion of results and conclusions

Respondents' statements were divided into several sub-topics. Environmental education was created on the basis of the awareness of the dangerous ecological disaster as well as of sustainable development as a tool to stop or slow down negative impacts. Similarly, this fact can be perceived by the interviewed students who are aware of the threat of ecological catastrophe and perceive sustainable development as a tool for changing current developments.

More than half of the students consider environmental education as a unifying element of the curriculum in accordance with the research of Lozano et al. (2013); Annan-Diab & Molinari (2017). Students also often criticized the absence of environmental education at lower levels of education. At the same time, it was empirically found that environmental education at this level of education has an impact as well (e. g. Hoang & Kato, 2016).

It is necessary to consider the importance of the finding that students respond to the out-of-school form of education. It is important that students understand its complementary relationship to the school form. The impact of social networks and media, which is often the subject of research and publications, has also been confirmed (e. g. Andresson & Öhman, 2016; Ors, 2012).

Subsequently, the research dealt directly with the environmental knowledge that students acquire during the education. The fact that all respondents believe that their acquired knowledge will influence future economic development can be considered very positive. Different perceptions of school and out-of-school environmental knowledge were found. This difference is related to the complementary perception of school and out-of-school forms of education.

With the growing interest of companies in the green economy or the circular economy, the demand for workers with environmental knowledge can be expected to increase (e.g. Brekke & Nyborg, 2008; Comodi et al., 2019).

Students are able to implement their environmental knowledge when working for modern companies that practice environmental management and have elements of green economy or circular economy in their strategies. They correctly combine their future applications with these companies. However, a small proportion of students see a mismatch in the labor market in the sense that their offer of environmental knowledge is rather an offer for the future. According to them, the labor market does not currently require experts to such an extent.

The results of the pilot survey showed how a group of economics students perceive environmental education. The survey provides a partially simplified but comprehensive framework for further research in this area. Interpreting the results into several sub-topics and outlining their interrelationships can be considered as the main contribution of this paper, which in the future may facilitate the creation of an extended and more sophisticated research.

Acknowledgement

References

Andresson, E. & Öhman, J. (2016). Young people's conversations about environmental and sustainability issues in social media. *Environmental Education Research.*

Annan-Diab, F. & Molinari, C. (2017). Interdisciplinarity: Practical approach to advancing education for sustainability and for the Sustainable Development Goals. *The International Journal of Management Education, 15,* 73-83. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S1472811717300939

Brekke, K. A. & Nyborg, K. (2008). Attracting responsible employees: Green production as labor market screening. *Resource and Energy Economics*, 30, 509–526

Cato, M. S. (2009) *Green Economics. An Introduction to Theory, Policy and Practice*. London: Earthscan.

Comodi, G., Cioccolanti, L., Makhamov, K., Penlington, R., Lapuerta, M., Hernandez, J. J., Lora, E. D. S., Venturini, O., Cobas, V. R. M., Palacio, J. C. E., Freires, F. G. M., Torres, E. A., da Silva, J. A. M., Kafarov, V., Velasco, J. L. C., Martinez, J. E. S., Salcedo, G. Y. L., Suárez, I. D. S., Jaen, R. L., Gonzales, J. I., Fernandez, M., Faure, L. J. G., Oliva-Merencio, D., Reyes, I. P., Salas, J. M. & Ramírez, C. C. (2019). Analysis of labour market needs for engineers with enhanced knowledge in renewable energy in some European and Latin-American Countries. *Energy Procedia,* 158, 1135-1140.

Ellen Macarthur Foundation. (2013). *Towards the Circular Economy.* Retrieved from: https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf

Environmental Management Group & UN. (2011). *Working towards a Balanced and Inclusive Green Economy*.

Erdogan, N. (2009). Testing the new ecological paradigm scale: Turkish case. *African Journal of Agricultural Research*, 4(10), 1023-1031. Retrieved from: http://academicjournals.org/article/article1380883767_Erdogan%202.pdf

European Commission. (2020). *Czech Republic: National Reforms in School Education*. Retrieved from: https://eacea.ec.europa.eu/national-policies/eurydice/content/national-reforms-school-education-17_en

Gong, X., Zhang, J., Zhang, H., Cheng, M., Wang, F. & Yu, N. (2020). Internet use encourages pro-environmental behavior: Evidence from China, *Journal of Cleaner Production*, 256.

Government of the Czech Republic. (2015). *Příloha č. 2 k zápisu z 2. zasedání Výboru pro vzdělávání k udržitelnému rozvoji.* Retrieved from: https://www.vlada.cz/assets/ppov/udrzitelny-rozvoj/vybory-rvur/Zapis_VpVUR_15-01-13_priloha-c--2_usneseni-a-stanovisko-k-DZ.pdf

Grønhøj, A. & Thøgersen, J. (2012). Action speaks louder than words: The effect of personal attitudes and family norms on adolescents' pro-environmental behaviour, *Journal of Economic Psychology*, 33: 292-302.

Hendl, J. (2005). *Kvalitativní výzkum: základní teorie, metody a aplikace*. Praha: Portál.

Holm, T., Vennervirta, P., Pöykkö, T., Hämeenoja, E. & Teirasvuo, N. (2017). Identification of Skills Needed for Central Areas of Green and Low-Carbon Economy, for the Needs of Labor Market, in Finland. *European Journal of Sustainable Development Research*, 5.

Hoang, T. T. P. & Kato, T. (2016). Measuring the effect of environmental education for sustainable development at elementary schools: A case study in Da Nang city, Vietnam. *Sustainable Environment Research* 26, 274-286.

Lieder, M. & Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. *Journal of Cleaner Production* 115(1), 36-51. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0959652615018661

Lozano, R., Lukman, R., Lozano, J. F., Huisingh, D. & Lambrechts, W. (2013). Declarations for sustainability in higher education: becoming better leaders, through addressing the university system. *Journal of Cleaner Production,* 48, 10-19. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0959652611003775?via%3Dihub

Meadows, D. H. & Club of Rome. (1972). *The Limits to growth: A report for the Club of Rome's project on the predicament of mankind*. New York: Universe Books.

Ministry of the Environment of the Czech Republic. (2008). *Strategie vzdělávání pro udržitelný rozvoj ČR 2008-2015*. Retrieved from: https://www.mzp.cz/C1257458002F0DC7/cz/news_tz080711strategie_VUR/$FILE/Strategie_VUR_CR.pdf

Ors, F. (2012). Environmental education and the role of media in environmental education in Turkey. *Procedia – Social and Behavioral Sciences* 46, 1339-1342.

Reichel, J. (2009). *Kapitoly metodologie sociálních výzkumů*. Praha: Grada.

Sharma, U. & Kelly, M. (2014) Students' perceptions of education for sustainable development in the accounting and business curriculum at a business school in New Zealand. *Meditari Accountancy Research*, 22 (2), 130-148. Retrieved from: https://doi.org/10.1108/MEDAR-12-2012-0042

Steiner, G. & Posch, A. (2006). Higher education for sustainability by means of transdisciplinary case studies: an innovative approach for solving complex, real-world problems. *Journal of Cleaner Production, 14,* 877-890. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0959652606000242

UNESCO`s Commitment to Sustainable Development. (2011). *From Green Economies to Green Societies*. Retrieved from: https://unesdoc.unesco.org/ark:/48223/pf0000213311

Wiek, A., Withycombe, L. & Redman, C. L. (2011). Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science, 6(2),* 203-218.

World Commission on Environment and Development. (1987). *Report of the World Commission on Environment and Development: Our Common Future*. Retrieved from: http://www.un-documents.net/our-common-future.pdf

Zsóka, A., Szerényi, Z. M., Széchy, A. & Kocsis, T. (2013). Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior and everyday pro-environmental activities of Hungarian high school and university students. *Journal of Cleaner Production* 48, 126-138.

Bioeconomy, sustainability and ecological economics' paradigm

Eva Cudlínová[1], Nikola Sagapova[2], Miloslav Lapka[3]

Abstract: Bioeconomy is not itself directly sustainable or unsustainable, the outcome seems to depend on which conditions are supposed to be applied. From the perspective of sustainability paradigm as same as the ecological economy one, there are important factors which determine the character of economy. It is a role of time, scale and role of market mechanism in a specific type of economic development. It means a long perspective based decisions, preference of local solutions and limited role of free market in a special case of environmental management.

Our paper will focus on the analysis testing how each of these factors mentioned above will fit into the political definition of bioeconomy and relevant documents delivered by OECD, US and EU. A potential danger of universal solution offered by bioeconomy is also a part of our research question.

There is not just one definition of bioeconomy, we could find different views in political documents and research articles. In research articles we could find the 'bioeconomy' (BE) and the 'bio-based economy'(BBE). The former is focused on converting raw material into value-added products, with biotechnology as a conversion technology. Thus the BE concept is technology-driven whereas the BBE concept is resource-driven in that it presupposes a transition from a fossil-based to a bio-based economy. There exists also bio-ecology vision of bioeconomy that highlights the importance of ecological processes that optimize the use of energy and nutrients, promote biodiversity, and avoid monocultures and soil degradation.

Our analysis is based on opinion that there does not exist universal solution for our future. Whatever and whenever something is presented as the global solution we must be very cautious. Global solution based on one dimensional change as for instance on bio-based resources is a very weak proposal. The need of diversity is seen from different approaches even in one type to greener future - we could speak about green economy, circular economy, bioeconomy and try to discuss their mutual relationship.

Bioeconomy represents just one part of the future mosaic of alternatives enabling us to change the mainstream growth paradigm. If it will be applied locally and differentially adapted to diverse local condition it could play a role leading to a more sustainable future.

Keywords: Bioeconomy, bio-based economy, sustainability, time, space, scale
JEL Classification: A13, Q56

1 Introduction

Bioeconomy promises to solve the main global changes such as climate changes, world hunger and poverty or resource depletion. Speaking about these challenges we must mention that there are not new ones. We are witness that main global challenges we are exposed at present are more or less the same one which appeared at the 70th of twentieth century. Those most crucial are mentioned above. As an example of latest global challenge discourse could serve 8 Millennium development goals (MDGs): and their transformation to 17 Sustainable development goals (SDGs).

It seems that, challenges are not changing very fast, but the urgency to deal with them is increasing, at least in the last few decades. What is changing more rapidly are offered solutions and social or political prescriptions how to deal with challenges as to solve them.

First new paradigm which took place on international scene was the idea of sustainable development (SD) that appeared at late 80th of last century (World Commission,1987). Sustainable development represents a new paradigm opposed to paradigm of economic growth, which was popular from the end of second world war up nowadays. The most famous

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definition of sustainable development "The idea that human societies must live and meet their needs without compromising the ability of future generations to meet their own needs" was presented in publication Our Common Future (Commission Report 1987). It highlighted the fact that current patterns of resource consumption and environmental degradation could not continue as they were and that in order to reduce the problem facing us, society must act as a whole. In fact, SD is a mixture of scientific knowledge system, environmental values, ideology, social actions, moral attitudes, qualitative patterns as well as quantitative indicators and many other, often ambivalent, social constructions of the relationships between man and nature. The main features of sustainability are time dimension and justice between a generations and among nations. That must be sustained within the limits of our planet.

A crucial part of sustainable development seems to be ecological economics which represents an economic background that could be used for practical application of sustainable principles. Ecological economy is almost an inherent part of sustainable development principle in terms of its economic dimension. Ecological economics is a relatively young scientific discipline, the International Society for Environmental Economics (ISEE) was founded in 1989 and in 1990 the first issue of the journal "Ecological Economics" was published. The name of ecological economics was influenced by the composition of the scientific community who was present at the birth of this discipline. In connection with the issue of sustainability of life on our planet, just ecology and economics seemed to be the main disciplines which could solve the problem.

Ecological economics supports the definition of so called strong sustainability, when to maintain the sustainable life on our planet is not enough to keep the total amount of capital for future generations, it is necessary that the amount of natural capital was not reduced (Neumayer, 1999). This requirement follows logically from the principles of ecological economics, according to which there is no absolute substitution of resources, but only their complementarities, especially between the natural and human-created capital. The main representatives of this current economic paradigm is Herman Daly, Mick Common, Robert Costanza, Sylvie Faucheux, Carl Folke, John Gowdy, AnnMari Jansson, Joan Martinez-Alier, Charles Perrings, John Proops, Clive Spash and Peter Soderbaum. We named at least some of a large number of prominent scientific personalities

From the 2012 the concept of bioeconomy started to be supported in political documents o EU and US (European Commission 2012, The White House 2012) These documents do not deal with any kind of serious comparison or analyses of ecological economics, green economy and bioeconomy. There is a broad range of political definitions as same as scientific definition of bio-economy. It is not clear whether it is a new branch of economics, a new economic paradigm or just a specific part of the green economy based on biological resources and the application of biotechnology (Maciej-czak 2015).

Bioeconomy and sustainability seems to be tight connected. There is a half dozens of reasons considered bioeconomy as a tool for achievement sustainability. Bioeconomy is bio-based. It means renewable sources for production as well as renewable sources of energy. Bioeconomy is circular-based. Bioeconomy copies natural cycles. Then, effectivity of bioeconomy is effectivity of natural processes. Yesterday's unwanted wastes are becoming today's perspective resources. Bioeconomy is challenge for global implementation of modern biotechnology. Bioeconomy helps development of rural areas. Bioeconomy is right answer on global impending challenges like global climate changes and global environmental pollution by industry and unsustainable consumerism. Bioeconomy within political documents mentioned above seems to be universal solution for the main global challenges.

The trap of at first glance complex solutions lies in their expected universal validity and load of our wishes and expectations. In our opinion, this is the case of bioeconomy. too. Bioeconomy itself is not internally tight with sustainability or unsustainability. Bioeconomy is in fact one of the economic modern tool and its support of sustainability or unsustainability depends on which social economic conditions are supposed to be applied.

Universalism indicates a concept, or theory, that is universally applied or applicable, i.e. valid for all relevant things in any place and at any time. (Siegel, 2002). This concept belongs to philosophy of science, to epistemology and methodology. Economy used the universalism in its categories such "consumer" or "resource" or "distribution of sources and justice". Policy based on those concept wants to achieve universal applicability. Bioeconomy is based on the same concept mainly in political documents.

Bioeconomy is dealing with a belief in one fundamental truth - important characteristic of Universalism. On the other hand, bioeconomy is social and cultural construction. In fact, Universalists accept the Western Modern Science is culturally constructed. "In particular, universalists happily agree that scientific theories are human constructions in the sense that they are conceived, formulated, articulated, and revised by human scientists, typically over a considerable period of time by large numbers of them." (Siegel, 2007, p. 6).

Universalism gives the idea of bieconomy great advantage of global sharing universal value chain. The limits of its universal application shows the heterogeneity of social and natural ecosystems and the need of the respect to regional and local indigenous sources and patterns.

The problem of limits of universalism in bioeconomy attracts attention, but it is not mainstream in the discourse in comparison with perspective of biotechnology application and perspective of bioeconomy markets in the near future. Richardson (2012) shows the political influence in the incorporation of bioeconomy in transformation to bio-based energy, Pätäri et al. (2017) shows the role of culture, nations and individual knowledge among the students in terms of acceptation of sustainable forest industry. Both are representing the critical point of view on strong universalism of bio-economy value chain, on the other hand there are not rejection the idea of bioeconomy as such.

Our analysis is based on opinion that there does not exist universal solution for our future. Whatever and whenever something is presented as the global solution we must be very cautious. Global solution based on one dimensional change as for instance on bio-based resources is a very weak proposal. The need of diversity is seen from different approaches even in one type to greener future - we could speak about green economy, circular economy, bioeconomy and try to discuss their mutual relationship.

2 Goals and Methods

The aim of the paper is comparison of three ~~political~~ definitions of the bioeconomy within three political documents delivered by OECD, US and EU in terms of the role of time, space and market, main factors characterising way of economic development. How are these three dimensions - crucial for sustainable development - taken into account and perceived in the definitions of OECD (2009), US (The White House, 2012), and EC (2011)? What about potential danger of universal solution offered by bioeconomy?

The new economic paradigm of ecological economics is normative. It does not describe the world as it is, but what it should be. It responds to the change that occurred in the situation when the limit of economic growth is not technological progress and man-made capital, but the limits are natural resources and ecosystem services.

Although the paradigm of sustainable development has been the subject of criticism, sustainability as a principle is mentioned in all later models and solutions that seeks to replace it. We can speak about the green economy and green growth, and currently the bioeconomy and the circular economy. All these terms serve like representatives of one big family of an alternative green way of our future. Sustainability is added like a sticker to all of these newly emerged approaches of economic practice.

Why we choose three main characteristics: the role of time, scale and market forces?

These characteristics are based on the ecological economic approach. The main characteristics of this approach are specific interpretation of the role of market forces; the scale of economic decision; and the growth versus development in a long-time perspective.

Market:

Market forces are not totally rejected, but play only a limited role in a certain area of the economics. They should not have a decisive say matters relating to the environment or social justice. Political decision-making should follow next principle: the policy should strive for the maximum state control at the macro-level. At the same time, it should provide the maximum degree of freedom at the micro-level (Daly and Farley, 2004).

Scale:

In terms of scale ecological economics tries to solve the question of scale of economy within the carrying capacity of our planet. Its paradigm is changing the approach to the definition of efficiency, the optimal allocation and the scale in which the economy moves. It focuses primarily on macroeconomics. It does not look for the optimal allocation and use of natural resources within the society and for society, but looking for the optimal dimension of the economy, considering the viable capacity of our planet. Its scale is global, because global problems require global solutions.

Time:

Ecological economics generally assumes a longer time horizon. It pays more attention to cause-effect chains, interactions and feedback between natural and human-economic systems. The concept of ―co-evolution is in this respect relevant, reflecting a mutual influence of economic and environmental systems. Ecological economists see systems, including markets, as adaptive rather than optimal in the neoclassical sense. In this sense, ecological economics inherently entails an evolutionary dimensionThe question of growth is also a natural part of our analyses. (Ecological-economics, 2013)

We compared three political definitions of the bioeconomy and three political documents delivered by OECD, US and EU in terms of the interpretation of time, space and market.

3 Analyses and Results

There is not just one definition of bioeconomy, we could find different views in political documents and research articles. OECD documents define a bioeconomy as "transforming life science knowledge into new, sustainable, eco-efficient and competitive products" (OECD, 2009), whereas European Commission documents refers to "a bio-based economy that integrates the full range of natural and renewable biological resources – land and sea resources, biodiversity and biological materials (plant, animal and microbial), through to the processing and the consumption of these bio-resources" (EC, 2011). The USA bio-economy blueprint determines that "the bio-economy is one based on the use of research and innovation in the biological sciences to create economic activity and public benefit". (The White House 2012).

Table 1 presents the inclusion of these factors within the political definitions of the bioeconomy.

Table 1 The role of time, space and market in three political bioeconomy definitions

Factor / definition	OECD	US	EU
Time	sustainable products	-	renewable resources
Space	-	-	land and sea resources
Market	new, eco-efficient, competitive products	economic activity, public benefit	processing and consumption of resources

Source: OECD (2009), The White House (2012), EC (2011), own processing

Taking a closer look into the political documents, the role of time, space and market is visible in broader context in a more detailed matter. Some of the factors which are not included in definitions themselves are later mentioned in texts of these documents.

The OECD focuses on technology approach, where biotechnology applications are core principle for bioeconomy which invents, develops and produces different goods through use of biological processes and products. Amongst the expected benefits improvements in health, productivity boost, and enhancing environmental sustainability are mentioned. It estimated biotechnological development to 2015, and it presents fictional scenarios to 2030 to illustrate the interplay between policy choices and technological advances in shaping the bioeconomy. The impact of bioeconomy on GDP in 2030 will be result of governance, the level of international cooperation, and the competitiveness of biotechnological innovations. It indicates that the bioeconomy will be global, while the main markets considering the primary production could be in developing countries, and it expects the creation of large markets for biofuels. Collaborative markets to share knowledge, reduce research costs and integrator models shall create and maintain markets. Sustainable development and economic growth decoupled from environmental degradation needs to reduce environmental damage, and repair degraded soil, water and air. Biotechnology is recognized as a tool to support sustainable development through environmental efficiency of primary production and industrial processing with potential ability to repair degraded soil and water.

As for the EU bioeconomy policy document, it stresses sustainability. Bioeconomy is therefore presented as the potential pathway to enable environmental sustainability of primary production as well as sustainable resource use, resulting in welfare and wellbeing of EU´s citizens considering even the prosperity of future generations. A key role in European bioeconomy play rural, coastal and industrial areas managing resources sustainably with respect not only to their use, but also to ensure healthy ecosystems. Developing smart sustainable farming, fisheries, aquacultures and small-scale local bio refineries operating in regional dimension will help to future development of rural and coastal areas contributing to the local and regional economy creating job opportunities in these areas. Although there is cooperation and coherent policy of EU, setting up regional and national bioeconomy strategies is supported. Bioeconomy is a key element for sustainable smart and green economic growth, based on sustainable production and consumption enhancing higher yields of primary production, while decoupling environmental degradation and loss of ecosystem services without compromising food security or distorting markets in favour of energy use. Opening new and diversified markets in bio-products

and better communication is needed to encourage participatory models for engaging citizens and end-users who shall make responsible and informed consumer choices to live healthy and sustainable lifestyle.

US policy document presents bioeconomy as a large and rapidly growing segment of technology-fuelled economy with potential to bring economic growth as many other societal benefits. The development of US bioeconomy is perceived as the develoment of genetic engineering, DNA sequencing, and automated manipulations of biomolecules combined with future expansion of technologies such as synthetic biology, proteomics, and bioinformatics. Bioeconomy presents a way to create jobs in rural America where bioproducts are manufactured and bioeconomy will generate new drugs, higher-yielding food crops, biofuels, biobased chemicals and materials. Federal governments intend to support and prioritize procurement of cost-effective biobased and sustainable products to drive the creation and growth of new bioeconomy markets. An increased focus on entrepreneurship, science, regulations and technology can help with application and delivering the products into markets. Federal agencies should provide incentives to catalyse public-private partnerships and collaboration where sharing information shall generate transformative outcomes.

4 Conclusions

We may conclude that while OECD highlights the role of biotechnology within the concept of bioeconomy, EU stresses out sustainability, while US points out the research in novel biology technologies for future development of sustainable bioeconomy that generates various products, economic growth and many social benefits. The EU and US policy documents rely on rural areas of Europe and America, while the approach of OECD relies on global areas and mainly developing countries to produce biomass and manufacture different bioproducts. The EU considers to open new markets for bioproducts generated from sustainably processed renewable resources, where responsible well-informed consumers do the right choices to achieve healthy and sustainable lifestyle. The OECD expects large markets for biofuels, as well as collaborative markets with information sharing to maintain markets providing economic growth with the potential of biotechnologies to repair degraded environments.

Similar approach analyzing bioeconomy definitions could be found in FAO, (2018) in part Bioeconomy definitions and strategies (p. 43). There are sectors included into bioeconomy strategies in EU and other countries as well as bioeconomical economy priorities for countries with high and low domestic biomass. Nearly to our approach are sustainable indicators in Italian bioeconomy strategy, (p. 48), but not based on general characteristic of ecological economy time, space and market mentioned above.

As regards the threat of universalism, this topic is not usually tied with bioeconomy. Anyway, some studies shows the unsustainability of the trust to universal solution regards relationships between society and environment (Norgaard, Kallis, 2011): Petit, Vivien, 2016).

There is a hidden real threat of decoupling growth and sustainability. It is just a small step to exclude green from growth or put growth alone without the requirement of sustainable development. Without serious scientific analyses of the main presumptions and basic principles of these different alternatives of bioeconomy mentioned in policy documents analysed above, it could be easily made a radical step back to the economic growth under the political flag of green development and sustainability.

Bioeconomy represents just one part of the future mosaic of alternatives enabling us to change the mainstream growth paradigm. If it will be applied locally and differentially adapted to diverse local condition it could play a role leading to a more sustainable future.

References

Ecological-economics (2013): Retrieved from: http://www.ejolt.org/2013/02/ecological-economics/
FAO, (2018): Assessing the contribution of bioeconomy to countries' economy. A brief review of national frameworks. Rome.
Ford, Liz (2014). Campaigners Welcome 'Milestone' Agreement at UN Gender Equality Talks. *The Guardian*. Retrieved from: https://www.theguardian.com/global-development/2014/mar/23/campaigners-welcome-agreement-un-gender-csw-talks

Daly, H. E. & Farley, J. (2004): Ecological Economics: Principles and Applications. Washington, Covelo, London: Island Press.

European Commission (2011) 'Bio-based economy in Europe: state of play and future potential - Part 2 Summary of the position papers received in response of the European Commission's Public on-line consultation'. Retrieved from: ec.europa.eu/research/consultations/bioeconomy/bio-based-economy-for-europe-part2.pdf.

Maciejczak, M. (2015). How to Analyze Bioeconomy? *Roczniki Naukowe,* 17(6), 165-171.

Neuymayer, E. (1999). Weak versus Strong Sustainability - Exploring the Limits of Two Opposing Paradigms. Cheltenham, Northampton: Edward Eglar.

Norgaard R.B., Kallis G. (2011): "Coevolutionary Contradictions: Prospects for A Research Programme on Social and Environmental Change", Geografiska Annaler: Series B, 93 (4), pp. 289-300.

Pätäri, S., Arminen, H., Albareda, L., Puumalainen, K. & Toppinen, A. (2017). A – Student values and perceptions of corporate social responsibility in the forest industry on the road to a bioeconomy. *Forest Policy and Economics*, 85(1), 201-215.

Petit, O, Vivien. F. D. (2016): When economists and ecologists meet on Ecological Economics: two science paths around two interdisciplinary concepts . 11th biennal Conference of the European Society for Ecological Economics, University of Leeds, Jun 2015, Leeds, United Kingdom.Retrieved from: https://halshs.archives-ouvertes.fr/halshs-01249774/document

Siegel, H., (2002). Multiculturalism, Universalism, and Science Education: In Search of Common Ground. *Science Education*, 86(6), 803 – 820.

Richardson, B. (2012). From a Fossil-Fuel to a Biobased Economy: The Politics of Industrial Biotechnology. *Environment and Planning C: Government and Policy*, 30(2), 282-296.

OECD (2009). The Bioeconomy to 2030 Designing A Policy Agenda: Main Findings and Policy Conclusions. OECD International Futures Project. Retrieved from: www.oecd.org/futures/long-termtechnologicalsocietalchallenges/42837897.pdf

The White House (2012). National Bioeconomy Blueprint. Washington: White House.

UN (2000). General Assembly Resolution 55/2 of 8 September 2000. Retrieved from: *https://en.wikipedia.org/wiki/United_Nations_Millennium_Declaration#cite_note-FOOTNOTEUN2000-1*

UN (2015). Resolution adopted by the General Assembly on 25 September 2015, Transforming our world: the 2030 Agenda for Sustainable Development (A/RES/70/1). Retrieved from: *https://www.eea.europa.eu/policy-documents/resolution-adopted-by-the-general*

UNEP (2011). Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication – A Synthesis for Policy Makers'. Retrieved from: https://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=126&menu=35

United Nations (2012). Report of the United Nations Conference on Sustainable Development. New York: United Nations.

World Commission on Environment and Development (1987). Our Common Future: Report of the World Commission on Environment and Development. 'Brundtland Report'. Oxford: Oxford University Press.

New paradigm of circular economy

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Abstract: The paper deals with a comparison of several theoretical directions in economics of the last decades in terms of their potential to become a significant or directly key stream of economic thinking. The work analyzes the so-called *new economy*, at least in part the economic directions dealing with the response to the financial crisis 2007, which for the purposes of the work we call collectively alternative economic directions, and finally the *creative economy* all on the first, on the the second is a key subject of research interest - the *circular economy*. The thesis concludes that the first group of theoretical directions responds to a greater or lesser extent to specific stimuli and to specific economic and social events, or to the development of technology and the associated change in the field of cooperation and other parameters of reality. These thoughts try then to explain these phenomena theoretically. In the case of the *circular economy*, however, it is a direction that responds to the change of social and political paradigms and to the shift of the general public's view of the meaning of economic activities, especially at the business and corporate level (in the production chain). From this point of view, if the paradigm shift is permanent or long-lasting, a truly significant chance does not only change economic practice, but also take over or fundamentally influence the main line of thought in the field of economics.

1 Introduction

In recent decades, trends have emerged several times that appeared to be a revolution in either economic science or a revolution in economic practice with the potential to cause earthquakes in theory. These trends had ambitions not to be an opinion revolution, but a system revolution, which, according to its pioneers, should completely change the view of the whole economic issue. In the end, it always turned out that the mainstream of economic thinking was ultimately not skewed and only absorbed some as yet unthoughtful views on the matter or unexplored issues. It also turned out that economic life continued to revolve around the same things. Perhaps only with the difference that new possibilities, new perspectives, new approaches have been added to the used procedures or, for example, control mechanisms.

We can certainly name as a strong example a significant wave of thought from the turn of the twentieth and twenty-first century, which was then called new economy or new economics and which included, for example, the rise of so-called soft data, ie indicators unrelated to financial statements and financial results of corporations. .

We could also go back to 2009 and 2010, when the very fashionable and socially successful trends in the alternative economy associated with movements such as Occupy Wall Street emerged. It is worth noting here that on their journalistic and political level, the ideas of the representatives of alternative economic experiments were often connected with the so-called conspiracy theories. Of course, these are not theories in the scientific sense of the word, but this is secondary at this level.

From a somewhat different point of view, we could then cite as a fundamentally related case a wave of interest in the so-called creative economics and the associated methods of informal management and many other stimuli. It should not be forgotten that, on a theoretical level, this line of thinking has been defined in the so-called creative economy.

Now we live again in times when circular economics and circular economics gain great influence in theory and in practice.

The legitimate question, therefore, is whether circular economics and its theoretical reasoning and thinking (circular economy) awaits a similar fate as the new economy, alternative schools of thought in economics or creative economy. That is, after a few years of strong interest, these concepts will not go out and be postponed as a temporary historical

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story, which only partially enriched economic theory in detail or in specific views and was reflected to a greater or lesser extent in economic practice and politics.

2 Methods and basic comparison of theories

In order to be able to answer the above-mentioned question, to what extent the circular economy will become a new long-term and significant or even predominant stream of economic thought, whether it will be constituted as an independent theory, it is necessary to formulate the circular economy itself as a stream of economic thinking with its own specific questions and with its own procedures, with defined goals, with a defined relation to political decision-making processes and, above all, with a defined relation to the concept of market and market function. Furthermore, it will be necessary to assess the extent to which the economic and political environment has changed, as well as the extent to which socially accepted paradigm has changed and whether the circular economy is not the answer of economic science to these processes. If this proves possible, it is necessary to analytically describe the differences between the stream of thought represented by the circular economy and the already mentioned historical episodes of the new economy, alternative directions and creative economy. From the principle of the matter, this difference seems to lie in the very basis and perspective of economic issues.

Both the new economy and the creative economy examined certain ongoing phenomena (it can be said straightforwardly that they examined phenomena called nec economics and creative economics), drawing certain theoretical conclusions from their observations, which we can say were very far-reaching. The ideas of alternative directions in the economy responded to the financial crisis of 2007 and 2008 as well as the resulting economic crisis. So it was a response to a truly deep shock caused by the long-growing imbalance that has accumulated in the financial sector of the economy - to some extent it can be said that these currents of thought were "finding the culprits" and ways to "punish" them.[3]

In this chapter, the work will first deal very briefly with the scientific methods used, then the analysis of some features of the mentioned theories, which will be compared with each other. Attention will also be paid to the development of prevailing paradigms, as the real economy and theories also necessarily respond to the environment created by social development and political decisions. Their relationship with the circular economy will then be dealt with in the following chapter.

2.1 Methods

The work will be based on a comparison of some features of the above theories. Based on this comparison, conclusions will be drawn about the similarity or, on the contrary, the nature of individual theories and related economic trends, while decisive attention will be paid to the circular economy. The compared features will be determined on the basis of an analysis of the development of individual theories, and to some extent on the basis of an analysis of the course of "loss" of the influence of these theories.

2.2 New economy and new economics

So called *new economy*[4] had a significant influence on economic thinking, especially in the second half of the 1990s and at the beginning of our century. If we simplify the problem very much, then it can be said that it was based on two relatively different trends. The first was the dynamic growth of the impact of technological changes, especially the mass use of computer technology and the development of communication networks (including, but not limited to, the Internet, intranet) on economic relations and cooperation ties. The second was the belief in the gradual decline in the importance of traditional financial indicators as an optimal way of assessing performance and, above all, the outlook for companies. As part of new economy considerations, the trend of replacing hard data with new soft indicators intensified, which was primarily innovation capacity, the speed of the innovation cycle, the introduction of new technologies and the like.[5]

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[3] More to this Kislingerová (2009).

[4] In English, the term new economy is used for the whole area of discussions on this topic in the overwhelming majority of cases, even when it would be more appropriate to distinguish between new economics, but it is difficult to do anything retrospectively with this conceptual weight. However, because this distinction is relatively important for our topic in many cases, we consistently stick to the distinction between the two concepts, ie the structured use of new economy and new economics, even if the current scientific text on this topic would work only with the term new economy and differentiation. whether it is a theoretical or practical level would be left to the context.

[5] In general, within the economy, hard data are measurable financial results of companies, while soft data are referred to as intuitive, difficult to measure conclusions or data. Usually, these are not, in fact, even data, but rather numerical or otherwise expressed evaluation results. A good example is the difference between the reading of a periodical (ie how many people get one copy of a newspaper, for example, and get interested in it to some extent), which is a soft figure, and the actual number of copies sold (even better supplemented by the total number of copies produced), which is a hard indicator.

In this context, it would certainly be extremely interesting to examine the relationship between the constitution and strengthening of the influence of the new economy and the so-called dot-com bubble.[6] If we want to define this investment fever very simply, then during a truly extraordinarily dynamic increase in Internet use, the market capitalization of many companies grew, their real financial results were more than poor, but the market valued primarily their opportunities in the emerging market. a large future profit potential was expected. Hard data, such as profit and the actual development of sales, were perceived as insignificant in the sector, an important element was technological innovation and, above all, the development of market potential. At the same time, at the end of the 1990s, the Fed pursued a policy of low interest rates, which led to a high availability of investment capital. Another influence was the fear of complications associated with the end of 1999 and the transition to the new year (2000), which, however, turned out to be odd.[7] When the Fed announced in early 2000 a departure from the low-rate strategy and, conversely, its growth, it turned out that Y2K had far from anticipated problems and also lost the high costs of managing it during 1999, a bubble dramatic and for many investors. tragic circumstances during February and March collapsed.[8]

It is worth noting that at the same time, a new phase of globalization was taking place very intensively and there were dramatic changes in world trade. As a consequence the WTO was established in 1995[9], former GATT[10] supplemented by an institutional component (GATT was a multilateral agreement modified and deepened in individual negotiating rounds, while its phases are referred to as, for example, GATT 47 or GATT 94, the WTO is an institution with member states). The emergence of the WTO, the gradual rapprochement of China and a number of developing countries with the GATT and later the WTO and many other events have not been particularly highlighted and examined in the new economy, but rather only as new facts and to some extent new paradigms. It could almost be said that there was some confusion of cause and effect and mixing of the effects of relatively different events and their only very insufficient analysis..[11] In any case, the theoretical discussions associated with the new economy and the attempt to constitute the new economy as a new prevailing ideological stream in economic thought have greatly contributed to the research of issues related to inflation and productivity[12] and how the measurement of both coped with the effects of technological change. Some neglect of the impact of these changes on globalization tendencies has led to some research - for example, the interpretation of structural changes within the US economy has not been sufficiently enriched by examining the change in import structure and especially the price structure of imports compared to previous domestic production (lower productivity imports).It is thus clear that the new economy, in the sense of science, reacted primarily to the existence of a new phenomenon, which was commonly called new economics. For theorists of this direction, this phenomenon was primarily the rise of information technology, which actually began in the deep eighties, but manifested itself particularly strongly in the second half of the nineties as computers began to connect to networks, how dynamically increased the possibility of transferring information from place to place, and especially as the possibilities of continuous communication of more entities in real time increased.[13] New economy theorists derived from network arrangements and new business models the existence of a structural change in cooperative economic ties. Only secondarily did it get to the issues of globalization and related events.

The new economy has never freed itself from its relatively narrow base on which it was built, namely to examine the effects of a particular set of phenomena related to computerization and later digitization. Interest in this trend thus began

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[6] The dot-com bubble or dot-com boom is a period limited to the years 1996 to 2001.

[7] This problem is usually abbreviated *Y2K* (*year2kilo*, where kilo is used in the sense of thousand).

[8] For example shares of *Yahoo.com* had dropped from 200 dollar per share to 12 dollar per share.

[9] *World Trade Organisation*

[10] *General Agreement on Tariffs and Trade*

[11] In the Czech environment, these events were reflected in the discussion by Václav Klaus (2000) versus Jiří Zlatuška (2000) and possibly Jiří Hlavenka (2000). In this discussion, it was primarily a question of whether information technology fundamentally changes the economy as a system or whether it is a change of mechanisms (for example, trading, business models), but while maintaining the original ground plan of the economic system as such. Václav Klaus took the view that information technology is to some extent a significant change, but not interfering with basic economic relations. According to Jiří Zlatuška, this development was so fundamental that its effects will be reflected in elementary economic relations and mechanisms and in the very functioning of cooperation between economic entities. At the same time, however, Zlatuška and Jiří Hlavenka did not question the persistence of the existence of basic economic and political relations in the sense of preserving the ownership-cooperative system. However, the latter emphasized the impact of technological change on the economic structure and the share of individual sectors in the whole. Of course, the discussion also had deeper economic moments - for example, the question of explaining the situation that arose in the second half of the 1990s in the United States, when a period of low inflation at low rates lasted for a relatively long time and relatively robust economic growth. This was difficult for the economic theory of the time to interpret, but from the point of view of the new economy it was a natural part of the technological shock and the result of structural change within the economy. In similar debates, the issue of the need to change the view of labor productivity and other economic parameters, the development of which was much more difficult to measure and also interpret in the new technological environment, was also addressed.

[12] Oliner et al. (2007)

[13] It is no coincidence, then, that other concepts that emerged in connection with the new economy and new economics were network economics, digital economy, knowledge economy and others.

to decline quite clearly at the moment when the phenomenon was first described and at least economically researched in its foundations, and secondly, especially when the main currents of economics began to be carefully interested in this set of phenomena and analyzed. these facts from their ideological starting points and by means of their methodological procedures.[14]

2.3 Creative economy, creative industries and creative class

As interesting as it would be interesting or amusing to pay at least some attention to the alternative directions of economic theory responding to the financial crisis, it would take disproportionate space. It will therefore be possible to suffice with the statement that all these outbursts of thought were, firstly, a response to the very specific crisis of 2007 and the following years, and secondly, to one degree or another, they followed Marxism, neo-Marxism,[15] corporatism and other trends that were considered hopelessly dead just a few months before the crisis.

Although it cannot be said that neo-Marxism has lost its influence in the economy since Occupy Wall Street, the alternative economic trends associated with this movement have been completely defeated, at least on a theoretical and scientific level, and have no real weight. Therefore, creative economy will be a more interesting phenomenon,[16] which appears in various forms in economic discussions and to some extent follows the fate of the new economy - it gradually becomes a fixed (however partial) part of the main currents of thought.

The principle of creative economy is the belief that the decisive impulse of economic growth is creativity, innovative ability and the resulting benefits enabled by the use of new technologies and new procedures. All the other elements present only serve in one way or another to show the benefits of creativity. Creativity is not in itself sectoral, it can and does manifest itself in all areas of the economy.[17] However, a specific area is the creative industry, which we could basically call the entertainment industry (from computer and other games to the commercial appreciation of art).[18] In general, areas of the economy can be distinguished into those where there is still a lot of room for creativity and thus a lot of room for innovation, new creation, new products and also new product classes, and those where the room for creativity is already exhausted and as long as there is no technological change or significant impulse, it will not even be renewed.

The first areas include, of course, the creative industry (or industries), which is developing dynamically and growing technologically (for example, 3D, music sharing, and so on), or the industry associated with mobile communications (rapid development of mobile phones and applications to them). then, for example, the mining industry, traditional energy or heavy engineering. As a result, it is therefore possible to distinguish between creative industries in terms of new and rapidly changing areas of the economy.

However, theorists of the creative economy did not stop at the national economic level of things. According to them, the described changes and the rise of creative industries also bring about the emergence of a whole new social class or layer - the creative class.[19] This means that this theory has expanded into the field of sociology.[20]

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[14] From the point of view of the above-mentioned dispute, Klaus versus Zlatuška and Hlavenka, it can be said that the former named dominantly won in the part of the dispute which concerned the specifics of the new economy in the sense of science. It turned out that the theory does not need a change and in the analysis of new trends in reality, it suffices comfortably with what it had before, if it approaches the topic without prejudice. On the contrary, Václav Klaus's opponents no less convincingly won that the technological change, then known as new economics, led to profound and long-term structural changes and brought phenomena that economic theory had to carefully analyze before it could explain. Two decades from this discussion, we could boldly say that many of the impacts of the described changes have not been sufficiently analyzed and recognized even now - simply because, contrary to many expectations, the then technological shock created by computerization turned into the technological shock of mobile communications. It can be boldly noted that the extreme technological differences between the world of 1990 and the world of 2020 could not be reflected in the whole structure of economic relations and cooperation. However, it was an extremely dramatic evolution, not a revolutionary development that would change the essence of the economic order..

[15] Years later, the calls "read young Marx" or "read Marx through the eyes of uncorrupted Lenin" reappeared, slogans known from the 1960s.

[16] To certain conceptual inaccuracies in the use of economy and economics, which have already been discussed, is now compounded by the fact that the most common term in this context is creative industry or creative industries. Only some authors dealing with the given issue talk about economy and economics here. To maintain the conceptual system of this study, these higher terms will be used here more than would correspond to the usual state of affairs.

[17] More on this issue for example Howkins (2002).

[18] However, many authors are not satisfied with such a broad definition and distinguish between different creative industries and different cultural industries. Within them, they define specific sub-industries such as the adventure or film industry and many others. (Kraus, Žáková 2014; Němec 2013) It is possible to discuss the usefulness of such a positivist approach and enumeration description, however, it is not only about the Czech specifics and such a procedure is not unusual even for foreign authors.

[19] Florida (2002)

[20] In the Czech environment, we would also find a certain response to these considerations and research. (Prokop 2020, str. 25-32)

Creative economy does not react (in opposition to the new economy or alternative economic shocks) to any specific and quite clearly defined development and not to a specific event at all. Nevertheless, creative economy is associated with social changes and also with economic changes, which are much longer-term and cannot be derived from some clearly defined event with a clearly defined date. At the original level, it was even an analytical evaluation of the growth of leisure time, as has occurred in Western advanced societies, especially since the 1950s, and an evaluation of the effects of growth in disposable income. New economic trends were sought, which are based on changes in these two parameters. It was found that the volume of some areas of the economy is growing dynamically, while this trend in the production of various leisure activities was striking. It has also been shown that the key figures in these empowering industries are people with certain relatively specific skills. From this, theorists thinking about this problem came to the already mentioned concept of creative class.

Also in the case of the creative economy, some attention is paid to the issues of globalization. The level of creativity of individual national economies is understood as a key advantage in terms of competitiveness, and the sectors with the highest level of creativity are then usually considered to be those that excel in added value and also those that have the greatest global impact and impact. At the same time, it is true here that the issues of globalization are not understood from the point of view of theory as key, because globalization is more of a new characteristic and accelerator of the market environment than something else. However, highly creative industries exist (with natural exceptions) in the context of global markets and are characterized by natural penetration into new areas and usually also by rapid technological development.

Despite the completely indisputable fact that creative or cultural industries are obviously existing phenomena and there can be no denying the truly dramatic growth of markets with films, games and many other products or applications, attempts to constitute creative economy as a distinctive field failed in principle. Apparently, basically no one doubts that various entertainment and other industries exist, but as in the case of the new economy, the discussion is mainly about the depth and structural impacts of the changes brought about by the creative industry. In principle, the existence of a creative class is not questioned either - although this concept is considered rather helpful within one of the more standardized structures of society.[21]

It is also possible to add one common remark for both the new economy and the creative economy: several times, when discussing these directions, we have mentioned the issue of globalization, which is both perceived as a certain background and environment for both phenomena. In fact, over a period of time, it seems that new economics and creative economics can also be understood as identical processes (but judged from other angles) taking place not only due to technological changes with which they are directly connected, but also due to globalization trends, with which they interact and accelerate each other. However, examining these relationships would already be a topic for another study.

2.4 Circular economy

The *circular economy* began to be constituted at the beginning of the twenty-first century in connection with the growing influence of environmental ideas and as a continuation of the constitution and development of ecology as an independent scientific discipline, which can be dated from the second half of the last century.

Although circular economy may seem at first glance to be a programmatic partial approach to theory (and circular economics as a programmatically partial change of the economic environment), in reality both necessarily interfere with the whole area of interest of economics as science and economics as human activities.

In very simple terms, we can define circular economics as a theory of how to replace Cradle to Grave with Cradle to Cradle in order to minimize waste generated both at the end and at the end of the chain. It is based on several principles, such as biomimetics,[22] the already mentioned theory of cyclic chains (*Cradle to Cradle*) and others.

So we see a clear difference between the new economy and the creative economy on the one hand and the circular economy on the other. The first two mentioned concepts responded to real events and trends taking place in the real world, but the circular economy is a concept defining the future optimized form of the world. It is basically a visionary theory, a project of future solutions.

In comparison with both mentioned currents, the circular economy is thus a vision and a program, perhaps it could even be said that it is a form of ideology that seeks the means and procedures of its political enforcement. Nevertheless,

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[21] The usual way of examining social groups or classes (within a nation, whether in the traditional national sense of the word or in the political sense of the word) is to sort them on the basis of income (poor, lower and upper middle class, rich, etc.) . In such an income hierarchy, there is no natural place for the creative class - however, we can assume that to some extent members of this class coincide with members of the upper middle class and rich class, as they are either entrepreneurs or employees in higher grades.

[22] Interscientific discipline based primarily on biology, the aim of which is to apply natural methods and mechanisms used by flora and fauna in artificial technological solutions.

or rather precisely because of this, it can be assumed that, on the contrary, from all compared concepts of thought (including alternative economic theories), it has a disproportionately greater chance of becoming a truly specific theory that will be constituted into mainstream economic reasoning. For the new economy, alternative directions and the creative economy, it can be said that reality (economics) shaped the theory (economy). However, the circular economy is the opposite case, where the theory works to transform reality.

3 Analysis of the difference of individual researched theories

As mentioned in the previous part of this work, the circular economy is an artificial thought construct based on environmental ideas and the development of ecology as a scientific discipline. It is based on the task of adapting production mechanisms and processes as quickly and thoroughly as possible to the human will, which is defined as a social, public or global interest, regardless of or only with reasonable regard to the opinion and will of economic operators. . This task is to reduce the side effects of production processes as much as possible, while the main side effects are the generation of waste both in the production itself and in the logistics belonging to it, and at the end of the product's life.

As can be seen at first glance, the *circular economy* is a response to a paradigm shift, which can be formulated as a fundamental difference from any previous state and from most earlier economic theories, at least from all theories that have become the predominant attitudes of the main mind. current. *Economy* becomes a tool and helper for the enforcement of political will, and this political will is based on the social paradigm.[23]

Let us try to define, at least very broadly and in a few points, what impacts this means as a result. On this ground plan, we will then assess whether, while maintaining this new paradigm, the mainstream of economic thought will be affected, how it will occur, and what the possible consequences will be.

3.1 Impacts of the circular economy on economic theory

If we talked about the social paradigm shift and its reflection in political decisions, which are reflected in the setting of conditions for the functioning of economic entities, it is necessary to define what we mean by that. Obviously, it is primarily a matter of prioritizing a certain type of accompanying feature of the production activity (waste) over other circumstances of this activity, to which we can count, for example, profit, employment and many others. It is possible to discuss at length the extent of this preference, its concrete manifestations and the setting of priorities, but undoubtedly there must be changes compared to the previous situation - which is crucial in this context.

In the usual constellation, the question of the economic context of waste (within production and business activities) is given by several factors. There are costs in the first place, because, at least in theory, the low rate of waste generation during production activities, whether waste in the form of unused material, scrap, waste and others, is a manifestation of higher production efficiency. The question then is at what other costs this higher level of production efficiency is achieved and whether the costs of increasing efficiency are sufficiently lower compared to the returns of this efficiency. These relationships are then affected by the costs of external interventions, ie the costs of waste storage, disposal and the like. Similarly, we can include health protection costs for waste that can be classified as hazardous to health and if regulations in the area prescribe it or if it is necessary to incur these costs for other reasons. Thirdly, tax aspects come into play, ie the taxation of waste or the taxation of technologies that produce more waste than other technologies.

From the point of view of economic theory, it is necessarily true that the lower the costs associated with waste, the less pressure will be on such adjustments to production activities that would lead to a reduction in waste generation. As it is a direct proportion, the opposite is also true - the higher the costs associated with waste, the higher the pressure to eliminate waste. From this perspective, it can be said that the circular economy is based on existing theoretical (and ultimately practical) knowledge - in other words, it is said that the issue of waste generation is largely and crucially a question of setting the price of waste.

But here we come to the basic problem. The price for waste is a regulatory measure because the price for waste is not and cannot be determined by the market. Of course, there are certain sub-markets for waste (paper, scrap metal, glass), but their pricing is influenced primarily by the external aspect, which is the price of the original raw materials. If the price of the original raw materials is low, then the market for the secondary raw material (waste) will set a low price. In such

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[23] We could now discuss for quite some time the extent to which this political will is indeed a reflection of the majority convictions of the peoples of individual countries, and the extent to which this political will passes the test of the democratic majority. In essence, we would get into the field of discussions about the democratic nature of political decision-making, for example within the European Union or possibly in other developed countries, where circular economics is promoted through political decisions (for example through taxes, regulations and the like). However, this discussion is very extensive, very specific and, above all, it is not a very economic issue, nor is it even a question of political economy, but rather of political science, sociology and other disciplines. For the purposes of this study, paradigm shift is considered a fact based on realized and accomplished social change. The study does not and cannot lead a possible discussion on this particular topic.

an environment, the system will not necessarily work - ie a secondary market for raw materials can only exist if a sufficiently high price of the primary raw material is available. This problem is, of course, well known and nothing substantially new is said here.

The whole discussion is therefore about the costs of enforcing the paradigm (which we can simply call maximizing the *Cradle to Cradle* system in the real world). In all simplifications and the use of truly elementary expressions, this is the core of the question posed by the *circular economy* as a school of thought, the task of which is in fact to find in the field of theoretical research the possibilities of practical maximum promotion of *circular economics* into real life. Whether these costs will be socially tolerable is then a matter of subsequent political decisions and does not belong to economists.[24]

From the point of view of economics, a higher-order question arises here, which then touches on the basic principles of theoretical thinking. The purpose of economic activities has always been and is, at least always applied to all the main theoretical directions, to satisfy the needs of participants in economic events, ie specific people. This satisfaction occurs through profit or profit sharing or remuneration (most often wages). It is clear that if costs (the cost of waste) are a means of enforcing *circular economics*, then it is more than likely that this necessarily affects both profits and rewards. Again, the decision on the extent of the impact on one or the other area is ultimately a political decision, but it must necessarily have an economic basis. These bases must be very complex and must examine not only the mechanisms of influence within the system (say national economies or continental economies, for example), but must also include mechanisms for applying these costs to imported goods (and of course services), as the imposition higher costs of domestic or continental production must be compensated, otherwise it will lead to unsolvable results.

Thus, regardless of the complexity of the problem, which is obviously aware of the circular economy, the question arises as to whether in economic practice it is possible to at least partially replace the profit function in a sufficiently effective way and replace it in a sufficiently effective way at least partially within the social paradigm. Related to this is the question of an acceptable level of regulation. Although it may seem at first sight that the main regulatory framework concerns the issue of the price of waste (waste tax and other forms of price influence), there is a risk of secondary events which may necessitate further regulatory action in the mass enforcement of *circular economics*. The plot can only be a random transfer of production to countries with lower waste prices, the transfer of capital to sectors with lower waste production and thus the undercapitalization of waste-intensive industries and, many others. It is therefore necessary to address in particular the question of the extent to which the benefits of a market economy can be maintained while rigorously enforcing the paradigm and the prevailing regulatory environment in such an environment necessarily leading to the strengthening of elements of the planned economy. modification of the actions of economic operators is, in fact, the strengthening of the plan against the market).

3.2 Impacts of the circular economy on real economics

As can be seen from the previous list of problems, the new paradigm[25] raises a number of questions, some of which we can even consider to be largely new not only in their form and wording, but also in principle. The purpose of a theoretical reflection on the need to implement the paradigm in real life is how to achieve this at acceptable national economic costs and how to protect the economic environment from the aggressive environment of others, which will be spared such costs.

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[24] In this context, let us leave aside the idea that in some conceivable future, circular economics will naturally be cheaper than, for example, current production chains. In fact, this can only happen under two assumptions. The first is a huge technological leap that would make the use of secondary raw materials so dramatically cheap that they would become naturally competitive over primary raw materials. Such a leap is certainly possible, unlike perpetuum mobile, but there are no indications that it should happen. The second option is a technological leap that would lead to the production of new products directly on the basis of waste. Such processes are emerging, they are economically sustainable, but so far there is no prospect of moving from relatively isolated situations to conventional production processes. In this regard, it is possible to make perhaps one comment on the question of acceptability and real support for the paradigm. Although it is likely that societal attitudes have indeed changed dramatically in recent decades (we can say with a certain amount of pathos that it has strengthened social responsibility for the sustainability of life on the planet), this process does not seem to have reached a stage of societal willingness. sacrifice customs and existing standards. Products derived from the recovery of secondary raw materials (waste) do not have such consumer support on the market that would correspond to the idea completely unconditionally and as a result of the adopted paradigm.

[25] It must be emphasized again that the purpose of this work is by no means to assess real social power and real support for the paradigm. The paradigm is considered to be an existing fact in the context of the study and its potential impact on its consistent enforcement is examined. Of course, there are a number of interesting questions that sociologists, political scientists and other social scientists should certainly address - one of which is, for example, the development of a social degree of support for the promotion of environmental economic practices (which may be another name for *circular economics*) depending on possible costs (unemployment, lower real wages).

Although this may seem like a relatively basic problem at first glance, it is in fact a complexly structured and very complex issue.

4 Summary

Circular economy is obviously a direction in the development of economic thinking, which brings so far either unknown at all or only marginally known specifics. The main thing is that it is not a response to some economic events (such as a crisis) or technological change, but a theoretical evaluation and analysis of how some ideas from the social sphere could be introduced into the real economy and how it could be done. necessary political decisions to promote these ideas at an acceptable economic cost. Logically, the next task must be to define these costs, describe them and point out their existence. The creation of individual practical solutions as they form or will form *circular economics* is then more the task of technologists and scientists or technicians from other fields, it is not an economic question in the true sense of the word.

However, it is clear that if the new social paradigm, the existence of which we took as a fact in this work and whose support we have not questioned, persists, then the economic theory of the coming years or decades will have to cope with this task quite fundamentally, including change. a number of as yet undisputed postulates. Or at least including asking a number of very burning questions. These may include, for example, whether the market environment is able to enforce the social paradigm in real life and, if not, how strongly will elements of the planned economy need to be added through regulations and possibly planning institutions to enforce the paradigms? Another such question (out of many potentials) is: To what extent is it possible to achieve the implementation of the paradigm in parallel with the fact that profitability indicators remain key indicators for investment decisions? And is it possible to enforce a change in the view of profitability other than through extensive regulations or directive decisions?

Acknowledgement

References

Florida, R. (2002). *The Rise of Creative Class and How It´s Transforming Work.* New York: Basic Books.

Hlavenka, J. (2000). Co znamená nová ekonomika pro Václava Klause. (23. srpna 2000) Dostupné online: https://www.zive.cz/clanky/co-znamena-nova-ekonomika-pro-vaclava-klause/sc-3-a-17798/default.aspx

Howkins, J. A. (2002). *The Creative Economy: How People Make Money from Ideas*. New York: Penguin Global

Kislingerová, E. (2009). *Podnik v časech krize.* Praha: Grada Publishing.

Klaus, V. (2000). Úvodní projev na konferenci Informační technologie – módní vlna versus vážné úvahy. (9. října 2020). Praha. Dostupné online: https://www.klaus.cz/clanky/2302

Kraus, M.& Žáková, E. (2014). *Kulturní a kreativní průmysly ve vybraných zemích Evropské unie.* Praha: Institut umění – Divadelní ústav.

Němec, N. (2013). *Význam kulturních a kreativních průmyslů v Evropské unii, České republice a hl. m. Praze.* Praha: Útvar rozvoje hl. m. Prahy.

Oliner, S., D., Sichel, D. E. & Stiroh, K. J. (2007). Explaining a Productive Decade (December 2007). *FEDS Working Paper* No. 2007-63. Dostupné online: https://ssrn.com/abstract=1160248 or http://dx.doi.org/10.2139/ssrn.1160248

Prokop, D. (2020) *Slepé skvrny (O chudobě, vzdělávání, populismu a dalších výzvách české společnosti).* Brno: Host.

Zlatuška, J. (2000). Informační technologie mění ekonomiku (14. září 2000). Online: https://archiv.ihned.cz/c1-762647-informacni-technologie-meni-ekonomiku)

Economic Impacts of Changes and Policies in the Fields
of Finance, Accounting, and Taxation

Impacts of Federal Reserve System (FED) Economic Reports on US Financial Market Using Text Mining

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Abstract: Today, computer technology is becoming an effective means of disseminating various types of information. It brings news and issues to reach a wide range of audiences, including investors. The requirement for market information and the forecast of financial assets is crucial for investment decisions. This study first examines the relationships between monetary policy reports and the stock index prices. The aim of the paper is to perform text mining of published Federal Reserve System (FED) reports and from these reports to determine the sentiment communicated by the central bank and to identify the impact on stock markets. The motivation for conducting the study is the assumption that, for example, the Fed's communicated policy regarding raising interest rates or other similar macroeconomic events may have a significant impact on the purchase or sale of financial assets by investors. The paper is exceptional in that it links the interdisciplinary nature, which at the core includes both behavioral economic topics obtained from published central bank reports and the Support Vector Machine method, which is used to determine sentiment and mood scores communicated by the central bank of USA. The results of the study show that if higher stock market's higher fear of the VIX index persist, there is a weak ability to predict the direction of US stock indices, despite the optimistic tone in the Fed's economic growth statement.

Keywords: central bank, data mining, FED, financial market, sentiment, text mining.
JEL Classification: C49, E22, E50, G10

1 Introduction

Public reports provide early warnings of the current stock market situation, while media reports influence market participants' beliefs and force investors to enter or withdraw their funds from investment instruments. The ability to use such public information comes with the growth of large data, which decomposes data sets so large that they cannot be quickly analyzed by traditional database software tools. Analytics comes with innovative software products intentionally designed for large amounts of data in all forms, including textual information, numbers, and images. In fact, sentiment analysis in natural language texts is a large and growing field, especially for financial economists. This allows the human brain to discover hidden correlations more quickly, and therefore use intuition and logical deduction to extract a hypothesis from an incomplete data set. In addition, differences in funding appear to be a source of agent heterogeneity, while they may facilitate trading in financial markets. Disclosure of public information, which has important implications for forward prices, could greatly widen differences of opinion and offer traders the advantage of information processing. This could lead to information asymmetries and affect the provision of market liquidity, damage market functioning and damage transmission processes, as described by Apergis & Pragidis (2019). In particular, central bank communications have a profound impact on financial markets. While previous research has shown that monetary policy communications affect asset markets, the exact mechanism is not yet fully understood (Hansen & McMahon, 2016). As central banks address various issues in their communications, the question remains whether discussions on inflation, macroeconomic activity or financial market issues affect financial market performance. Central bank communication can affect market results through "reporting", where changes in communication are reflected in market prices according to Hüning (2020). With regard to monetary policy, central bankers attach great importance to the transparency and predictability of their activities. and subsequently their associated impact on financial markets. Due to the pace of today's technological developments, information travel is faster and more efficient according to Alamsyah et al. (2018).

Macroeconomic uncertainty is a factor that affects the purchase and sale of financial assets. For investors, macroeconomic uncertainty is a degree of unpredictability for the future direction of the economy, from several themes, monetary and fiscal policy in each country and trade between the two countries. In such circumstances, investors may act differently because they have different views on the macroeconomic future. Some investors may alternatively buy and sell assets, resulting in high asset price volatility, as described by Yono et al. (2019). In a modern economic environment, there are several macroeconomic uncertainties at the same time; furthermore, investors can improve their investment strategies if they can quantify the uncertainty based on its source and measure the uncertainty. They can hedge the risk associated

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with high macroeconomic uncertainty. The easiest way to quantify uncertainty is to measure the volatility of certain assets with respect to this macroeconomic uncertainty. Currently, an alternative method for the evaluation of macroeconomic uncertainty using the text mining method according to Yono et al. (2019). When discussing (expected) macroeconomic conditions, central banks signal likely future policy action and therefore reduce market uncertainty about the future path of the political rate. Second, assuming asymmetric information between the central bank and the private sector on macroeconomic fundamentals, i.e. central banks could have better information on the state of the economy (Romer & Romer, 2000), communication reduces this asymmetry and signals the central bank's view of macroeconomic aggregates.

The research hypothesis addresses the question of whether the discussion on inflation, macroeconomic activity or financial market issues communicated by the Fed affects investors' activities. Central bank communications can affect market outcomes through 'reporting', where changes in communications affect financial market movements. This paper examines the impact and impact of Federal Reserve System (FED) communications on stock markets. Monetary policy reports are identified through changes in published reports and the application of natural language processing techniques. More specifically, Machine Learning is used to identify topics that the FED discusses in its press releases and press conference introductory statements. In addition, the thematically specific tone is measured using a dictionary approach. This makes it possible to determine the sentiment communicated by the central bank and subsequently to address the impact on the stock markets, including the prediction of its future development using artificial intelligence methods.

2 Literature review

The growing literature studies the role of the central bank's information effects, ie the notion that central bank announcements reveal relevant information about the economy that influences investor behavior in the stock market. For example, Audrino et al. (2020) analyze the impact of sentiment variables on stock market volatility using an extensive dataset that combines social media, news articles, information consumption, and search engine data. They use state-of-the-art sentiment classification techniques to examine whether sentiment and attention measures contain additional predictive power for realized volatility in controlling a wider range of economic and financial predictors. We identify the most important variables to be the investor's attention, as measured by the number of Google searches on financial keywords (such as "Financial Market" and "Stock Market") and the daily volume of company-specific reports published on StockTwits. In addition, their study shows that attention and sentiment variables are able to significantly predict volatility, although thematic indicators of improvement are relatively small from an economic point of view. Hüning (2020) analyzes the effects of the Swiss National Bank's communication on the uncertainty of securities investors. Monetary policy reports are identified through changes in short- and medium-term futures prices. Overcoming changes in policy rates and the future development of insurance rates has an asymmetric effect on the uncertainty of equity investors. In addition, taking into account the various topics mentioned in the statements, the author proves that investor uncertainty is declining due to the optimistic tone in communication about economic growth. The increased uncertainty expressed in policy statements is reflected in the growing uncertainty of equity investors. The results explain how the innovations contained in monetary policy statements reduce noise in financial markets and therefore contribute to financial stability. Yono et al. (2019) developed a model for measuring economic uncertainty based on the text of reports. They have further developed an extended thematic model that uses not only textual news data but also numerical data as a supervised signal for each news article. Subsequently, using the proposed model, they created indices of four macroeconomic uncertainties. All of these indices were similar to those observed in historical macroeconomic events, and the correlation was higher with the volatility of the market index with respect to the uncertainty index. Based on evidence from the four major central banks, Cieslak & Schrimpf (2019) breaks down the messages mediated by the central bank's communication into monetary policy reports (monetary reports) as well as non-monetary reports, i.e. economic growth reports and reports affecting premiums. on financial risks. The announcements of political decisions are dominated by reports that appear every month. However, the non-monetary component accounts account for more than half of communications that provide context for political decisions, such as press conferences and minutes. The authors show that non-monetary news is an important part of the response in financial markets during the financial crisis and in the early recovery, while monetary news is gaining in importance since 2013.

Apergis & Pragidis (2019) examine the link between changes in sentiment tones in the light of European Central Bank (ECB) announcements and stock returns. The analysis creates a new index that describes the tone of judgment derived from these announcements, covering the period January 2002 to June 2016. The novelty of this work is the development of a unique sentiment index linked to ECB-mediated news and its impact on the average and volatility of certain major international stock markets. The findings suggest a significant impact on both average and yield volatility, while the association of news sentiments and stock returns increases during the crisis. These findings survive close scrutiny based on the personality characteristics of the Governor of the ECB. Nardo et al. (2016) examine whether online news has any effect on the financial market, and also examine what effect it has. They examine the growing literature on the predictability of financial movements using online information and report mixed findings. In addition, they gather efforts from

a variety of disciplines, including economics, text mining, sentiment analysis, and machine learning, and offer suggestions for future research. In the case of the ECB announcement, Kurihara (2014) examined whether and how the ECB's communications affected the return on shares in the euro area. Its results highlighted that the impact of such announcements on stock returns was not significant. Gidofalvi (2001) obtained over 5,000 financial intelligence articles on 12 specific stocks and identified a 20-minute period before and a 20-minute period after the financial news release. During this time, he has shown that there is a weak ability to predict the direction of the return of stocks before the market itself adjusts to equilibrium. Bai (2014) distinguished investor sentiment only in the market from sentiment across international markets. In particular, he examined various aspects of the impact of investor sentiment by distinguishing the extent of the sentiment effect. Its results document that developed and evolving regional sentiments in EU stock markets have a significant impact on market excess returns and volatility. In addition, its findings showed that regional sentiments were transmitted across borders through special transmission mechanisms, such as interbank lending networks. As a result, sentiment was contagious according to strong evidence of causality across sentiment indices. Hansen & McMahon (2016) found that Federal Free Market Committee (FOMC) communications regarding current economic conditions and instructions shocks did not have significant effects on real economic variables. They used these studies to quantify the content of central bank notifications using direction-based methods. The topic used was a context-specific list developed by Apel & Grimaldi (2012), specially designed to measure the tone of central bank communication using a combination of words. This paper contributes to this literature by developing a detailed word list that allows word combinations, as in Apel & Grimaldi (2012).

3 Methodology

Sentiment analysis generates stories independent of price movements. The idea is that the text is essentially positive or negative, not positive or negative, because it has been "optimally" associated with a rising/falling trend in stock prices, as described by Nardo et al. (2016). In this context, text classifier algorithms select fit-to-the-purpose texts and spot positive/negative tonality or more complex feelings (sentiments) according to some externally provided dictionaries and semantic rules. Several issues are crucial to determine the quality of the results. The first is a "good" set of texts from which tonality/sentiment is derived. A typical problem is noise reduction, i.e. the detection of an irrelevant message. The literature has responded to this challenge in three ways (which are not mutually exclusive): (i) by limiting the web-coverage to specialized sources such as The Wall Street Journal (Tetlock, 2007), Yahoo! Finance (Schumaker & Chen, 2009), RagingBull (Antweiler & Frank, 2004) and The Financial Times (Alanyali et al., 2013); (ii) by utilizing sources with a structured or annotated corpus messages: tweets (limited to 140 characters and explicit hash tags and channels, see Ruiz et al., 2012) or New York Times Annotation Corpus (Zhai et al., 2011) and (iii) by using a linguistic classifier based on dictionaries. Within linguistic classification (and mood detection), the most common textual representation is the bag-of-words (Schumaker & Chen, 2009): texts are analyzed according to the presence/frequency of a given set of words or keywords. More sophisticated text classification algorithms can be based on assigned word categories (Gilbert & Karahalios, 2010) or on lexical semantic/syntactic notation (Schumaker & Chen, 2009). Keywords can be drawn from very general dictionaries (e.g. Harvard psychosocial dictionary) or less often from financial specific glossaries. A good vocabulary is crucial for choosing a meaningful set of articles and/or for detecting their mood, especially in finance.

We first identify the relevant reports published by the US Federal Reserve System, then use the macroeconomic issues in the reports published by the FED and examine the impact of these reports represented by sentiment on the US stock market. Sentiment analysis first deals with determining the correlation between sentiment and stock price dynamics. To clarify the description, it will be described in Fig. 1.

Figure 1 Sentiment analysis using Machine Learning
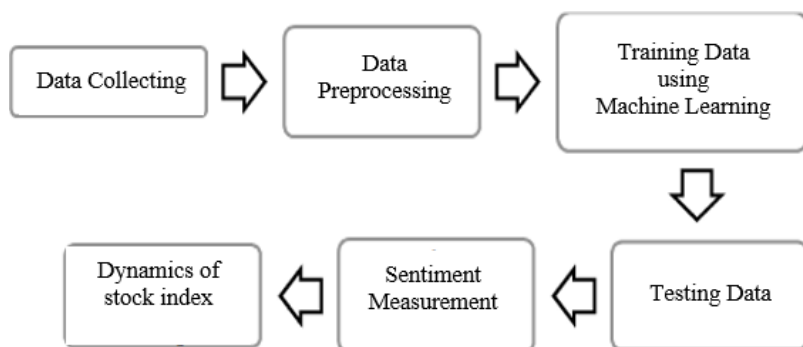
Source: Own processing

The function of sentiment analysis is to map the investor's opinion. The method is by researching macroeconomic problems in the market. The sentiment variable consists of time and polarity. We describe several steps for the analysis

of the experiment. All systems use as input at least two data sources, namely text data from online sources and market data, as described by Nassirtoussi et al. (2014).

- Text Data

Text input can have several sources and types of content. Most systems use financial newspapers because they are thought to have less noise compared to general news. The text of the message or the title of the message is extracted here. Report headings are sometimes used and are said to be more straightforward and therefore less noisy due to detailed text (Huang, et al., 2010). This study uses statements that are published immediately after a political decision at a meeting of the Federal Open Market Committee (FOMC). The press conferences are a relatively new development and were first introduced in April 2011. Probably, because historically there were no press conferences to provide information on the political decision, the MPD statements were longer than those of other central banks. They contain an average of 12 sentences and their length has been increasing since the financial crisis. Until 2011, statements were issued regularly at 14:15 New York time. The release time changed in 2011 and alternated between 12:30 and 14:15 depending on whether the meeting was followed by a press conference; the statements are currently published at 14:00., the press conference at 14:30. The FED holds eight scheduled meetings per year (plus one unscheduled meeting during our sampling period).

- Numeric Data

Another source of input data for the systems are numerical values on the financial markets in the form of price points or indices. This data is used mainly for the purpose of training machine learning algorithms and occasionally is used for prediction purposes. The time frame from the moment the report is issued to the monitoring of the market impact may vary from seconds to days, weeks or months. The analysis lists the major US stock indices, i.e. S&P 500, DJIA, NASDAQ. Data were collected for the monitored period of 2019 on a daily basis.

Once the input data is available, it must be prepared so that it can be inserted into a machine learning algorithm. For textual data, this means transforming unstructured text into a representative format that is structured and can be machine processed. In data mining in general and text mining in particular, the preprocessing phase has a significant impact on overall outputs (Uysal & Gunal, 2014). There are at least three sub-processes or aspects of pre-processing, which we contrasted there in the monitored works, namely: feature-selection, dimensionality-reduction, feature-representation. The decision on the features through which the text is to be presented is crucial because incorrect representation input cannot be expected to be anything other than meaningless output. The most common technique is the so called ''bag-of-words'' which is essentially breaking the text up into its words and considering each of the as a feature. Having a limited number of features is extremely important as the increase in the number of features which can easily happen in feature-selection in text can make the classification or clustering problem extremely hard to solve by decreasing the efficiency of most of the learning algorithms, this situation is widely known as the curse of dimensionality (Pestov, 2013). Common approach is using a predefined dictionary of some sort to replace them with a category name or value. Some of these dictionaries are specially put together by a market expert or they are more specific to a specific field like psychology in the case of Harvard-IV-4. And other times they are rather general use dictionaries like the WordNet thesaurus. Another set of activities that usually constitute the mini-mum of dimensionality-reduction are features stemming, conversion to lower case letters, punctuation removal and removal of numbers, web page addresses and stop-words. Pre-processing of data is important in the data mining process. The principle of derivation and removal of waste is interpreted on data mining and machine learning. The three steps of data preprocessing are tokenization, which is used to separate all text into a phrase and a symbol, which is the second non-lowering character. Filtering is used to clean up data from characters or important symbols, such as read and join tags. Stemming is shortening a sentence and makes each word a single word. We have successfully collected 9 press releases and meaningful data that serve as inputs to the Support Vector Machine (SVM), which uses both content and metadata to detect sentiment from FED reports. A score above 0 indicates positive sentiment, a score below 0 indicates negative sentiment, and a score close to 0 indicates neutral sentiment.

4 Research results

This research basically focuses on the use of computational modeling to identify possible relationships between US central bank textual information and the stock market. This is a research problem. In order to adequately address this research problem, at least three separate fields of study must be covered: linguistics (understanding the nature of language), machine learning (accessible computer modeling and pattern recognition), behavioral economics (to demonstrate economic meaning). First, it is necessary to obtain a press release published on the official website of the FED. An example of published text is shown in Fig. 2.

The extracted texts for the period of 2019 are then used to detect sentiment through Machine Learning, specifically the Support Vector Machine. Each text is analyzed separately to determine, where appropriate, the impact of central bank reports on US stock markets represented by major stock indices such as S&P 500, DJIA and NASDAQ, including traded

volumes on the day the FED officially publishes. During the monitored period, i.e. 2019, the FOMC published a total of 9 press releases. The publication always took place at 14:00, except for the extraordinary publication at 10 - Oct at 11:00.

Figure 2 Sample of Federal Reserved press release

Source: Federal Reserve, 2020

Sentiment is determined based on the procedure outlined in Section 3 of the Methodology. The sentiment results for each published report are shown in Tab. 1. It can be noted that all official FED reports for 2019 sound positive, as the value of sentiment is always higher than 0. The highest positive sentiment is measured when issuing an extraordinary report in 10 - October, when the value of sentiment indicates 0.6148. On this day, it can be noticed that the value of the VIX index decreased significantly, which is declared by the change of -5.74 %. This means that market volatility and fear are declining, which may be supported by the very positive thinking and communication of the US Federal Reserve. In addition, all monitored US stock indices showed a positive return on that day. Specifically, the closing price for the S&P 500 index increased by 0.64 % compared to the previous day. Similarly, the DJIA shows an almost identical yield of 0.57 %, including NASDAQ 0.60 %. Thus, it can be said that the significantly positive sentiment or mood communicated by the FED to the investing public, supported by low market fear, encourages investors to buy investment instruments and indicates a positive return. The second highest positive sentiment or positive thinking of the FED is recorded on 30 - January. The calculated sentiment value based on the published press release, an example of which is shown in Fig. 2, indicates a value of 0.5301, which again indicates a positive mood. This positive communication from the FED is supported by very low volatility or the fear index, which shows a negative change or decrease of -7.68 %. The monitored leading stock indices, even in this case, recorded a positive return, when even the NASDAQ reported a gain of 2.20 %. High changes in the volumes of stocks purchased within these indices can also be observed. On the contrary, the lowest value of market sentiment is measured on 19 - June with a value of 0.3920, which can be compared to other results as a slightly positive mood. On this day, the VIX index also shows low market volatility. However, despite these positive signals and the positive return of stock indices, a lower volume of stocks is traded, which is declared by the negative changes in all examined indices.

However, investors follow many different types and kinds of news and information published on various portals, newspapers, social networks, etc. For this reason, despite the positive mood declared in the central bank's press releases, investors follow other indicators. An example is the press release published by the FED 1 - May. Sentiment determined by Machine Learning indicates a sentiment value of 0.4548, which is positive. However, when looking at the VIX investor fear index, which shows a significantly high value on this observed day, with a change from the previous day by 12.8 %, which indicates significant volatility in the stock market. In this situation, the FED's communication is not very authoritative for investors and is driven by the prevailing market fear, as evidenced by the negative return or decline in the values of the S&P 500 (-0.75 %), DJIA (-0.61 %) and NASDAQ (-0.57 %). A similar example in 2019 can be seen on 31 - July. The sentiment of the FED shows a value of 0.4625, however, the VIX index shows a significantly increasing tendency, up to 15.64 % compared to the previous day. Here, too, the investors are not guided by the slight positive communication of the central bank, on the contrary, the prevailing and growing fear and volatility in the market reduces the returns of investors, which show negative values.

Table 1 FED sentiment and US stock index returns

Date	Sentiment	VIX	S&P 500 Return	S&P 500 Volume	DJIA Return	DJIA Volume	NASDAQ Return	NASDAQ Volume
30 – Jan	0.5301	-7.68 %	1.55 %	4.29 %	1.77 %	7.95 %	2.20 %	8.54 %
20 – Mar	0.4103	2.58 %	-0.29 %	1.77 %	-0.55 %	-2.65 %	0.06 %	-0.16 %
1 – May	0.4548	12.80 %	-0.75 %	-3.14 %	-0.61 %	-4.92 %	-0.57 %	2.62 %
19 – Jun	0.3920	-5.41 %	0.30 %	-1.93 %	0.15 %	-5.50 %	0.42 %	-4.71 %
31 – Jul	0.4625	15.64 %	-1.09 %	10.45 %	-1.23 %	11.84 %	-1.19 %	15.09 %
18 – Sept	0.4841	-3.39 %	0.03 %	-2.89 %	0.13 %	-2.13 %	-0.11 %	4.13 %
10 – Oct	0.6148	-5.74 %	0.64 %	7.18 %	0.57 %	5.89 %	0.60 %	5.87 %
30 – Oct	0.4365	-6.59 %	0.33 %	2.19 %	0.43 %	-6.57 %	0.33 %	2.17 %
11 – Dec	0.4266	-4.40 %	0.29 %	-1.20 %	0.11 %	0.05 %	0.44 %	-2.52 %

Source: Own processing

In Fig. 3 and Fig. 4 shows an example of a stock index S&P 500, resp. of the VIX index, the cross showing the issue of FOMC press releases at exactly 14:00. The figure shows graphs of the development of indices in five-minute intervals. These graphs should provide a higher informative value, as they show shorter time periods than shown in Tab. 1, which is based on daily data. From Fig. 3, it can be noted that after the publication of the FED's press releases, all of which sound slightly positive, the immediately rising price of the S&P 500 stock index is evident on 30 - January, 20 - March, 1 - May, 19 - June, a few minutes after These reports are being corrected in the market. On the contrary, on 31 - July, after the publication of the press release, the value of this stock index decreased. The explanation can be found in the high uncertainty in the market and the fear that spreads in the market, which is illustrated by the VIX index.

Figure 3 Example of a graphical representation of the FED's published news on the S&P 500 index
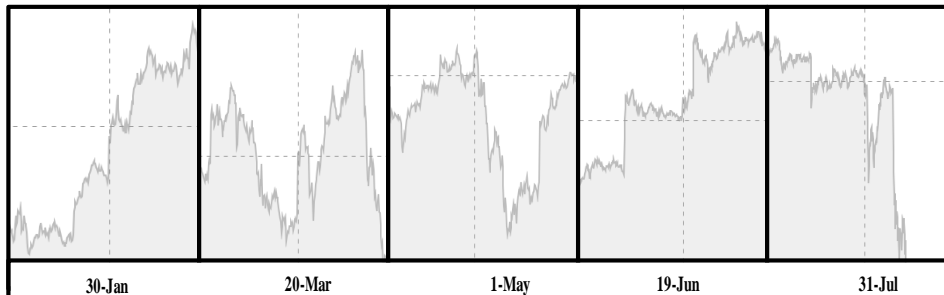
Source: Own processing

Fig. 4 shows an example of the development of the VIX index in the time period of the publication of the official reports of the FED. It is evident from the graphs that after the publication of the reports, which are represented by a cross, on 30 – January, 20 - March and 19 - June there is a noticeable decrease in the index or alleviated fear in the market. On the contrary, on 1 - May and 31 - July, the growth of the volatility index is noticeable, despite the positive opinion of the US Federal Reserve System. The explanation in these is today the VIX index grew not only after the publication of the FED's news, but probably on the stock market there were other, different events that have nothing to do with the FED's monetary policy. Thus, it can be said that although positive monetary messages are communicated, investors also perceive other market news that increases their fear or volatility in the stock market, which is evident from the development of the VIX index.

Figure 4 Sample graphical representation of published FED reports on the VIX index
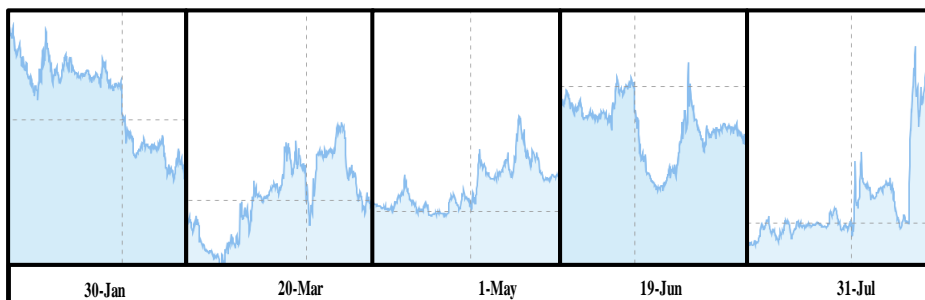
Source: Own processing

This paper contributes to the expansion of previously published research focused on text mining in the stock market. In particular, press releases published by the central bank can have a profound impact on these markets. Because central banks address various issues related to inflation, macroeconomic activity or financial market issues in their communications. It has been shown that immediately after the publication of positive-sounding reports by the Fed, combined with the low value of the VIX fear index, leading US stock indices are rising. However, it has also been shown that if the market remains more feared by the VIX index, despite the central bank's optimistic tone in economic growth communication, it is not authoritative for the investing public and stock indices will fall even after positive news. The results showed that there is a weak ability to predict the direction of stock indices, which is in line with the findings of Hansen and McMahon (2016) or Kurihara (2014), who, unlike the present study, examined the influence of the ECB. The main shortcoming of this study is the length of the research period and the volume of analyzed reports. It would be appropriate in the next study to monitor a longer period of time and extract a higher volume of text messages published by the Fed. To further improve the study, other channels through which the Fed communicates with the public would be analyzed, or the study could be extended to other stock markets and the interdependence and interconnectedness of these markets should be monitored.

5 Conclusions

Today, computer technology is becoming an effective means of disseminating various types of information. It brings news and issues to reach a wide range of audiences, including investors. This study examines the relationship between monetary policy reports and the stock index price. Specifically, this article analyzes the effects of Federal Reserve System (FED) communications on the stock market. For example, the FED's policy to raise interest rates or other similar macroeconomic events can have a major impact on the purchase or sale of financial assets by investors. There is thus an interdisciplinary connection, which at its core includes both behavioral economic topics obtained from published central bank reports and the Support Vector Machine method, which determines the sentiment and mood communicated by the US Federal Reserve. According to the hypothesis set out in the introductory part of the paper, we can say that the FED's communication affects financial market movements. Specifically the results of our study show that the FED's positive communication, together with low market volatility or investor fear represented by the VIX index, supports the trading activities of the investing public and leads to positive returns of leading stock indices in the US stock market. Especially if the resulting sentiment of the Fed is greater than 0.5, a positive effect on stock markets is evident. The increased positive mood expressed in the policy statements is reflected in growing investor confidence, a decline in the VIX volatility index and an incentive to buy shares. The results explain how the innovations contained in monetary policy statements reduce noise in financial markets and therefore contribute to financial stability. Lower sentiment indicates an insignificant effect on stock markets. However, investors follow many different types and kinds of news and information published on various portals, newspapers, social networks, etc. Our findings thus support the conclusions of Hansen & McMahon (2016), who found that Federal Free Market Committee (FOMC) communications regarding current economic conditions and shocks to the transmission of instructions did not have a significant effect on real economic variables. The recommendation for further study is to expand the research period and the volume of analyzed data. To further improve the study, it would be appropriate to analyze other channels through which the Fed communicates with the public, or the study could be extended to other stock markets and the interdependence and interconnectedness of these markets should be monitored.

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References

Alamsyah, A., Arasyi, M. T., & Rikumahu, B. (2018). Supporting Investment Decision Using Socio-Economic Issues Exploration and Stock Price Prediction. In: 2018 International Symposium on Advanced Intelligent Informatics (SAIN). IEEE, 2018, 20-25. doi: 10.1109/SAIN.2018.8673343

Alanyali, M., Moat, H. S., & Preis, T. (2013). Quantifying relationship between financial news and stock market. Scientific Reports 3:3578, http://www.nature.com/srep/2013/131220/srep03578/full/srep03578.html.

Antweiler, W., & Frank, M. Z. (2004). Is all that talk just noise? The information content of internet Stock Message Boards. Journal of Finance. 59(3), 1259–1294.

Apel, M. & Grimaldi, M. (2012). The information content of central bank minutes. Riksbank Research PaperSeries, No. 92.http://archive.riksbank.se/Documents/Rapporter/Working_papers/2012/rap_wp261_120426.pdf. Accessed 20 May 2020.

Apergis, N., & Pragidis, J. (2019). Stock Price Reactions to Wire News from the European Central Bank: Evidence from Changes in the Sentiment Tone and International Market Indexes. International Advances in Economic Research. 25(1), 91-112. doi: 10.1007/s11294-019-09721-y.

Audrino, F., Sigrist, F., & Ballinari, D. (2020). The impact of sentiment and attention measures on stock market volatility. International Journal of Forecasting, 36(2), 334-357. doi: 10.1016/j.ijforecast.2019.05.010

Bai, Y. (2014). Cross-border sentiment: An empirical analysis on EU stock markets. Applied Financial Economics, 24(1), 259–290.

Bas, E., Yolcu, U., & Egrioglu, E. (2020). Picture fuzzy regression functions approach for financial time series based on ridge regression and genetic algorithm. Journal of Computational and Applied Mathematics, 370. doi: 10.1016/j.cam.2019.112656

Cieslak, A., & Schrimpf, A. (2019). Non-monetary news in central bank communication. Journal of International Economics. 118, 293-315. doi: 10.1016/j.jinteco.2019.01.012

Federal Open Market Committee: Meeting calendars, statements, and minutes (2015-2021). Federal Reserve [online]. 20th Street and Constitution Avenue N.W., Washington, DC 20551 [cit. 2020-08-27]. Available: https://www.federalreserve.gov/monetarypolicy/fomccalendars.htm

Gidofalvi, G. (2001). Using news articles to predict stock price movements. Working Paper, Department ofComputer Science and Engineering, University of California, San Diego.http://cseweb.ucsd.edu/~elkan/254spring01/gidofalvirep.pdf. Accessed 6 August 2020

Gilbert, E., & Karahalios, K. (2010). Widespread worry and the stock market. Fourth International AAAI Conference on Weblogs and Social Media, (ICWSM), Washington (DC), USA.

Hansen, S., & McMahon, M. (2016). The nature and effectiveness of central-bank communication. URL:http://voxeu.org/article/nature-and-effectiveness-central-bank-communication

Huang, C. J., Liao, J. J., Yang, D. X., Chang, T. Y., & Luo, Y. C. (2010). Realization of an ews dissemination agent based on weighted association rules and text mining techniques. Expert Systems with Applications, 37, 6409–6413.

Hüning, H. (2020). Swiss National Bank communication and investors' uncertainty. The North American Journal of Economics and Finance, 51. doi: 10.1016/j.najef.2019.101024

Kurihara, Y. (2014). Do European central bank announcements influence stock prices and exchange rates? Journal of Applied Finance & Banking, 4(1), 1–14.

Nardo, M., Petracco-Giudici, M., & Naltsidis, M. (2016). Walking down wall street with a tablet: a survey of stock market predictions using the web. Journal of Economic Surveys. 30(2), 356-369. doi: 10.1111/joes.12102

Nassirtoussi, A. K., Aghabozorgi, S., Wah, T. Y., & Ngo, D. C. L. (2014). Text mining for market prediction: A systematic review. Expert Systems with Applications. 41(16), 7653-7670. doi: 10.1016/j.eswa.2014.06.009.

Romer, C. D., & Romer, D. H. (2000). Federal reserve information and the behavior of interest rates. American Economic Review, 90(3), 429-457.

Ruiz, E. J., Hristidis, V., Castillo, C., Gionis, A. & Jaimes, A. (2012). Correlating financial time series withmicro-blogging activity. In E. Adar, J. Teevan, E. Agichtein and Y. Maarek (eds.). Proceedings of the FifthInternational Conference on Web Search and Web Data Mining (513–522). Seattle (WA), USA.

Schumaker, R. & Chen, H. (2009). A quantitative stock prediction system based on financial news. Information Processing and Management. 45(5), 571–583.

Yono, K., Izumi, K., Sakaji, H., Matsushima, H., & Shimada, T. (2019). Analysis of the Macroeconomic Uncertainty Based on the News-based Textual Data with Financial Market. In: 2019 8th International Congress on Advanced Applied Informatics (IIAI-AAI). IEEE, 2019, 661-666. doi: 10.1109/IIAI-AAI.2019.00137

Uysal, A. K., & Gunal, S. (2014). The impact of preprocessing on text classification. Information Processing and Management, 50, 104–112.

Zhai, J., Cohen, N. & Atreya, A. (2011). Sentiment analysis of news articles for financial signal prediction. Mimeo, University of Stanford, USA.

Usury and the Czech Criminal Law

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Abstract: Usury has always existed. At present, however, this term appears quite often in the public sphere in connection with loans, which are often provided under special conditions. Their providers benefit from people who are often willing to sign very unfavourable loan agreements due to their difficult financial situation. The main goal of this paper was to evaluate the extent to which usury is used by law enforcement agencies according to the Czech Criminal Code and whether there is an increase in the number of accused and/or convicted persons of this crime. Another goal of the paper was to compare the usury with the merits of fraud, in terms of statistics and in matter of fact. The difference between usury and fraud can be briefly defined in such a way that a usurer, unlike a fraudster, does not mislead anyone. The numbers of defendants in the crime of usury are very low nationwide, which is probably due to the fact that most of those who are called "usurers" are convicted of fraud because they have misled the victim, which the usurer (as defined by the criminal Code) does not. According to experts, creditors often keep debtors in check with the threat of credit fraud and also deliberately do not want to know any information about their possible distress. For the purposes of this work, methods of comparison, description, analysis and synthesis were used.

Keywords: usury, fraud, unfavourable credit agreements, Czech Criminal Code
JEL Classification: K14

1 Introduction

In the Czech Republic, usury is regulated in both civil and criminal law. In the new Civil Code, effective from 2014, usury has its own paragraph. It was not explicitly regulated in the previous Civil Code, however, the case law worked with usury contracts as with contracts contrary to good morals, i.e. invalid ones. However, this paper deals with the criminal law regulation of usury.

In order to achieve the aim of the paper, it is necessary to briefly define the regulation of usury in the Criminal Code, to summarize the merits of usury through its obligatory characteristics, i.e. object, objective element, subject and subjective element and to address the circumstances precluding illegality and circumstances precluding criminal liability in this crime.

Usury can be viewed from two angles: in a narrower sense and in a broader sense. Usury in the narrower sense is conduct that is associated with lending money in the context of credit relations and loans. In particular, due to disproportionate interests in these relationships, there is a disproportionate enrichment of the creditor. This usury is also referred to as interest or credit usury. In a broader sense, usury can be understood as "*any contractual action in which one contractor benefits from the difficulties, recklessness and similar state of the other contractor and enriches himself with a profit that is in no way proportional to the material advantage conferred on the other contractor*" (Ottův slovník naučný, 1999). Thus, any type of contract may be considered a usury contract, including unnamed contracts, as long as they constitute a gross disparity between the reciprocal performances and have been concluded subject to the specific subjective circumstances described below. Thus, for example, a purchase contract, a lease contract, a contract of carriage, etc. can also be described as a usury contract. The performance is provided either by the moneylender, which may be, for example, the above-mentioned rental of an apartment or transportation of goods for which it requires a disproportionately high price, or the opposite situation may occur where the performance is provided by the injured party and the moneylender pays an unreasonably low price, such as the purchase of real estate.

The merits of the criminal offence of usury is included in a special part of the Criminal Code, Act No. 40/2009 Coll. in Title V. among the criminal offenses against property, namely in the Section 218[3]. In the basic merits of usury, usury

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[3] Section 218 of the Criminal Code - Usury
"(1) Whoever, while taking advantage mental weakness, distress, inexperience, carelessness or distraction of another, gets promised to him-/herself or to another performance, value of which is grossly disproportional to the value of mutual performance, or whoever

is a misdemeanour, as well as in the merits described in the second paragraph. Only a qualified merits of usury according to the third paragraph is a crime.

It is a criminal offense if it meets two basic features, which are illegality and the features of the merits of the crime. Individual criminal offenses are distinguished by merits. The merits include the so-called typical features of the crime, which are the object, the objective side, the subject, and the subjective side. In order to fulfil the merits and thus to commit a criminal offense, all the above-mentioned features must always be fulfilled. In addition to type features, there are also so-called general features of the crime, including the age and sanity of the offender. The merits of the criminal offense of usury is defined in the provision of the Section 218 of the Criminal Code, from which it follows that in order to fulfil it, it is necessary to meet two conditions. The first condition is a promise or the provision of a usurious conduct, i.e. a conduct whose value is grossly disproportionate to the counter-performance provided. Another condition is that the injured party participates in the relationship because of his distress, inexperience, recklessness, mental weakness or upset. There must be a causal link between the abuse of the state of distress or other disadvantaged state of the injured party and the gross disparity of performance, which means that the mentioned state of the injured party must be at least one of the reasons for concluding the unfavourable contract.

Usury is defined as a combination of objective and subjective features. The first objective sign is the existence of distress, mental weakness, recklessness, inexperience or agitation on the part of the abbreviated. The second objective feature is a gross disparity in the values of mutual performance. The subjective features are, on the one hand, the conscious provision of disproportionate performance, and, on the other hand, the perpetrator's awareness that the injured party approaches this relationship precisely because of his distress, mental weakness, recklessness, inexperience or agitation. Janoušek defines the signs of usury in a different way: "*In Czech conditions, the construction of usury is built on a combination of objective and two subjective signs. The subjective sign on the disadvantaged side will typically be distress. The second subjective feature is the conscious use of weakness by the contractual partner. The objective element is the value of performance*" (Janoušek, 2014). In the commentary to the Criminal Code, the individual object of usury is defined as follows: "*the object of the crime of usury is a free disposition of property, the possibility of correct decision-making in property matters and the property itself are protected*" (Šámal, 2012). This corresponds to the decision-making practice of the Supreme Court of the Czech Republic, which states, for example, in a resolution of 2015: "*The object of the crime of usury is a free disposition of property. The possibility of correct decision-making in property matters and the property itself are protected here. It is not only the protection of property rights to certain things, but Section 218 applies to property as a whole, which may include, in addition to things, other property values, such as receivables, business shares in companies, etc. The object of the crime of usury is the property sphere as a whole*" (Nejvyšší soud, 2015).

The objective side of the crime expresses the manner of execution of the crime and the consequences and itself consists of obligatory characteristics (conduct, consequence, causal link) and optional characteristics (place, time of committing the crime; special method of execution; means by which the criminal offense was committed; material object of attack). In the latter case, these are optional features, which may not occur at all, but where the relevant merits so require, they must be met. With regard to the first obligatory characteristic, i.e. conduct, the objective aspect of the crime of usury has two basic forms: 1) the perpetrator abuses mental weakness, distress, inexperience, recklessness or agitation and gives either himself or a third party a promise or a performance; whose value is grossly disproportionate to the value of the reciprocal performance (usury); 2) the offender asserts such a claim or, with the intention of asserting it, transfers it to himself [4]. Another mandatory characteristic of the objective side of the crime is the consequence. In the basic merits, the mere threat to an object is sufficient to complete a criminal offense. This means that the conduct at the trial stage is as punishable in the same way as the conduct that was completed according to the perpetrator's ideas. However, the situation is different for the merits referred to in Section 218 (2a) of the Criminal Code, i.e. if the offender obtains a significant benefit for himself or for another, or in Section 218 (3b) of the Criminal Code, i.e. if he obtains a large-scale benefit for himself or for another. By benefit is meant the enrichment of the offender, which occurs at the expense of the victim. This

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claims such a debt or transfers it to him-/herself with the intention to claim it, shall be sentenced to imprisonment for up to two years or to prohibition of activity.
(2) An offender shall be sentenced to imprisonment for six months to five years or to a pecuniary penalty, if he/she
a) gains for him-/herself or for another substantial profit by the act referred to in Sub-section (1),
b) commits such an act as a member of an organised group,
c) causes a state of severe distress to another by such an act.
(3) An offender shall be sentenced to imprisonment for three to eight years, if he/she
a) commits the act referred to in Sub-section (1) in a state of national peril or state of war, during a natural disaster or another event seriously endangering lives or health of people or property, or
b) gains for him-/herself or for another extensive profit by such an act."

[4] This work does not deal with this form of usury which is in Czech called „palichva"

objective page character can be described as an effect and its violation as a consequence. In these two cases, the crime is not completed until this effect occurs. The same applies to the merits referred to in Subsection (2c) of the Criminal Code, if the injured party is to be caused by a state of severe emergency. The third obligatory characteristic of the objective side of the crime is the already mentioned causal relationship between the conduct and the consequence. Novotný states in more detail: "*An offender can be criminally liable for a criminal offense only if his actions actually caused a criminally relevant consequence. If there is no causal relationship, no consequence can be attributed to it* " (Novotný, 2007).

The perpetrator (subject) of the crime of usury may be a natural or legal person who meets two basic conditions referred to as obligatory characteristics of the subject, namely a specified age and sanity. Given that this is a sophisticated crime, it is not assumed that it was committed by a person under the age of 18 or by an insane person.

Usury is an intentional crime, which is confirmed and further elaborated by court practice. "*From the point of view of the subjective aspect, intentional fault is needed to commit the crime of usury (Section 13 (2) of the Criminal Code). The intention of the offender must also include the fact that the injured party is in a state which seriously restricts him in his free choice in dealing with property, and that there is a gross disparity in the relationship between reciprocal benefits in the sense that the value of benefits …very significantly exceeds the value of the consideration the injured party receives* "(Nejvyšší soud, 2016).

The Criminal Code stipulates the circumstances that make it impossible to act as a criminal offense from the very beginning. These are extreme emergency, necessary defence, consent of the injured party, tolerable risk and legitimate use of the weapon. In cases of the crime of usury, only the consent of the injured party comes into consideration. Pursuant to Section 30 of the Criminal Code, a criminal offense is not committed by a person who acts on the basis of the consent of a person whose interests, which that person may legitimately decide on without restriction, are affected by the act. Permission must be given in advance or at the same time as the conduct of the person committing the offense otherwise it is criminal. Kratochvíl states: "*An exhaustive list of criminal offenses for which the institution of the victim's consent can be applied is not defined by law, which can be considered a deficiency. There are also controversial cases, such as the crime of usury under Section 218. We believe that the consent of the injured party cannot be exercised here, as it is not free will and otherwise the amendment of this provision would be meaningless* "(Kratochvíl, 2012).

Criminal law also knows several circumstances that occur after the commission of a crime and result in the cessation of criminal liability. These include the perpetrator's death, amnesty, effective regret, voluntary abandonment of completion at the stage of preparation or experiment, and limitation. As regards effective regret, Section 33 of the Criminal Code lists the offenses for which effective regret may be invoked, but the criminal offense of usury is not among them. As already mentioned, the fulfilment of the basic merits takes place at a stage when there has not yet been an effect on the material object of the attack, so it is difficult to refrain from completing usury at the stage of attempting it.[5] In the event of limitation of criminal liability, the termination of criminality is bound to the expiration of the period stipulated by law. The length of this period is referred to in Section 34 (1) of the Criminal Code and is, in the case of a criminal offense of usury, three years for the basic merits and 10 years for the qualified merits. In the case of limitation, it is essential to determine the beginning of the limitation period.[6]

2 Methods

The difference between usury and fraud and the statistics of the courts, which show how common the use of these merits has been in recent years, is processed by methods of comparison, description, analysis and synthesis. For comparison, the crime of oppression is also included in the statistics, especially because of its similarity to usury in the issue of abuse of distress. Their common feature is the distress of the injured party, which can be abused not only in the crime of usury, but also in fraud and oppression (Section 177 of the Criminal Code). The merits of these crimes differ in legal terms. In the case of oppression, however, the perpetrator is not interested in usurious profit, the injured party is only forced to do something. It is therefore not possible to speak of a significant disparity between performance and consideration. On the contrary, it is typical of usury and can also be the result of fraud.

3 Research Results

3.1 Comparison of usury and fraud

As mentioned above, Section 218 (1) of the Criminal Code provides that whoever abuses one's intellectual weakness, distress, inexperience, recklessness or upset, may make or promise to himself or another a performance the value of which is grossly disproportionate to the value of the mutual performance, or whoever asserts such a claim or intends to assert it

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[5] According to the literature, an attempt at the crime of usury is possible, but it is quite rare. A more detailed description goes beyond the scope of this work.

[6] However, the analysis goes beyond the scope of this paper

to himself, shall be punished by imprisonment for up to two years or a ban on activity. There must be a causal link between the abuse of the state of distress, inexperience, mental weakness or agitation of the injured party on one hand and the gross disproportion of the performance provided or promised to the offender or another person on the other hand. Thus, the mentioned state of the injured party was the reason why he entered into an unfavourable relationship with the perpetrator (Vávra, 2015). In addition, the criminal offense of fraud under Section 209, Paragraph 1 of the Criminal Code punishes anyone who enriches himself or another by misleading someone, using someone's mistake or withholding material facts, and thus causes damage to another people's property. It is punishable by imprisonment for up to two years, by prohibition of activity or confiscation of property. In short, a moneylender does not mislead anyone, as is the case with fraud.

3.2 Statistical comparison of crimes of usury, fraud and oppression

As can be seen from the statistics below for 2014 to 2017[7], the crime of usury does not occur very often in the practice of law enforcement agencies. On the contrary, the number of persons accused of fraud is about two hundred times higher. There is a slight tendency to decreased number of cases by the crime of oppression.

Table 1 Number of accused persons for the crime of usury, fraud and oppression (2014 – 2017)

Number of accused persons				
Crime/year	2014	2015	2016	2017
Usury Section 218	13	14	17	22
Fraud Section 209	2620	2871	3608	3729
Oppression Section	12	21	14	15

Source: www.justice.cz, own processing

Table 2 Number of persons convicted of the crime of usury, fraud and oppression (2014 – 2017)

Number of convicted persons				
Crime/year	2014	2015	2016	2017
Usury Section 218	4	10	11	11
Fraud Section 209	3367	3351	3111	3138
Oppression Section	18	20	16	13

Source: www.justice.cz, own processing

Table 3 Number of persons acquitted of the crime of usury, fraud and oppression (2014 – 2017)

Number of acquitted persons				
Crime/year	2014	2015	2016	2017
Usury Section 218	1	5	3	4
Fraud Section 209	224	280	262	242
Oppression Section	6	4	7	2

Source: www.justice.cz, own processing

The authors asked themselves to what extent, according to the Criminal Code, usury is used by bodies active in criminal proceedings and whether there is an increase in the number of accused persons of this crime. Although we can observe a slight increase in the number of accused persons, the increases in cases in individual years are minimal, and therefore almost certainly below the limit of statistical significance. However, this is certainly not at the expense of fraud, because it is growing slightly as well. As for the number of convicted and acquitted, their numbers have rather stagnated in the mentioned three years. However, as in the case of the defendants, the figures are so low and no significant conclusions can be drawn from them.

The reason for such low numbers for usury may be the fact that some cases are convicted as fraud[8], precisely because the injured party is very often misled. This is also confirmed by the case mentioned in the literature, which was reclassified from the crime of usury to fraud, during criminal proceedings, which is not so common (Vávra, 2019). I this case the accused person had abused the financial distress and especially the addict's drug addiction and offered the injured party a loan in the amount of CZK 50,000. He had two documents signed for the borrowed money, one of which was entitled Change of ownership and the other of the Purchase Agreement, both of which related to the property of the injured party. The defendant explained to the injured party that the second contract would come into force if it was not paid on time.

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[7] Data for 2018 were not available as of September 10, 2020
[8] although "intuitively" we perceive that it is usury

The defendant also assisted the injured party in filing a motion to initiate proceedings to allow the deposit of the ownership right in the real estate cadastre, where, however, the purchase contract was deposited. However, the injured party considered that "only" a pledge agreement was concluded between them and was therefore misled. Therefore, the court leaned towards the legal qualification according to the merits of the crime of fraud referred to in Section 209 (1d) of the Criminal Code, although the prosecution saw this act as an offense of usury (Vávra, 2019).

However, another reason for the small number of defendants for the crime of usury may be the ineffective fight against usury as such. In the authors' opinion, Maříková put it well: "*On the contrary, the fight with moneylenders looks futile. Not only absurd interest rates or sanctions on loans are enough to challenge a debt, but the abuse of one's distress, vulnerability, mental weakness and so on must also be proven. What is commonly referred to in the media as usury is simply "just" immorality, which in itself leads to the invalidity of the contract, but no longer to criminal prosecution and conviction, which could have a deterrent effect. According to police statistics, about ten cases of usury are clarified every year. This figure is in sharp proportion to how many credit frauds are clarified, where, for example, borrowers have overstated their income or withheld other liabilities when arranging loans. Last year (*in 2017, authors' note*) there were 4,100 of them*" (Boříková, 2018). Němec explains that it is advantageous for creditors to take credit fraud to court, because then their debt reliable will not be reduced. For example, some creditors deliberately stated in the contracts that the loan was for building alterations and claimed to future borrowers that it was a formality. At the same time, people did not have it for any building modifications. When they wanted to defend themselves, they were kept in check by committing credit fraud if they used the money, for example, to pay off other debts (Boříková, 2018). Moreover, it is not a criminal offense of usury until such a provider simultaneously abuses someone's mental weakness, distress, inexperience, recklessness or upset, which does not happen in practice, given the fact that the loan companies do not want to hear any such information and therefore do not even demand them (Vicherek, 2011).

From the authors' point of view, it is irrelevant whether a high-interest lender is convicted of fraud or usury, although some "positive impact of deterrence" could be considered if dishonest companies were convicted of usury. More serious is the fact that many of these companies are not criminally convicted at all and the contract is, at best, invalid. In the worst case, the debtor, under the threat of being sued for committing credit fraud, pays outrageous interest or is visited by an executor.

4 Conclusions

The main goal of this paper is to evaluate the extent to which usury according to the Criminal Code is used by bodies active in criminal proceedings and whether there is an increase in the number of accused/convicted persons of this crime. The secondary goal is to compare usury with the merits of fraud in terms of matter of fact and statistics.

The difference between usury and fraud can be briefly defined in such a way that a usurer, unlike a fraudster, does not mislead anyone. This is also evidenced by the case law that has recently been mentioned in the literature. The numbers of defendants in the crime of usury are very low nationwide, which is probably due to the fact that most of those who are called "usurers" are convicted of fraud because they have misled the victim, which the usurer (as defined by the Criminal Code) does not. The increase in accused persons for the crime of usury over time is statistically insignificant. It comes from the (legal and judicial) practice of experts that creditors often keep debtors in check with the threat of credit fraud and also deliberately do not want to know any information about their possible distress. In the authors' view, it is therefore less important whether a high-interest lender is convicted of fraud or usury, although a certain "positive impact of deterrence" could be considered if dishonest companies were convicted of usury. They consider more serious the fact that many of them are not criminally convicted at all and the contract is "only" invalid.

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References

BOŘÍKOVÁ, Hana (2009) Nejvyšší soud definoval odpovědnost věřitelů. In: *www.businessinfo.cz* [online]. 3.12.2018 [cit. 2019-08-09]. Available from: https://www.businessinfo.cz/cs/clanky/nejvyssi-soud-definoval-odpovednost-veritelu-117213.html

JANOUŠEK, Michal. (2014) Lichva jako sporný institut obecné závazkové části nového občanského zákoníku. *Právní rozhledy*, č. 13–14, 467.

KRATOCHVÍL, Vladimír a kol. (2012) *Trestní právo hmotné. Obecná část.* 2. vydání. Praha: C. H. Beck

NOVOTNÝ, Oto a Marie VANDUCHOVÁ a kol., (2007) *Trestní právo hmotné – I. Obecná část*. Praha: ASPI

ŠÁMAL, Pavel a kol. (2012) *Trestní zákoník II. Komentář*. 2. vydání. Praha: C.H. Beck

VÁVRA, Libor. Lichvář nebo podvodník?. (2019) In: *www.pravniprostor.cz* [online]. 7.3.2019 [cit. 2019-08-09]. Available from: https://www.pravniprostor.cz/clanky/trestni-pravo/lichvar-nebo-podvodnik

VÁVRA, Libor. In: *Www.pravniprostor.cz* [online]. (2015) [cit. 2019-08-09]. Available from: https://www.pravnipro stor.cz/clanky/trestni-pravo/o-zlem-lichvari-a-statecnem-princi-statu

VICHEREK, Roman. (2011) Základní skutková podstata lichvy dle § 218 odst. 1 tr. zákoníku. In: www.epravo.cz[online]. 13.10.2011 [cit. 2019-08-09]. Available from: https://www.epravo.cz/top/clanky/zakladni-skutkova-podstata-lichvy-dle-218-odst-1-tr-zakoniku-77208.html

Other:

https://cslav.justice.cz/InfoData/statisticke-rocenky.html

Zákon č. 40/2009 Sb., trestní zákoník

Zákon č. 89/2012 Sb., občanský zákoník

Usnesení Nejvyššího soudu ze dne 17. 9. 2015, sp. zn. 4 Tdo 1013/2015, část trestní

Usnesení Nejvyššího soudu ze dne 25. 5. 2016, sp. zn. 7 Tdo 431/2016, část trestní

Interpretation limitations of selected financial analysis indicators in case of a municipality

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Abstract: The paper analyses the interpretation limitations in case of three selected financial analysis indicators in the budget management area – i.e. current budget surplus per current incomes ratio, tax incomes per capita ratio, and own incomes per current expenditures ratio. The paper first analyzes each indicator separately and describes its specifics. To achieve a higher interpretation, a modification of the selected indicators was performed. The modification was based on the specifics of each indicator. The modified indicators can then be used not only to monitor the development of the results from a longer-term perspective in the municipalities, but also for cases of the comparison with other municipalities.

1 Introduction

The financial analysis evaluates the financial management of an entity, which can be both a private sector entity, or a non-profit sector. The financial analysis focuses on the identification of problems, strengths and weaknesses of the financial management, the degree of achievement of the set goals and potential threats in the future. The information obtained from the financial analysis allows conclusions to be drawn about the overall management and financial position of the entity. At the same time, they represent a basis for management decision-making (Kraftová, 2002).

The financial analysis is one of the sophisticated components of the financial management, but its use is expected more for the market sector, profit companies. In the public sector, the financial analysis has certain specifics. Therefore, in case of using financial analysis for the territorial self-governing units, it is necessary to modify the indicators of the financial analysis and choose the indicators in the adjusted structure. The set of the financial analysis indicators includes indicators of the budget management, indicators of autarky, liquidity, profitability, activity, productivity, financing or investment development/decline. The territorial self-governing unit then selects for its analysis such areas of indicators that are relevant to it (Kraftová, 2002). The financial analysis is an important management tool at the level of the local government. It should result in recommending the financial strategy for the next period. From this point of view, it is very necessary for the compilation of a realistic budget outlook and its connection to the development plan of the territorial self-governing unit (Peková, 2011).

As a rule, the financial analysis is performed on the basis of accounting data as an ex-post analysis, but it is also applicable as an ex-ante analysis. The accounting data are based on the financial statements, which each member of the local government is obliged to compile. The budgets are also other important sources in the preparation of the financial analysis of the municipalities (Peková, 2004). In rare cases, the municipalities may also use data from off-balance sheet records.

2 Methods

The following chapter describes three selected indicators of the financial analysis in the field of the budget management (focus on income and expenditure side, budget) – i.e. current budget surplus per current incomes ratio, tax incomes per capita ratio, and own incomes per current expenditures ratio. These selected indicators of the budget management are described by Kraftová (2002), or they are modified.

2.1 Budget Management Indicator (BMI₁): Current budget surplus per current incomes ratio

This is the basic and the most important indicator from the area of the budget management indicators, which allows to assess how much the municipality has saved in the current budget in one period (i.e. only current, operating incomes and expenditures are evaluated, not investment). The indicator assesses the municipality's ability to achieve savings and at the same time the disposition of achieving savings in the current budget.

$$BMI_1 = \frac{BS_C}{I_C} \tag{1}$$

where:

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BMI$_1$ budget management indicator$_1$
BS_C current budget surplus
I_C current incomes

2.2 Budget Management Indicator$_2$ (BMI$_2$): Tax incomes per capita ratio

This is another important indicator from the area of the budgetary management indicators, which makes it possible to quantify the amount of the stable, regularly recurring sources (incomes) per capita. The tax incomes form the most important item of the current incomes of the local budgets (Peková, 2011). In particular, shared taxes have a specific representation in the area of tax incomes, which include the following:

- value added tax,

- corporate income tax excluding tax paid by municipalities and regions,

- personal income tax collected by deduction,

- personal income tax from self-employment,

- personal income tax from dependent activity.

These shared taxes are characterized by the fact that the state and the territorial self-governing unit share the same tax base. Subsequently, Act No. 243/2000 Coll., On budgetary determination of incomes of certain taxes to territorial self-governing units and certain state funds, as amended, determines the share of the municipalities, regions and the state budget (state) in the national revenue of a given, specific shared tax (Peková, 2011). The fiscal autonomy of the local governments is thus very small, often zero, when sharing taxes. The local governments are usually legally entitled to a share of the shared taxes (Jílek, 2008). Furthermore, the tax incomes are also made up of entrusted tax incomes, for which the entire revenue is the income of the budget of the territorial self-government unit – i.e. real estate tax and corporate income tax on tax paid by the municipalities and regions. Subsequently, also local fees and administrative fees, gambling taxes and environmental fees and levies (Peková, 2011).

Although the results of this indicator cannot be fully influenced by the municipalities through their activities, it is the main source of the municipal budgets.

$$BMI_2 = \frac{I_T}{P}$$
(2)

where:
BMI$_2$ budget management indicator$_2$
I$_T$ tax incomes
P   population (per capita)

2.3 Budget Management Indicator$_3$ (BMI$_3$): Own incomes per current expenditures ratio

The last analyzed indicator from the area of the budget management indicators focuses on the municipality's ability to cover operating, current expenditures with its own incomes.

The own incomes are such incomes, when the municipality can influence their amount by its activities. In terms of the division into this category, tax incomes, non-tax incomes and capital incomes are included in the own incomes. However, the inclusion of all tax incomes in the own incomes is ambiguous. Peková (2004) also classifies shared taxes in the category of the own incomes, while Jílek (2008) states that the shared taxes have the nature of non-purpose transfers. That is why the shared taxes should not be included among the own incomes, but rather among the transfer incomes together with transfers.

$$BMI_3 = \frac{I_O}{E_C}$$
(3)

where:
BMI$_3$ budget management indicator$_3$
I$_O$ own incomes
E$_C$ current expenditures

3 Research results

The chapter Research results points to the ambiguous places of three selected indicators of the financial analysis in the area of the budget management in case of the territorial self-governing units. The interpretation limitation of the selected indicators is given as a result of either ambiguous interpretation in the professional literature or also due to the indicators

themselves. For this reason, possible proposals for the elimination of the interpretation limitations of these selected indicators are presented in this chapter. Furthermore, the modification of the indicators is performed leading to increase the interpretation of the individual indicators.

3.1 BMI₁: Current budget surplus per current incomes ratio

Current budget surplus per current incomes ratio is one of the most important indicators in the area of the budgetary economy. It is very beneficial for the municipality to compare the indicator over time. Comparing the results of the indicator among several municipalities may no longer achieve significant informative values. This is due to several reasons. First, the performance of the state administration in the delegated competences differs among the individual municipalities. Of course, if the municipality performs a larger scope of the state administration in the delegated competences (e.g. municipalities with an authorized municipal office or municipalities with extended competences) than the municipality that performs only the basic scope of the delegated competences, then the municipality performing the larger volume of the acts collects the larger volume of the non-investment transfers to its budget compared to municipalities, which perform only the basic scope of the delegated competences. Second, the difference is given by the size structure of the municipality - both the population of the municipality, and the area. These two factors significantly affect the volume of the tax incomes that the municipality receives in its budget (see the budget determination of the taxes). At the same time, the fact that the municipalities cannot influence the amount of the collected tax incomes into their budget and, on the other hand, the municipalities are obliged to pay mandatory expenditures cannot be neglected. The real estate tax is the only tax for which the municipality has at least partially the opportunity to influence the size of its incomes, and consequently its budget incomes. Furthermore, the local fees are the only payment of a tax nature (although referred to as fees), the introduction of which is largely decided by the municipality itself. The purpose of these fees (so-called local taxes) is to secure certain incomes to the municipal budget. As confirmed by Marková (2000), any decrease in the yield of the local fees of the municipality is noticeable.

If the indicator should be used for the comparison among several municipalities, it would be appropriate to further modify the indicator, for example by recalculating the ratio per capita. The result would be savings per capita on the current budget. Alternatively, exclude the non-investment transfers collected by the municipality for the performance of the state administration in the delegated competences from the current budget surplus and at the same time exclude from the current expenditures such expenditures which are incurred for the performance of the state administration in the delegated competences. This could largely eliminate the interpretation limitations of the indicators in comparisons among several municipalities. However, as Matej (2017) states, there are currently huge differences in per capita tax incomes, without giving special reasons. Especially thanks to the special coefficients applied by Act No. 243/2000 Coll., as amended, for Prague, Brno, Ostrava and Pilsen. Then the question remains whether the indicators after the modifications will have a higher interpretation and will be able to be used for the comparison among the municipalities.

3.2 BMI₂: Tax incomes per capita ratio

As mentioned above, the municipality cannot affect the results of the indicators except for small exceptions, which are the real estate tax and the local fees. Thanks to the expression of the tax incomes per capita, the municipality can use the indicator for the comparison over time, as well as a possible prediction of the future tax incomes per capita (assuming unchanged conditions in Act No. 243/2000 Coll., as amended). The indicator generally indicates the financial situation of the municipality, but for a closer analysis of the indicator it is appropriate to structure the municipality's tax incomes into categories of the entrusted taxes, the shared taxes, the local and administrative fees and other tax revenues (including the gambling taxes and the environmental fees and levies). Following the categorization of tax incomes, the municipality can further analyze the quality of its management.

The interpretation limitations of the indicator may also be to some extent influenced by the corporate income taxes on the tax paid by the municipalities and regions. In the main activity, the municipality pays this tax to itself, at the same time, the tax will also be reflected in the expenditures on the side of the municipal budget. Furthermore, however, there may also be a situation that the municipality may not incur the tax liability to this tax at all during the period. In case of the economic activity of the municipality, the corporate income tax on the tax paid by the municipalities and regions will be reflected as a cost in the economic (business) activity, which will be stated in the Profit and Loss Statement. For these reasons, it can be stated that the tax does not significantly increase the tax incomes of the municipality, because, as mentioned above, the tax liability of the municipality to this tax may not arise in the period. To increase the interpretation of this indicator, it would be appropriate to further reduce the total tax incomes by the amount of the corporate income tax on the tax paid by the municipalities and regions. Only stable, regularly recurring tax incomes related to the population would be retained in the indicator. Subsequently, this indicator could be used not only in the municipality to monitor the developments in the long term, but also to compare the results of the indicator among several municipalities. The modified indicator would be as follows:

$$BMI_{2M} = \frac{I_T - CIT_{M,R}}{P} \qquad (4)$$

where:
BMI₂ₘ   budget management indicator₂ – modification

I_T tax incomes
$CIT_{M,R}$ corporate income tax on tax paid by municipalities and regions
P   population (per capita)

3.3 BMI₃: Own incomes per current expenditures ratio

The indicator simply expresses the ability to cover current expenditures with its own incomes. In other words, how can the municipality cover the expenditures of its operation from its own incomes.

The first point of the discussion for this indicator is shared taxes as a part of own incomes. According to Jílek (2008), shared taxes have the nature of rather non-purpose transfers, and therefore should not be included in the own incomes, in the calculation. If these shared taxes were excluded from the own incomes, the results of the indicator would be essentially fully dependent on the activity of each municipality. This would increase the interpretation of the indicator as a result of the exclusion of the shared taxes on the own incomes. Another limitation of the indicator results from the inclusion of the capital incomes in the municipality's own incomes. The capital incomes of the municipalities belong to the category of the incomes that are not stable in the municipalities every year, they are volatile incomes. Some municipalities have not even to report these capital incomes in a given period. Then the question is whether to keep the capital incomes in the own incomes, from which the current expenditures are to be paid. On the other hand, these are such incomes that the municipality is able to influence through its own activities. The last limitation of the indicator is the inclusion of all current expenditures. As already pointed out in the paper above, the amount of the current expenditures may vary for the municipalities, precisely due to the extent of the performance of the state administration in the delegated competences. Then municipalities with a larger scope of the state administration in the delegated competences will also report the higher current expenditures. These current expenditures associated with the greater performance of the state administration in the delegated competences are financed from the non-investment transfers, they are not expected to be financed from the own incomes. As a result, the interpretation of the indicator is again affected. To increase the interpretation of this indicator, it would be recommended to exclude such current expenditures from the total current expenditures that are financed from the non-investment transfers. And at the same time, exclude the non-investment transfers intended to finance the performances of the delegated competences from the own incomes. The resulting indicator after these modifications could have the following composition:

$$BMI_{3M} = \frac{I_O - T_S - TR_{NI}}{E_C - E_{UDP}} \qquad (5)$$

where:
BMI₃ₘ   budget management indicator₃ – modification
I_O own incomes
T_S shared taxes
TR_{NI} non-investment transfers intended to finance the performances (expenditures) of the delegated competences
E_C current expenditures
E_{UDP} expenditures incurred under the delegated competences

The indicator allows to compare the results in the municipalities among years. From a long-term perspective, the indicator is suitable for evaluating the development of the municipality's economy, the independence of the municipality, the municipality's ability to cover the operating expenditures from its own incomes. The indicator is also suitable for the planning future current expenditures, whose amount is affected by the own incomes. If the indicator were to be used for the comparison among several municipalities, further modification would be appropriate, by recalculating the number of the inhabitants of each municipality because of the differently sized municipalities.

4 Conclusions

The indicators of the financial analysis for the territorial self-governing units are very briefly represented in the professional literature. This fact can be attributed to the specific use of these indicators and the voluntary nature of the municipalities conducting financial analysis. Although the indicators are defined in the professional literature, their application brings a number of the limitations, especially in the interpretations of the individual indicators. For this reason, the financial analysis of the municipalities is relatively neglected.

The paper analyzed the reasons for the reduction of the interpretations in three selected indicators of the financial analysis in the area of the budget management. In order to achieve the higher interpretation, the modification of each indicator was performed, which was based on the specifics of each indicator separately. The indicators were modified to be used by the municipalities also for the cases of the comparison with other municipalities. Nevertheless, it should be noted that the same value of the indicators may have the different impacts in the different sized municipalities. Furthermore, the fact that the different results of the indicators among the municipalities may also be due to the different attitudes of the municipalities to the activities in the field of the municipal budgets, which the municipalities may affect.

References

Jílek, M. (2008). Fiskální decentralizace, teorie a empirie. Praha: Wolters Kluwer. ISBN 978-80-7357-355-3.

Kraftová, I. (2002). Finanční analýza municipální firmy. Praha: C. H. Beck. ISBN 80-7179-778-2.

Marková, H. (2000). Finance obcí, měst a krajů. Praha: ORAC. ISBN 80-86199-23-1.

Matej, M. (2017). Financování obcí v ČR – současný stav a další vývoj RUD a dotací. *Deník veřejné správy.* [online]. Retrieved from http://denik.obce.cz/clanek.asp?id=6743008

Peková, J. (2004). Hospodaření a finance územní samosprávy. Praha: Management Press. ISBN 80-7261-086-4.

Peková, J. (2011). Finance územní samosprávy. Praha: Wolters Kluwer. ISBN 978-80-7357-614-1.

Zákon č. 243/2000 Sb., o rozpočtovém určení výnosů některých daní územním samosprávným celkům a některým státním fondům, ve znění pozdějších předpisů

Financing long-term care in Germany –
A systematic literature research

Gerda Schmahl[1]

Abstract:

Background: The aging of the population, combined with increasing severe disabilities and declining birth rates, increases the need for long-term care (LTC) and requires increasing resources to finance care costs. Many countries are under pressure to find solutions to finance LTC. Therefore, this issue has been placed at the top of their economic and social agenda. This manuscript goals are to contribute to acquire an improved knowledge about LTC systems within the European Union. The aim of this paper is to present the current state of the science on the question of financing LTC in Germany and to show which financing approach Germany follows to cover the social risk of the need for LTC.

Methods: A systematic literature search was performed for papers on financing LTC in Germany, using the following databases: PubMed and Scopus. The results were supplemented by a hand search on websites of national governments and institutions.

Results: 22 out of 873 potentially relevant studies met the inclusion criteria. These focused on the entire German financing system, LTC services, the social care insurance and the private complementary care insurances.

Conclusion: Recent policy reforms aim to address one of the program's core problems: the financial sustainability of LTC insurance in view of an aging population. The financing of the German welfare state is not yet sustainable in the long term. To avoid future increases in contributions rates, alternative financing mechanisms should be considered.

Keywords: Long-Term Care, Financing, Germany.
JEL Classification: G22, I11, J14

1 Introduction

The aging of the population, combined with increasing severe disabilities (Lafortune, et al., 2007) and declining birth rates, increases the need for long-term care (LTC) and requires increasing resources to finance LTC costs. Many countries are under pressure to find solutions to finance LTC. Therefore, this issue has been placed at the top of their economic and social agenda (Bascans, et al., 2017).

The way how LTC is financed in the social security systems of the European Union member states varies greatly (European Commission, 2013). In general, LTC systems fit into a wide range of funding schemes, including social security, a tax-financed system and/or facultative health insurance. In practice, however, hybrid models are found (Costa-i-Font, et al., 2012). The majority of the countries financed LTC almost entirely by the state through taxes or social security, while in other countries households play a major role with their private payments (Angermann, et al., 2012).

This manuscript goals are to contribute to acquire an improved knowledge about LTC systems within the European Union. The aim of this paper is to present the current state of the science on the question of financing LTC in Germany and to show which financing approach Germany follows to cover the social risk of the need for LTC.

2 Methods

The present manuscript is based on a systematic literature search, extended by a hand search. The research question is to be answered with the help of already analyzed data and existing expert publications. Specifically, this is a so-called secondary data analysis. The aim of this procedure is to provide a comprehensive overview of the current state of research and the respective implementation in the selected European country. The following chapter deals with the delimitation of the research content, the selection of the used data sources and a suitable screening of studies using selection criteria. The question of what, where and finally how was searched is answered here. The results of the search and selection are presented at the end.

2.1 Delimitation of the research content

The basis of any literature research is the reflection on the topic and the associated delimitation of the research content. The question of financing LTC in Germany is to be answered here. The definition of LTC by the European Commission provides the framework for the selection of the literature. Only through the same interpretation of the terms, a uniform

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methodical approach to literature procurement and evaluation, it is possible to make an exact statement about the state of knowledge. Assuming the definitions of the LTC, the width of the search depends on the number of countries to be examined. The depth of the research is determined by the intensity of the analysis. For one thing, the analysis should be as wide as possible in order not to limit the validity of the results by missing elements. For another thing, it is also useful to go into detail in the analysis, for being able to satisfactorily work out the financing structure of the German LTC system. The literature research must cover the width as well as the depth of the analysis mentioned above. On the downside, the scope of the work is limited, so that a compromise has to be found in the execution. For this work it implies that the literature search is mainly based on current studies. The aim of this section is to provide a statement on the current state of the science in financing LTC in Germany (Lafortune et al. 2007).

2.2 Sources of information

The first step in identifying suitable studies is the selection of search sources. The literature search should ensure a complete research. Therefore, the literature databases PubMed and Scopus are used. The results found there are supplemented by a hand search on websites of national governments and institutions, since information on political decisions and measures often cannot be found directly in the aforementioned databases. It should be noted that the subsequently developed search query is not supported in all institutional internet catalogs, which is why there is usually reason to conduct an individual research on hand searches.

2.3 Search strategy

At the beginning of the literature research, the search components must be identified. In order to carry out this process systematically, the research question to be answered is divided into several components. The following three search components can be identified with the question on how is LTC financed in Germany:

- Long-term care
- Financing
- Germany

For the three search components, suitable search queries in the form of terms, synonyms and keywords in German and English must be developed. In a first unsystematic online search, terms and synonyms were found. To make the search query more precise, suitable keywords were found in the register functions of the database owned thesauri of Scopus and PubMed. The aim of this procedure is to develop a uniform standard search query. The thesauri prevent misunderstandings regarding the terms and, as highly structured and standardized applications within the databases, allows an efficient search using a minimum number of words (Corrall, et al., 2002). In order to be able to perform a uniform search in the PubMed and Scopus databases, the MeSH terms were used for the individual search components, as they are used in both databases.

For a suitable search query, the search components must be linked reasonably and in a second step the search criteria themselves must be linked in a suitable manner. The Boolean operator "OR" is used to connect all terms within a search component. Records, which are anchored with at least one of these terms, are identified with it. The result is a union set. In the second step, the search components themselves are connected with the operator "AND". Records that are connected to both are identified. The outcome is the intersection of the results of both components. Table 1 shows the combination of the terms within the components as well as the connection of the components themselves to a search query (Lauerer, et al., 2011).

Table 1 Search terms with connections

Search components	Search terms with connections
1. Long-term care	„Langzeitpflege" OR „Formelle Pflege" OR „Informelle Pflege" OR „Long Term Care" OR "Formal Care" OR "Informal Care" OR "Long-Term Care"
	AND
2. Financing	„Finanzierung" OR „Versicherung" OR „Financing" OR "Financial* OR "Spending" OR "Insurance" OR "Economics" OR "Financing, Organized" OR "Financing, Government"
	AND
3. Germany	„Deutschland" OR „deutsch* OR „German" OR „Germany"

Source: Own presentation

A standard search query was created from the components of Table 1, which can be used for scanning the selected sources. Due to the diversity of the selected databases, the standard search query is slightly modified because of the different input possibilities.

2.4 Selection of search results

This section describes the inclusion criteria used in the systematic literature search. They serve as selection exclusion criteria for the results from the two databases that did not meet the requirements. In the following, the inclusion criteria are listed in order of importance and are detailed in Table 2 below:

Table 2 Overview of inclusion criteria

S1	Application / use of long-term care and a term of financing.
S2	Long-term care is being researched in Germany.
S3	Publication in the last eleven years.
S4	Language of publication is German and / or English.
S5	The same publication is included only once in the results.
S6	The full text of the publication is available.
S7	The publication is not in the form of a commentary, editorial or letter.

Source: Own presentation

To execute the screening, the search results were downloaded from the individual databases with title and abstract. The literature screening serves to systematically sift through the search hits received from the two databases. This is followed by a screening process consisting of several phases. First, the titles are examined. If a title violates an inclusion criterion, the publication will be excluded. This process is carried out separately from the results of the individual databases to determine which database was the most successful for the search request. The second step is the evaluation of the abstract. If the publications are in conflict, they will be excluded. The last step in the screening process is the review of the full texts for their relevance. If a publication has passed all three phases without exclusion, it is considered relevant.

3 Research results

A total of 873 search hits were generated on both databases. These were divided between the individual databases as follows: 675 search hits were found in the Scopus database and 198 search hits in the PubMed database. The results make it clear that the Scopus database was crucial for the search of literature on this topic. The identified titles were supplemented by 23 further results from the hand search. Shown below are the results presented graphically in a flowchart.

Figure 1 Research process
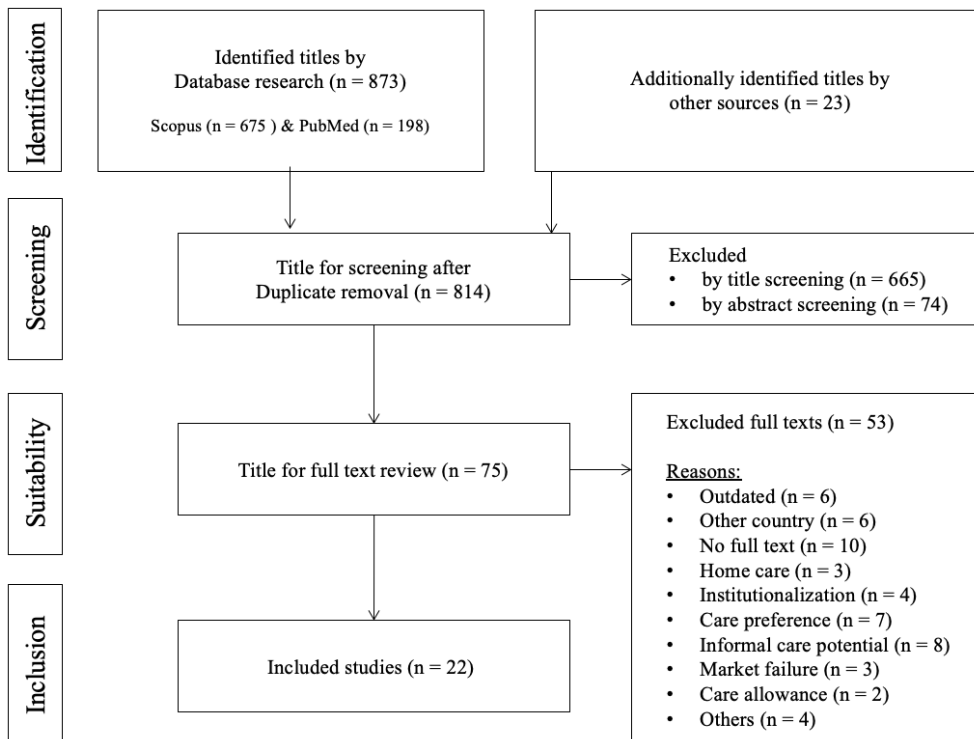
Source: Beutner, et al., 2017

Of the 896 publications identified, 821 references were discarded after duplicates had been eliminated and the title and abstract had been reviewed for thematic relevance. This left 75 publications for which inclusion or exclusion was decided on the basis of a full text review. In the graph above, the excluded full texts were listed with reasons. Finally, 22 publications were selected for this work. Six publications examined the entire German financing system, four focused on LTC services, 10 analyzed the social care insurance and two dealt with private complementary care insurances. Of the 22 publications, six were identified by the databases Scopus and PubMed. If one compares the 16 publications of the hand search, it can be seen that especially governmental institutions of the European Union and Germany are involved in research on the financing of LTC in Germany and provide research reports.

3.1 Financing of long-term care in Germany

Numerous aspects on financing LTC were covered in the publications. The key features about the German system are presented below.

3.2 Social Care Insurance

Financing the social care insurance had not been a problem in the first years of its introduction, as a surplus was generated by the few applicants. However, expenditure already exceeded income in 2002, which prompted increases in contributions and led to discussions about prefinancing the program, because the social care insurance is obliged to finance itself (Nadash, et al., 2018). The following major care reform in the last legislative period had considerable effects on the financing of the social care insurance (Rothgang, et al., 2018). The benefits for people in need of care have been expanded considerably with the introduction of the new care levels. In 2017, there were more than 700,000 people in need of LTC compared to the end of 2013. Between 2013 and 2017, the benefits' expenditure of the social care insurance rose by more than € 12 billion and thus much more strongly than expected to 35.5 billion. In order to compensate for the deficit of € 2.4 billion incurred by the social care insurance, contributions had to be increased (Bundesministerium für Gesundheit, 2018). As a consequence, maintaining the solvency of the social care insurance represents a major challenge (Nadash, et al., 2018).

The LTC insurance is based on the structure of the statutory health insurance. One major difference, however, is that it is only partially comprehensive insurance. As a rule, persons in need of nursing care have to make additional payments (Auth, 2012). Thus, the social care insurance already bears only half of the actual costs of the need for care, with a downward trend. The remaining amount is borne privately by those in need of LTC. Those who cannot afford the additional payments are entitled to social assistance under the "Help for Care" scheme (Breyer, 2016). In Germany, the most important sources of financing are the social care insurance, social welfare and private equity. In 2017, 89% of the German population is covered mandatory under the social care insurance. The remaining 11% of citizens are obliged to purchase a mandatory private care insurance (to supplement their private health insurance) (Rothgang, et al., 2018). Premiums have risen since the social care insurance was founded. Most recently, on January 1, 2019, the premium rates were increased by 0.5 points to 3.05% of the gross income (Nadash, et al., 2018). Employers pay one half, while after retirement the insured pays the full premium (Bundesministerium für Gesundheit, 2018). From the age of 23 onwards, childless persons must pay a supplement of 0.25 percentage points of their income to be paid by them solely. The private insurance companies charge premiums regardless of the income of the insured. If the privately insured person is an employee, he or she receives a subsidy from his or her employer in the amount that would be due if he or she were a member of the social care insurance (Nadash, et al., 2018). LTC in Germany is largely financed by the social care insurance. The income of the social care insurance is almost exclusively generated by contributions, which are paid on a pay-as-you-go basis (Heintze, 2012). The private care insurance operates on the basis of the projected unit cost method. Under this method, provisions for old-age are probably calculated for the future need for LTC. If nursing care is needed and outpatient services are used, the principle of cost reimbursement applies to the private care insurance and the principle of benefits in kind to the social care insurance (Rothgang, et al., 2014).

3.3 Expenditure

In 2016, 83.7% of total public expenditure on LTC will be covered by the social care insurance. A further 11.2% of this expenditure is covered by social welfare. In contrast, the share of public spending, borne by the private care insurance with a quota of 3.0%, war victims' benefits with a quota of 0.5% and civil servants' allowances with a quota of 1.5%, is relatively small. Overall, these sources of funding accounted for 80.1% of total LTC expenditure. The social care insurance is thus the most important funding source and at the same time covers only 67.1% of the costs incurred. Another 19.9% of total LTC expenditure was privately financed in 2016. However, this figure does not take into account the opportunity costs of family care nor the € 8 billion that was privately funded for board and lodging and investment costs in nursing homes. In addition to this, the € 3.8 billion of private expenditure by persons in need of care who were unable to pay the costs is missing. The partial insurance character of the LTC insurance system is therefore very clear (Rothgang, et al., 2018).

3.4 Private complementary care insurance

Private complementary care insurances have been available in Germany since the mid-80s. However, they only play a minor role in financing LTC (Rothgang, et al., 2018). The voluntary private complementary care insurance "Pflege-Bahr" was introduced in January 2013 (Costa-i-Font, et al., 2012). The aim was to use the private market to close the gap between the full costs of care and the benefits provided by social care insurance. This was achieved by promoting the purchase of private complementary care policies (Breyer, 2016). A premium of at least € 10 per month is charged, which is then subsidized with € 60 per year (Nadash, et al., 2018). In 2017, the number of state-subsidized policies rose by 7.3% to 834,000 contracts. The number of non-government subsidized policies increased by 2.1% to more than (Breyer, 2016) 2.74 million (Verband der Privaten Krankenversicherung e.V., 2018), so that there is now a total of around 3.6 million private complementary care insurance policies (Handelsblatt, 2018). For the year 2015, the number of contracts was compared with the size of the reference group. It was found that less than 7% of citizens have such a contract. The future share of purchases at the current growth rate will increase less than 1% per year. In 2040 only 27% of all citizens would have private complementary care insurances. The share of the private complementary care insurance market would be too small, since at this point in time the aging of the population in Germany has reached a level that would put the financing of social benefits in the social care system at considerable risk (Verband der Privaten Krankenversicherung e.V., 2018).

4 Conclusions

LTC insurance contains a number of birth defects that still have an impact today and are shaping current reform projects and debates. These include the dual system of social and private care insurance. In 2016, the average per capita expenditure from public sources for a private care insured person (plus those entitled to subsidies) was € 168 and € 393 per social care insured person. This corresponds to about 42% of the expenditures of the social care insurance for a private care insured person (Rothgang et al., 2014). The reason for this is risk selection, from which private care insurance benefits at the expense of social care insurance. This is because privately insured persons not only have higher incomes, but also lower age-specific care prevalence. In addition to this, there is above-average representation of men, who have a lower frequency of care. This results in a disadvantage for those insured under the social insurance system. An integrated LTC insurance system comprising the entire population would be the easiest way to compensate for the unequal distribution of risks.

The concept of advance financing through a demographic reserve fund was enabled in 2015 with the establishment of the LTC provision fund (Rothgang, et al., 2013). Currently, 0.1% of the nursing care insurance contributions per year are invested in this fund within the social care insurance. The aim is to pay into this fund by 2034. Thereafter, the paid-in funds plus interest will be added to the contributions to finance expenditure (Nadash, et al., 2018). The LTC provision fund has been the subject of considerable criticism. The Deutsche Bundesbank concedes that it is not possible to protect these reserves from future access by the Finance Minister, so there are doubts that this fund is really secure. On the other hand, the fund is so small that a relief of 0.1 contribution rate points is inevitable in the period from 2035 to 2045, when the contribution rate is likely to be closer to 4 contribution rate points. In addition, the fund is not sustainable. This is because it will be exhausted precisely when the highest number of people in need of LTC will probably be reached at the end of 2050 (Kochskämper, 2017).

Despite drastic reforms, the financing of the German welfare state is not yet sustainable in the long term. If attempts are made to maintain the current levels of benefits in the LTC insurance system, the contribution rates will have to be increased considerably. The main reason for this is the two-fold ageing of the German population. In addition to this there is the fact that LTC insurance already covers only half of the actual costs of the need for LTC. Those in need of care who are unable to pay privately for the costs have claims on their social welfare institutions. This expenditure by the local authorities amounted around € 3.5 billion in 2016, which is 14% of the expenditure from the social care insurance system. This amount is likely to increase dramatically in the next few years, as the pension level will very likely fall and care costs will rise disproportionately (Breyer, 2016).

Recent policy reforms aim to address one of the program's core problems: the financial sustainability of LTC insurance in view of an ageing population. However, it remains to be seen what the longer-term impact of this will be, given the unpredictability of demographic change, future LTC needs and the adequacy (or otherwise) of funding reforms (Nadash, et al., 2018). Conclude from the findings, the recommendation for further research is to explore other ways of financing future care services, at least for the part of care costs that is currently not covered by the social care insurance (Breyer, 2016).

References

Angermann, A. and Eichhorst, W. 2012. *Unterstützende Dienstleistungen für ältere Menschen im europäischen Vergleich.* Beobachtungsstelle für gesellschaftspolitische Entwicklungen in Europa (BEO) und Institution zur Zukunft der Arbeit (IZA). Berlin: Deutscher Verein für öffentliche und private Fürsorge e.V., 2012. IZA Research Report Nr. 45.

Auth, D. 2012. *Ökonomisierung von Pflege in Großbritannien, Schweden und Deutschland.* Zeitschrift für Gerontologie und Geriatrie. Springer Verlag. 26. August 2012, 7, pp. 618-623. Available under: doi: 10.1007/s00391-012-0389-0.

Bascans, J.M., Courbage, C., Oros, C. 2017. "*Public support and the interaction between long-term care insurance and informal care*", International Journal of Health Economics and Management, 17(2), pp. 113-133.

Beutner, K., Saal, S. & Klingshirn, H. 2017. Maßnahmen zur Prävention und Therapie von Beeinträchtigungen durch Gelenkkontrakturen in der geriatrischen Langzeitpflege - eine systematische Übersichtsarbeit. *Zeitschrift für Gerontologie und Geriatrie.* 6. April 2017, 50, S. 9.

Breyer, F. 2016. *Die Zukunft der Pflegeversicherung in Deutschland: Umlage und Kapitaldeckung.* In: Zeitschrift für die gesamte Versicherungswissenschaft. 105(5), pp. 445-461. ISSN 0044-2585. eISSN 1865-9748. Available under: doi: 10.1007/s12297-016-0357-7.

Bundesministerium für Gesundheit 2018. Pflegeversicherung, Zahlen und Fakten. *Warum höhere Beiträge zur Pflegeversicherung notwendig sind.* [Online] 30. November 2018. [citied 15. August 2020.].

Corrall, C. J., Wyer, C. P., Zick, L. S. & Bockrath, C. R. 2002. How to find evidence when you need it, part 1: databases, search programmes and strategies. Ann Emerg Med., 39(3), 302-306. Available under: doi: https://doi.org/10.1067/mem.2002.122149.

Costa-i-Font, J. & Courbage, C. 2012. Financing Long-Term Care in Europe - Institutions, Markets and Models. New York: Palgrave Macmillan, 2012. ISBN: 978-1-349-32079-0.

European Commission. 2013. *Long-term care in ageing societies - Challenges and policy options.* Social investment package. Commission staff working document. SWD. 41 final. Brussels: European Commission.

Handelsblatt. 2018. Statista. *Anzahl privater Pflegezusatzversicherungen in Deutschland in den Jahren 2014 bis 2018 (in Millionen).* [Online] 08. August 2018. [citied: 15. September 2020.] https://de.statista.com/statistik/daten/studie/893431/umfrage/private-pflegezusatzversicherung-in-deutschland/.

Heintze, C. 2012. *Auf der Highroad – der skandinavische Weg zu einem zeitgemäßen Pflegesystem - Ein Vergleich zwischen fünf nordischen Ländern und Deutschland.* Friedrich- Ebert-Stiftung, Wirtschafts- und Sozialpolitik. Bonn: Bonner Universitäts-Buchdruckerei.

Kochskämper, S. 2017. *Alternde Bevölkerung: Herausforderung für die Gesetzliche Kranken- und für die soziale Pflegevericherung.* Cologne: IW - Institut der deutschen Wirtschaft, IW-Report, No. 8/2017.

Lafortune, G. & Balestat, G. 2007. *Trends in Severe Disability Among Elderly People: Assessing the Evidence in 12 OECD Countries and the Future Implications.* Directorate for Employment, Labour and Social Affairs. Paris: OECD, Health Working Papers. 26.

Lauerer, M., Emmert, M. und Schöffski, O. 2011. *Die Qualität des deutschen Gesundheitswesens im internationalen Vergleich.* Burgdorf: Herz. ISBN: 978-3-936863-17-8.

Nadash, P., Doty, P. & von Schwanenflügel, M. 2018. *The German Long-Term Care Insurance Program:* Evolution and Recent Developmants. *The Gerontological Society of America.* April 2018, Issue 58, 3, pp. 588 - 597.

Rothgang, H., Müller, R., Mundhenk, R. & Unger, R. 2014. BARMER GEK Pflegereport 2014. Siegburg: Asgard-Verlagsservice GmbH, Schriftenreihe zur Gesundheitsanalyse. Issue 29. ISBN: 978-3-943-74494-1.

Rothgang, H, Müller, R & Unger, R. 2013. *BARMER GEK Pflegereport 2013.* Siegburg: Asgard Verlagsservice GmbH, Schriftenreihe zur Gesundheitsanalyse, Issue 23. ISBN: 978-3-943-74488-0.

Rothgang, H. & Müller, R. 2018. *BarmerPflegereport 2018 - Schriftenreihe zur Gesundheitsanalyse.* Berlin: BARMER, ISBN: 978-3-946199-19-9.

Verband der Privaten Krankenversicherung e.V., 2018. *Zahlenbericht der Privaten Krankenversicherung 2017.* Köln: Verband der Privaten Krankenversicherung e.V., ISSN 0503-8839.

Analysis of the financial indicators in companies affected by the circular economy

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Abstract: Circular economics is a system in which production systems are closed in relation to resources, where these resources are reused. This can occur in material flows, energy flows and more. This paper primarily deals with the analysis of financial indicators (total amount of assets, total amount of fixed assets, current assets, owner´s equity, liabilities, costs and revenues) for companies that have implemented elements of circular economy in comparison with companies that do not have implemented the elements of circular economies. It was found that certain financial indicators are influenced by the implementation of elements of the circular economy. These are indicators of current assets and owners' equity. Significant differences in other financial indicators were found in the breakdown of companies according to the established individual elements of the circular economy, such as backup of plastic packaging, increasing the life of packaging; recycling and re-use of waste; and use of renewable resources, specifically for the indicator total assets, fixed assets, liabilities, operational revenues and operational costs.

1 Introduction

The basic goals of the circular economy include minimizing the consumption of resources, which are limited and, conversely, focusing on re-inserting already used raw materials or outputs (waste) back into the production process. It is therefore a matter of the recovery of waste and its reprocessing. The concept of circular economics is derived from this goal, which means the constant circulation of raw materials in production. The circular economy is also supported by the transition to renewable energy sources, creating economic, natural and social capital. It is based on the principles of minimizing waste and environmental pollution, the constant cycle of products and materials and the regeneration of natural systems to ensure value for future generations. Circular economics is often defined as it focuses on resource use often follow the 3-R approach (Kirchherr et al., 2017):

- Reduce (minimum use of raw materials),

- Reuse (maximum reuse of products and components),

- Recycle (high quality reuse of raw materials).

The concept of circular economy has a growing trend. This is indicated by the rapid growth of peer-reviewed articles on this topic. More than 100 articles were published on the topic in 2016, compared to only about 30 articles in 2014 (Geissdoerfer et al., 2017). The transition to a system of circular economy is a difficult but important process, and requires cooperation and collaboration on several levels at once. At present, only 8.6% of countries belong to the circular economy. The World Economic Forum addresses three basic pillars that collect together private, public, civil society and professionals to accelerate the transition to a circular economy. In the private sector, key indicators are financial indicators, on the basis of which not only individual companies but also the entire economy are evaluated and analyzed (WEF, 2020). Pauliuk (2018) evaluates the circular economy standard BS 8001: 2017 issued by the British Standards Institution. Norm seeks to reconcile the revolutionary ambitions of the circular economy with established business practices. Pauliuk (ibid) describes the gaps contained in the standard and proposes general definitions of the system for deriving circular economy indicators.

Circular economics is also linked to the analysis of production, production systems, Industry 4.0, which are assessed on the basis of financial indicators, where based on the initial analysis firstly calculates the profitability and effectiveness of investments in the future. The connection of the circular economy to accounting and financial indicators is discussed by Fischer-Kowalski et al. (2011), who analyze individual methods of accounting for material flows within the whole economy. At the same time, they determine the reliability and uncertainty of data when charging the material flows.

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Cleveland et al. (2000) deal with the so-called energy accounting, ie accounting in relation to the use and consumption of energy. They found that companies with high environmental performance tend to be profitable. At the same time, they set suitable indicators for the analysis of ecological systems and the amount of energy put into operation. Franklin-Johnson et al. (2016) also work with developing new indicators for assessing the environmental impacts associated with a cyclical economy. These are indicators that can be used in the organization of production processes at various organizational levels in the company.

Scarpellini et al. (2020) define and measure the environmental capabilities used in the implementation of the circular economy in companies. The study provides material to bridge the gap between academic research in environmental accounting and the study of the introduction of a cyclical economy in companies. Based on statistically significant differences, King & Lenox (2008) found that there is a link between higher financial valuation and lower environmental pollution. Ghisellini et al. (2018) examine the environmental and economic costs and benefits of the circular economy in a selected industry. The aim is to innovate the whole chain of production, consumption, distribution and use of materials and energy. Lieder & Rashid (2016) seeks to propose a framework that will be used as a strategy for implementing a cyclical economy. They focus on three aspects: resource scarcity, waste generation and economic benefits, and seek to provide a comprehensive overview of research efforts covering these aspects.

The link between the circular economy and the possibilities of energy savings in the Czech Republic is set by Švecová et al. (2019), who discuss the problems of implementing zero carbon and zero waste approaches. They point out the obstacles and barriers that may arise in the implementation of decarbonisation plans and in the application of renewable energy. Their article focuses on the implementation of the circular economy and points out other possibilities for energy savings. The results show that the Czech Republic is involved in the system of circular economy and has great potential in this regard. The system of circular economy is also discussed in the paper by Smejkalová et al. (2018). They deal with the area of waste management and its development. In order for waste management to work effectively, a quality forecast reflecting the analyzed time frame is needed. When planning waste management, the production forecast and waste structure are very important. However, the currently available data are not sufficiently informative due to the short time series and the poor availability of socio-economic data. They propose a mathematical model for the prediction of future parameters related to waste, which would eliminate the existing shortcomings of previous models.

The aim of this paper is to analyse relationship between circular economy and selected financial data of analysed companies in the Czech Republic. The indicators total assets, total fixed assets, current assets, owner´s equity, liabilities, costs and revenues were selected for the analysis. Several hypotheses have been established. Therefore, it was established that there is not a relation between financial data and: circular economy (H1), backup of plastic packaging, increasing the life of packaging (H2), recycling and re-use of waste (H3), use of renewable resources (H4).

2 Methods

Data for analysis were obtained from two sources. In the first step, it was necessary to find out whether the analyzed companies have implemented elements of the circular economy or have not. This data was collected by means of questionnaire surveys, when a proportional sample of more than 12,900 enterprises was created to match the distribution in the Czech Republic, subsequently, in 2020, data from 245 companies were obtained with a return of almost 2 %. In the next step, the values of financial data were determined for such classified companies, where the data were obtained from the Albertina Gold Edition database. Unfortunately, it was not possible to obtain financial data from all 245 companies, but only from 160 companies. Data for 2018 were analyzed for these companies (financial data for 2019 were not yet available at the time of writing).

The enterprises were divided according to implementation of elements of circular economy for research purposes. Of these enterprises, 84 enterprises do not have implemented elements of the circular economy and 76 enterprises have them implemented. Subsequently, the individual relationships of these factors were analysed by using a statistical Mann-Whitey U test.

This test is used to evaluate unpaired experiments when comparing two different samples. It was tested the hypothesis that two variables have the same probability distribution. At the same time, these variables may not correspond to Gaussian normal distribution, it is sufficient to assume that they are continuous. The distribution under the zero hypothesis is known. U is then given by (Devore, 2015):

$$U_1 = R_1 - \frac{n_1(n_1+1)}{2}, \tag{1}$$

where:

U   the calculation of a statistic,

n_1 the sample size for sample 1,

R_1 the sum of the ranks in sample 1.

An equally valid formula for U is:

$$U_2 = R_2 - \frac{n_2(n_2+1)}{2} \tag{2}$$

The smaller value of U1 and U2 is the one used when consulting significance tables. The sum of the two values is given by:

$$U_1 + U_2 = R_1 - \frac{n_1(n_1+1)}{2} + R_2 - \frac{n_2(n_2+1)}{2} \tag{3}$$

where:

n_2 the sample size for sample 2,

R_2 the sum of the ranks in sample 2.

Knowing that $R_1 + R_2 = \frac{N(N+1)}{2}$ and $N = n_1 + n_2$, and doing some algebra, we find that the sum is $U_1 + U_2 = n_1 n_2$.

It was tested the hypothesis H0: $\vartheta1$ - $\vartheta2$ = 0 against the alternative one.

3 Research results

As mentioned above, the data for the analysis were obtained from two sources - the first source was a questionnaire (the questionnaire found out which companies have and which do not have implemented elements of circular economy) and the database as a second source to obtain financial data from these companies. Based on the Mann-Whitney U Test, the financial data of companies in relation to the implementation of elements of the circular economy were statistically analyzed. The level of significance was determined to p = 0.05. A total of 7 financial indicators were analysed and the results are shown in Table 1.

Table 1 Mann-Whitney U Test – dependence of financial indicators on the circular economy

Financial indicator	Circular econ. YES	Circular econ. NO	U	Z	P-value	Z edited	P-value edited
Total Assets	7074	5806	2880	1.0644	0.2871	1.0644	0.2871
Fixed Assets	6918	5962	3036	0.5313	0.5951	0.5313	0.5951
Current Assets	7414	5466	2540	2.2261	0.0260	2.2262	0.0259
Owner´s Equity	7247	5314	2388	2.5317	0.0113	2.5318	0.0113
Liabilities	6850	6030	3104	0.2989	0.7649	0.2990	0.7649
Operating Revenues	7134	5746	2820	1.26937	0.2043	1.2703	0.2039
Operating Costs	7118	5762	2836	1.2147	0.2244	1.2156	0.2241

Source: Own processing

The hypotheses H0 = x0.50 – y0.50 = 0 were tested, where it is assumed that the financial indicators in these companies are the same (or very similar) in both groups and the hypothesis HA= x0.50 > y0.50, which assumes that the financial indicators in these companies are different. Table 1 shows that there are significant differences in the indicators current assets and owner´s equity at the statistical level of significance p = 0.05. In these indicators the zero hypothesis in favour of the alternative hypothesis was rejected based on a set significance level. The following graph 1 provides more detailed results. From this graph (boxplot on the left) it is clear that the amount of current assets is higher for enterprises that do not have implemented elements of circular economy and at the same time (boxplot on the right) it is clear that enterprises that have implemented elements of the circular economy have a lower share of owner´s equity.

Figure 1 Owner´s equity (on the left boxplot) and current assets (on the right boxplot) in relation to circular economy
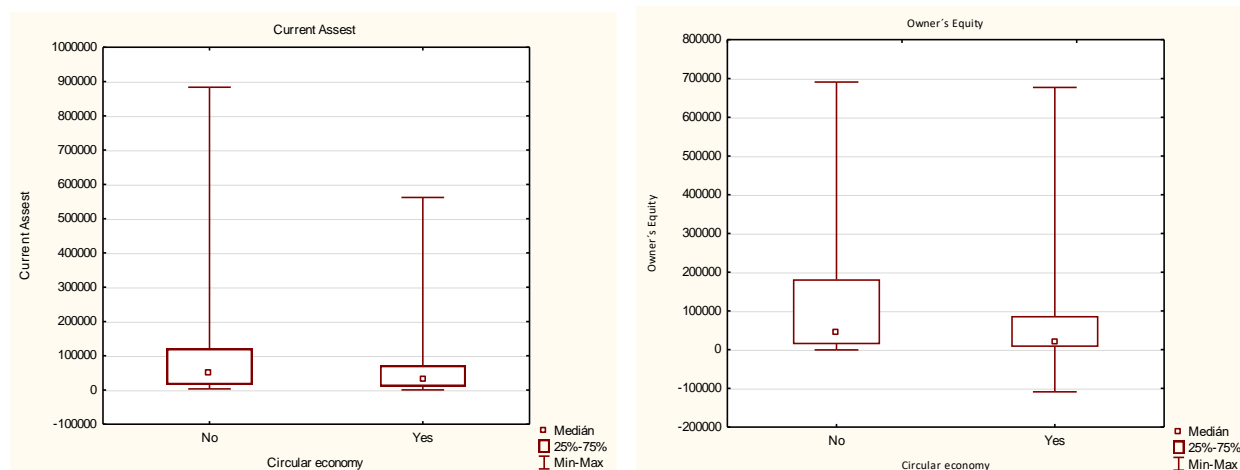
Source: Own processing

If we also look at other graphs (these were not inserted due to the scope of the paper), then other results are also obvious for the financial indicators total assets and fixed assets. Although these results were not statistically significant, the graphical representation shows that the value of total assets is higher for enterprises that are not affected by elements of the circular economy and the value of fixed assets is higher for enterprises that are affected by the circular economy.

The questionnaire survey also found out which elements of the circular economy are most often represented in companies. The three most common elements of the circular economy are 1) backup of plastic packaging, increasing the life of packaging, 2) recycling and re-use of waste, and 3) use of renewable resources. These elements were then analyzed using the same statistical test to determine their relationship to financial indicators. As in the previous step, the indicators total amount of assets, total amount of fixed assets, current assets, owner´s equity, liabilities, costs and revenues were analyzed. The results (confirmation and refutation of H2, H3 and H4) are shown in Table 2.

Table 2 Mann-Whitney U Test – dependence of financial indicators on individual elements of the circular economy

Financial indicator	Circular econ. YES	Circular econ. NO	U	Z	P-value	Z edited	P-value edited
Recycling and re-use of waste							
Total Assets	199	11	8	1.1968	0.2313	1.2014	0.2295
Fixed Assets	191	19	16	0.1889	0.8501	0.1896	0.8495
Current Assets	199	11	8	1.1968	0.2313	1.2014	0.2295
Owner´s Equity	187	23	16	-0.1889	0.8501	-0.1896	0.8495
Liabilities	207	3	0	2.2047	0.0274	2.2131	0.02688
Operating Revenues	195	15	12	0.6929	0.4883	0.6955	0.4867
Operating Costs	191	19	16	0.1889	0.8501	0.1896	0.8495
Use of renewable resources							
Total Assets	211	20	14	1.2562	0.2090	1.2603	0.2075
Fixed Assets	176	14	8	1.7329	0.0831	1.7398	0.08188
Current Assets	211	20	14	1.2562	0.2090	1.2603	0.2075
Owner´s Equity	213	18	12	1.4573	0.1450	1.4620	0.1437
Liabilities	201	30	24	0.2512	0.8016	0.2520	0.8009

Operating Revenues	209	22	16	1.0552	0.2912	1.0587	0.2897
Operating Costs	209	22	16	1.0552	0.2912	1.0587	0.2897
Backup of plastic packaging, increasing the life of packaging							
Total Assets	89	31	10	1.9445	0.0518	1.9711	0.0487
Fixed Assets	81	39	18	1.0017	0.3164	1.0154	0.3099
Current Assets	81	39	18	1.0017	0.3164	1.0154	0.3099
Owner´s Equity	93	27	6	2.4159	0.0156	2.4489	0.0143
Liabilities	69	51	24	-0.2946	0.7682	-0.2986	0.7652
Operating Revenues	87	33	12	1.7088	0.0874	1.7321	0.0832
Operating Costs	87	33	12	1.7088	0.0874	1.7321	0.0832

Source: Own processing

In the analysis of financial indicators and the element recycling and re-use of waste, only one statistically significant difference was found, namely the liabilities indicator. According to the graphic representation, it is clear that the value of the liabilities indicator is lower for companies that have implemented an element of circular economy recycling and re-use of waste. When analyzing the use of renewable resources element in relation to financial indicators, no difference was found at the significance level $p = 0.05$. However, if it is set the level of significance at $p = 0.1$, it was found a significant difference in the indicator of fixed assets and it can be state that the value of the indicator fixed assets is lower for companies that have implemented the element of circular economy use of renewable resources. The graphical representation also shows a lower value of owner's equity for companies that have implemented the element of circular economy use of renewable resources, although this difference is not statistically confirmed. In the analysis of financial indicators and the element of backup of plastic packaging, increasing the life of packaging, the most differences were found. At the level of significance $p = 0.05$, a statistically significant difference was found in the indicator of owners' equity, where its value is lower for companies that have implemented the element of circular economy backup of plastic packaging, increasing the life of packaging. When the level of knowledge was shifted to $p = 0.1$, other statistically significant differences were found in the indicators of total assets, operating revenues and operating costs. All these indicators are higher for companies that do not have implemented elements of the circular economy in place. The following graph 2 shows the relationships for operating revenues (boxplot on the left) and operating costs (boxplot on the right).

Figure 2 Operating revenues (on the left boxplot) and operating costs (on the right boxplot) in relation to circular economy
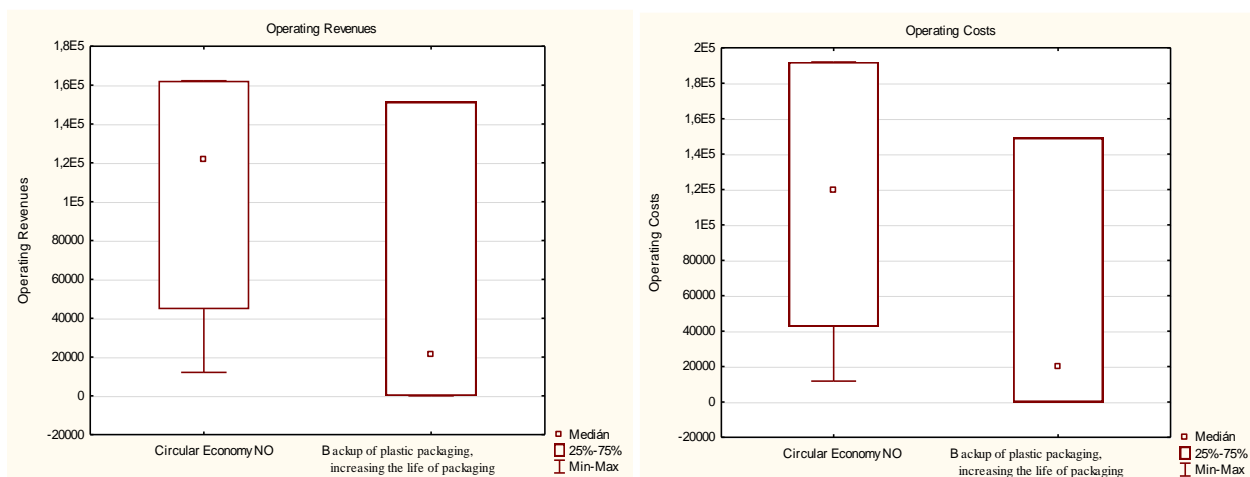
Source: Own processing

4 Conclusions

As Urbinati et al. (2017) say, the circular economy creates closed production systems, where resources are reused and maintained in a constant cycle for further use. The amount of certain financial indicators, which are stated in the balance sheet and in the profit and loss statement, is also related to this cycle in accounting. In this paper, the indicators from the balance sheet were analyzed - total assets, fixed assets and current assets, which have a direct impact on the way the production system is implemented; furthermore, owners' equity and liabilities indicators, which are the main sources of financing; and with regard to the profit and loss statement, the indicators of operational costs and operational revenues were analyzed, which again have a direct link to the use of production resources. In the initial analysis, it was found that at the level of significance $p = 0.05$, there are significant differences in the indicators of current assets and owners' equity. Both of these indicators are lower for enterprises affected by the circular economy. These lower values may be due to the fact that companies affected by the circular economy make better use of materials, raw materials and other consumed resources, and at the same time there is a need for lower sources of equity. Furthermore, financial indicators were analyzed in relation to individual elements of the circular economy, which are backup of plastic packaging, increasing the life of packaging; recycling and re-use of waste; and use of renewable resources. In the analysis of financial indicators and the recycling and re-use of waste element, a significant difference was found in the liabilities indicator. When analyzing the use of renewable resources element, no difference was found at the specified level of significance. At $p = 0.1$ level, however, a difference was found in the fixed assets indicator. In the analysis of the element of backup of plastic packaging, increasing the life of packaging, the most differences were found. At the significance level of $p = 0.05$, a significant difference was found in the owner's equity indicator, and when the level of significance was shifted to $p = 0.1$, other statistically significant differences were found in the total assets, operating revenues and operating costs indicators. All these indicators are lower for enterprises that have implemented elements of the circular economy.

References

Cleveland, C. J., Kaufmann, R. K. & Stern, D. I. 2000. Aggregation and the role of energy in the economy. *Ecological Economics*, 32(2), 301– 317.

Devore, J. L. (2015). *Probability and Statistics for Engineering and the Sciences*. 9th ed. Boston, MA: Brooks Cole.

Fischer-Kowalski, M., Krausmann, F., Giljum, S., Lutter, S., Mayer, A., Bringezu, S., Moriguchi, Y., Schütz, H., Schandl, H., & Weisz, H. (2011). Methodology and Indicators of Economy-wide Material Flow Accounting. *Journal of Industrial Ecology*, 15(6), 855–876. https://doi.org/10.1111/j.1530-9290.2011.00366.x .

Franklin-Johnson, E., Figge, F., & Canning, L. (2016). Resource Duration as a Managerial Indicator for Circular Economy Performance. *Academy of Management Proceedings*, 2016(1), 11617. https://doi.org/10.5465/ambpp.2016.11617

Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy – A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768. https://doi.org/10.1016/j.jclepro.2016.12.048 .

Ghisellini, P., Ripa, M., & Ulgiati, S. (2018). Exploring environmental and economic costs and benefits of a circular economy approach to the construction and demolition sector. A literature review. *Journal of Cleaner Production*, 178, 618–643. https://doi.org/10.1016/j.jclepro.2017.11.207 .

King, A. A., & Lenox, M. J. (2001). Does It Really Pay to Be Green? An Empirical Study of Firm Environmental and Financial Performance: An Empirical Study of Firm Environmental and Financial Performance. *Journal of Industrial Ecology*, 5(1), 105–116. https://doi.org/10.1162/108819801753358526 .

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the Circular Economy: An Analysis of 114 Definitions. *Social Science Research Network*. https://doi.org/10.2139/ssrn.3037579 .

Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: A comprehensive review in context of manufacturing industry. *Journal of Cleaner Production*, 115, 36–51. https://doi.org/10.1016/j.jclepro.2015.12.042.

Pauliuk, S. (2018). Critical appraisal of the circular economy standard BS 8001:2017 and a dashboard of quantitative system indicators for its implementation in organizations. *Resources, Conservation and Recycling*, 129, 81–92. https://doi.org/10.1016/j.resconrec.2017.10.019 .

Smejkalová, V., Šomplák, R., Nevrlý, V., Pavlas, M., 2018. Design and Decomposition of Waste Prognostic Model with Hierarchical Structures, *Mendel Journal series*, 2018 (1), 85-92.

Scarpellini, S., Marín-Vinuesa, L. M., Aranda-Usón, A., & Portillo-Tarragona, P. (2020). Dynamic capabilities and environmental accounting for the circular economy in businesses. Sustaina*bility Accounting, Management and Policy Journal*, ahead-of-print(ahead-of-print). https://doi.org/10.1108/SAMPJ-04-2019-0150 .

Švecová, L., Ostapenko, G., Veber, J., & Valeeva, Y. (2019). The Implementation Challenges of Zero Carbon and Zero Urbinati, A., Chiaroni, D., & Chiesa, V. (2017). Towards a new taxonomy of circular economy business models. *Journal of Cleaner Production*, 168, 487–498. https://doi.org/10.1016/j.jclepro.2017.09.047 .

Waste Approaches. *International Scientific and Technical Conference Smart Energy Systems 2019 (SES-2019), Kazan, Russia*, 124(04025). https://doi.org/10.1051/e3sconf/201912404025 .

WEF. (2020). *Platform for Accelerating the Circular Economy*. [on-line]. Retrieved from https://www.weforum.org/projects/circular-economy .

Australia's need for economic decoupling from China

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Abstract: Australia currently has a high economic interdependence on China. Australian exports to China are primarily in the energy market, featuring coal, gas and iron ore, and its imports from China are largely in manufactured items, where valued adding processes occur. Viewed from David Ricardo's theory of comparative advantage the trading relationship between Australia and China appears ideal, as each nation is providing the other what they are best at producing, however, the reality is quite different. Cultural, political and ideological differences, China's expansionary policy in its region (as witnessed by the 9-dash line concept), and the treatment of its own minority groups, as examples, are in juxtaposition to Australia's identity as a free nation that, whilst geographically located in Asia, has a distinct Western allegiance, largely due to its recent colonial historical developments. This paper considers the current relationships between Australia and China, not only in relation to trade, but also in relation to geo-political factors and the increasing influence China has been exerting through strategic investment in Australia. In order to bring more balance to Australia's exports and imports, and reduce the inherent risks associated with high reliance on one trade partner, Australia needs to economically decouple from China. Specific long-term changes are proposed in two areas: taxation, through accelerated depreciation write-off in R&D developments; and modifications to the current export market development grants, as a way to influence and encourage Australian businesses to diversify their exports, both in terms of export destinations and in the mix of exported items. These initiatives should begin to create a shift away from exporting primary energy products, such as coal, gas and iron ore, and towards other more value-added processes and products.

Keywords: international economics, economic decoupling, government subsidies, tax concessions, foreign direct investment, export market development grants.
JEL Classification: F19, H25, O39

1 Introduction

This qualitative paper considers the extent to which Australia is dependent on China for its exports and imports and argues there is a need for Australia to economically decouple from China, as the relationship between the two nations has recently shown signs of strains.

The paper firstly provides a background of data for the composition of Australia 's exports and import, and their destinations and origins, that highlights the economic interdependence with China. This is followed by data on foreign direct investment, before a brief literature review that considers the geo-political relationship between these two nations. The discussion focuses on recent developments that have causes strains in the eco-political relationship, from the lenses of cultural and ideological differences, before suggesting changes designed to diversify Australia's export destinations, before reaching the conclusion.

2 Australia's exports and imports - background

It is important to consider Australia's exports and imports as well as Foreign Direct Investment (FID), in order to provide relevant background to the issues relevant to this paper.

According to 2019 data from the International Trade Centre (2020a, 2020b), by value, Australia ranks as the world's 21st largest export nation, and the 23rd largest import nation. Historically, Australia's trade was linked to the United Kingdom, as a result of white colonisation, and it was not until about 40 years ago that Australia shifted its trade focus towards the geographically more proximal Asia. This was largely due to the Hawke-Keating Labour government that dismantled Australia's protectionist barriers in favour of a more open internationally focused economy. During that period the Australian dollar was also freely floated on international markets, leading to its worldwide acceptance, so much so that today it remains among the top 10 traded international currencies.

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The composition of Australia's exports for 2019 is dominated by minerals and fuels that account for approximately 67% of total exports (Statistics Section Trade & Investment Economics Branch, 2020). Of these, as shown in Table 1, coal, coke and briquettes account for almost 20% of all merchandise trade. What is of significance is the increasing export trend of these products, as is evident from Table 1, that may have questionable long-term survival, due to the global warming phenomenon that is placing mounting pressure to reduce carbon emissions and, consequently, demand - an issue that will be considered later in the paper.

Table 1 Australia: mineral and fuels exports and trends 2016-2019

Years	2016-17 AUD Million	2017-18 AUD Million	2018-19 AUD Million	% growth	
				2017-18 to 2018-19	5 year trend
Metal ores & minerals	85,100	89,770	109,187	21.6	3.6
Coal, coke & briquettes	54,213	60,407	69,595	15.2	14.0
Other Mineral Fuels	28,860	39,224	60,533	54.3	15.5

Source: Statistics Section Trade & Investment Economics Branch (2020)

In terms of export destinations, the five most important markets for Australia's economy are shown in Table 2, where it may be noted that China is the dominant export recipient nation by a significant proportion.

Table 2 Australia: Top five export destinations and trends 2016-2019

Years	2016-17 AUD Million	2017-18 AUD Million	2018-19 AUD Million	% share of total	% growth	
					2017-18 to 2018-19	5 year trend
China	110,014	123,619	153,177	32.6	23.9	10.5
Japan	44,456	51,256	61,728	13.1	20.4	4.1
Republic of Korea	22,762	23,713	27,771	5.9	17.1	4.6
USA	20,695	21,386	24,748	5.3	15.7	5.5
India	19,268	21,127	22,836	4.9	8.1	17.6

Source: Statistics Section Trade & Investment Economics Branch (2020)

Australia 's imports paint a similar picture of China's domination as a source nation, as shown in Table 3, with the USA, as the second sourcing nation accounting for almost 50% less than China.

Table 3 Australia: Top five import sources and trends 2016-2019

Years	2016-17 AUD Million	2017-18 AUD Million	2018-19 AUD Million	% share of total	% growth	
					2017-18 to 2018-19	5 year trend
China	64,249	71,381	81,777	19.4	14.6	8.2
USA	45,830	48,567	51,638	12.3	6.3	3.2
Japan	24,070	26,192	26,802	5.9	6.4	2.3
Germany	16,574	18,224	18,870	4.5	3.5	5.3
Thailand	16,642	17,992	17,336	4.1	-3.6	5.5

Source: Statistics Section Trade & Investment Economics Branch (2020)

The top 10 imported items are shown at Table 4. Australia's mineral fuels have limited scope due to their nature. There is no state-of-the-art machinery, computer or motor vehicle manufacture in Australia. Despite Australia being a leader in pharmaceutical R&D, historically, governments have not assisted or encouraged local commercialisation of discoveries – a point that will be considered later in the paper.

Table 4 Australia: Top ten import categories 2019

Category	2019 USD Billion	% share of total imports
Machinery including computers	30.7	14.3
Mineral fuels including oil	27.1	12.7
Vehicles	26.7	12.5
Electrical machinery, equipment	24.5	11.5
Pharmaceuticals	8.4	3.9
Optical, technical, medical apparatus	8.1	3.8
Gems, precious metals	6.6	3.1
Plastics, plastic articles	5.8	2.7
Furniture, bedding, lighting, signs, prefab buildings	4.6	2.1
Articles of iron or steel	4.5	2.1

Source: Workman (Workman, 2020)

Viewed from the lens of David Ricardo's theory of comparative advantage the trading relationship between Australia and China appears ideal, as each nation is providing the other what they are best at producing, however, the reality is quite different as other factors come into play, as considered in the discussion section.

Trade statistics only provide part of the overall economic picture, with FDI being another important aspect, particularly as this sector, unlike trade, has remained largely with Western nations. The major FDI nations in Australia in 2019 were the USA (AUD 983.7 Billion – 25.6% of total) and the UK (AUD 686.1 Billion – 17.8% of total), with China only accounting for AUD 78.2 Billion , or 2% of the total (Department of Foreign Affairs and Trade, 2020). As can be observed form Figure 1, the majority of FDI is in the mining and quarrying sector, accounting for over a third of all FDI. Chinese investment in mining has been an area of concern, as this presents an opportunity to control supply and demand, and thereby influence prices in favour of the Chinese buyer, that invariably is its government.

Figure 1 Australia's FDI by industry sector 2019
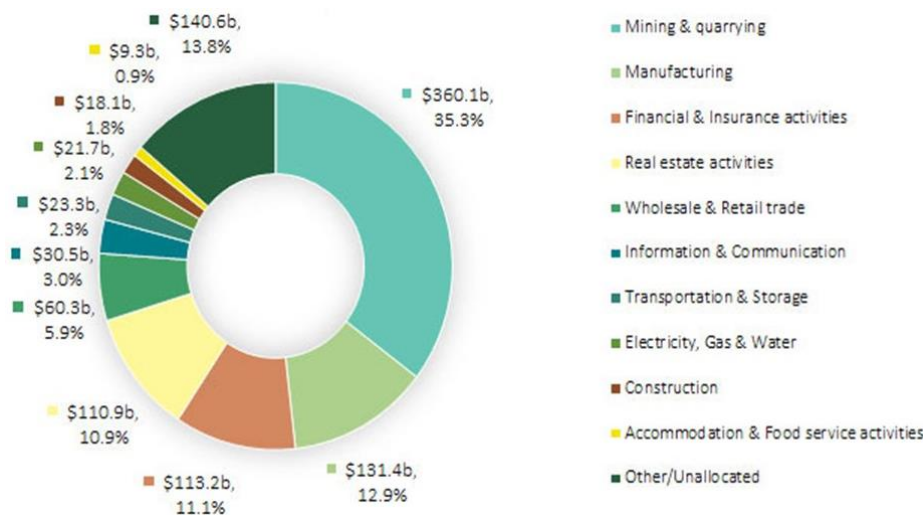
Source: Department of Foreign Affairs and Trade (2020)

The sensitivity around FDI in the mining sector and Chinese ownership is demonstrated by a number of recent government decisions under the „national interest" concept, that highlight „ownership, not necessarily the location, of any critical minerals project is what matters" (Bromby, 2020). Indeed, in 2020, Yibin Tianyi Lithium Industry withdrew its Foreign Investment Review Board application to invest a 12% (AUD 14.1 Million) share in AVZ Minerals who is involved in mining in the Democratic Republic of Congo, after they were advised by the Australian Treasurer this would be contrary to the national interest. Similarly, Baogan Group Investment (linked to China's largest rare earth mining company) was prevent by the Australian government to have an AUD 20 Million stake in Northern Minerals' Brown Range rare earth operation. The Australian government appears to be sending strong signals about the critical mineral sector in relation to FDI interests and controls, even beyond its borders. The suggestions for tripartite relationships involving Australia-China-Africa investments proposed earlier by de Jonge (2016) would seem to have been neutralised by the latest Australian government decisions.

Having provided some background to Australia's economic position in terms of trade and FDI, the next section provides a brief literature review on aspects of the relationship between Australia and China.

3 Literature review

The majority of the literature focuses on the geopolitical aspects of the relationship between Australia and China and how China may integrate into a new world order. White (2005) cautioned against the Australian government expectation that „as China grows it will become increasingly integrated into a US-led global system" (p. 469) and if this was not to be the case, then Australia may be faced with the hard task of choosing between China and the USA, not only on economic considerations, but also security interests.

Involvement with China in any area is not optional for Australia" (Jose, 2013, p. 126), especially as „the China Threat - the fear of being taken over by china and the Chinese - has never been far below the surface of public discourse in Australia" (Goodman, 2017, p. 770). Whilst Australia may be economically „tied" to China, but this is „at odds with its alliance with the USA in defence matters and on the international stage" (Goodman, 2017, p. 774). These arguments are

supported by Beeson and Zeng (2017) who highlight the significant challenges Australia faces in trying to balance its economic and strategic priorities, with "a heightened awareness of risk" (Medcalf, 2019, p. 109).

There is recognitions that "in the past few years, foreign policy tensions between China and Australia have become especially fraught" (Johanson et al., 2019, p. 397), as evidenced by new foreign influence and interference laws that have, in reality, targeted China. Perhaps this has been due to the fact that China "moved to translate its growing economic clout into political and strategic influence" (Suri, 2020, p.1).

Whilst the bulk of the literature focuses on the difference and the challenges of the Australia-China relationship. There is no focus given to providing potential solutions for mitigating the risks of being economically tied to one major trading partner, especially one that has a different ideology. This paper provides two possible solution to address these challenges in the discussion section that follows the methodology.

4 Methods

This paper focuses on current developments and analysis of historical data to determine the level of interdependence between Australia and China and the challenges of managing this relationship based not only on economic considerations but also on differences including culture, politics, strategy and security. Suggestions to lessen the risks of Australia's current high-level economic dependence are based on recent events.

5 Discussion

Perhaps the best way to begin an understanding of the differences and similarities between Australia, Chins and the USA is by looking at their cultural profile, as shown in Figure 2. There are remarkable similarities between the Australian and the USA cultures, that contrast most of those displayed in the Chinese culture. In fact, the only clear similarity between the three cultures in the degree of Masculinity each has. The most striking differences are in Power Distance, Individualism, Long term Orientation and Indulgence.

Figure 2 Australia, China and USA: Cultural dimensions
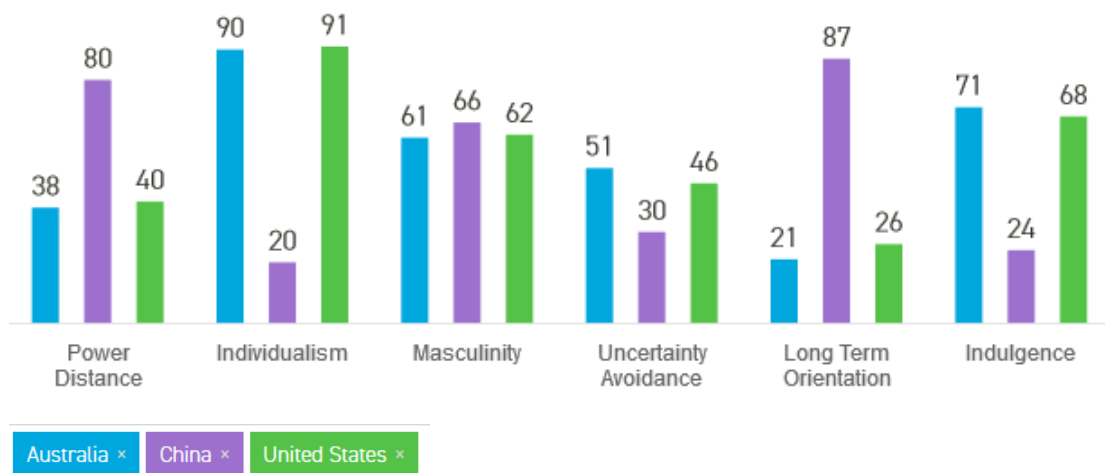
Source: Hofstede Insights (2020)

China is a hierarchical society, so the Power Distance is, not surprisingly, high. Chinese history has been dominated by Emperors who ruled with a high degree of authority. Whilst Emperors are no longer in power, the Chinese Communist Party (CCP) rules with similar authority. Perhaps, if one considers the sheer size of the population, a hierarchical structure may be a useful tool to prevent chaos. Related to Power Distance is also the notion of Individualism that is correspondingly low in China.

The population numbers may be a contributing factor, but it is argued here that the notion of a communist ideology is another factor. In theory, a communist regime is one were everyone is the same, although the current China is more of a "caputism" (Bergami, 2020) a capitalist-communist regime. This is a blend of capitalist system underpinned by communist ideals that provides what has been termed as the "best of both worlds".

Whilst the capitalist side of China pursues the free market economy opportunities, increasingly gaining additional wealth and, thereby, power, its activities are largely co-ordinated and directed by a central authority – the CCP. This enables planning in a different form to that of Western societies such as Australia and the USA, where there is a low index of Long Term Orientation. It is common for China to have five-year plans, whereas in Australia, typically there are

yearly budgets that are virtually the longest term outlook from any political party. The lack of Long Term Orientation proscribes a centralised co-ordinated effort to maximise opportunities to achieve long-run goals and objectives.

There is no place for Individualism or Indulgence in Chinese society. China is a collectivist society where preference is given to the group and not the self. There are strongly defined norms in Chinese society, consequently, the restraints of these social norms make one feel that indulging themselves is somewhat wrong.

The pursuit of some long term objectives are of concern to other nations. We consider two such objectives here: the reunification of Taiwan and the 9 dash line. There is no secret that China considers Taiwan part of its territory and has longer terms objectives to make this happen. To achieve that goal, it has pursued wolf diplomacy in systematically delegitimising Taiwan's recognition as a sovereign state on the world scene. Only a few nations recognise Taiwan, including the USA. The USA is bound by the Taiwan Relations Act in militarily supporting Taiwan with arms sales. To date the USA military has been the predominant force, however, the progressive arsenal increase by the People's Liberation Army (PLA) is challenging USA hegemony in the Asia-Pacific and there are fears of a conflict braking out between China and the USA either over Taiwan or the 9 dash line.

The 9 dash line has become a geo-political challenge as China pursues its expansionary policy and the USA tries to counteract unilateral sovereign Chinese claims over most of the South China Sea though freedom of navigation exercises. It is another flare point in a potential escalation between China and the USA, but one that may see Australia unwittingly dragged into choosing a side. It is unlikely that Australia, despite its economic interdependence with China, will not side with the USA. There are several factors that would lead one to this conclusion. Australia has a security treaty with New Zealand and the USA – the ANZUS Treaty. Australia also hosts the USA satellite surveillance base at Pine Gap and, additionally, is part of the Five Eyes intelligence alliance with Canada, New Zealand, the United Kingdom and the United States. The recent claim of escalating cyberattacks on Australian governments, public bodies and businesses and the denunciation of disinformation campaigns by China, coupled with the tightening of the scrutiny of foreign investment bids leaves little doubt that Australia is strategically in the USA camp.

Australia has furthermore angered China on an additional two issues. The first is the drive for an inquiry into the origins of Covid-19 and the second is the calling out of China's oppression of the Uighurs in the autonomous Xinjiang region of China. The Covid-19 enquiry was adopted by the World Health Organisation unanimously. "China accused Australia of running a politically motivated campaign in April. Two trade strikes would follow in early May. They were of course, unrelated, we were told. About $1 billion in the barley and beef trade is now affected" (Bagshaw, 2020). In May 2020, the Chinese government advised its citizens not to study in Australia or visit as tourist, as additional punishment measures for the Covid-19 enquiry. It seems China is not afraid to retaliate economically against "behaviour it does not approve of".

The plight of the Uighurs is an interesting proposition, as Australia condemns China's human rights records, whilst conveniently ignoring its own domestic treatment of Aboriginals that have been the subject of human rights abuses for decades – hypocrisy runs high at times, but this paper does not condone human rights violations in any form.

It should be evident by now that the relationship between Australia and China is the subject of discordance and misalignment across a number of areas. There is a clear need to diminish the risk exposure created by an economic over-reliance with one trading partner, especially one that has a different ideology. Given the short-term orientation of Australian culture, any changes that are proposed need to at least create the perception that something may be gained at the onset, in order for longer term changes to occur. We propose two policy changes to current taxation and export market development grants that should encourage firms, especially SMEs to seek and develop alternate markets to that of China.

The first policy change should be an increase in the current R&D taxation relief of 125% to 150%, but only for such expenditure as it relates primarily to nations other than China. Expenditure would be limited to activities primarily conducted in Australia, but not preventing the involvement of foreign parties in a minority interest. The way we propose this would work is as follows. The firm needs to firstly identify a product and a viable export market and present a business case to Innovation and Science Australia (ISA). ISA evaluates the proposal for viability and, if approved, the project is registered with the Australian Taxation Office (ATO), enabling the 150% taxation relief. The ISA process may require external parties to assess the project, and where this is deemed necessary, it is imperative that conflict of interest arise from external participants. The current threshold for claiming taxation relief is above AUD 20,000 expenditure and we propose this should be lowered to AUD 10,000 as a means to generate more SME interest in the program. As taxation matters are domestic, and not international, in nature, changes to R&D concessions are not subject to challenge under WTO or similar rules.

We see the benefits of R7D taxation relief as being two-fold. Firstly, R&D processes create new knowledge and employment in the local economy. Secondly, we forecast that in the medium to long term, R&D successes are likely to result in new value-added products /processes, generating additional economic activity and revenue.

Changes to the current Export Market Development Grants (EMDG). This scheme currently reimburses up to 50 per cent of eligible export promotion expenses above $5,000 provided that the total expenses are at least $15,000 per annum with a limit of eight grants to each eligible applicant. The maximum payable against any one application is AUD 150,000. Currently the EMDG is capped, meaning there is a limit to the amount of reimbursement given by the government. Where claims for any one year exceed the EMDG budget reimbursement is done on a pro-rata basis. We propose the EMDG exclude China as an eligible export market. There already is a precedent for this as New Zealand related expenses do not qualify. We further propose scrapping the budgeted cap approach and reimburse applicants 100% of their expenditure. This should provide certainty for firms trying to develop new markets, as the incentive for China is removed. We argue these changes will encourage the development of alternate markets to that of China.

6 Conclusions

This paper has highlighted a number of significant challenges that face Australia in the future as it tries to manage its relationship with China. The current economic dependence on energy products may not be sustainable in the long term and Australia must try to find ways to diversify its trade reliance on an economic partner with a different ideology and long-term strategy. Australia is currently at the economic whim of China that has shown no fear in retaliating against "unwelcomed behaviour". This environment does not provide business certainty. The Australian government should encourage businesses to find alternate markets to buffer any future threat of economic retaliation and we argue that changes in the R&D taxation provisions and EMDG scheme may be two avenues to encourage exporters to find new markets.

References

Bagshaw, E. 2020. No Longer a Joke: Why Australia's COVID-19 Inquiry Campaign Won the Day. *Sydney Morning Herald*, 20 May.

Beeson, M & Zeng, J 2017. Realistic Relations: How the Evolving Bilateral Relationship is Understood in Chian and Australia. *Pacific Focus,* XXXII**,** 159-181.

Bergami, R 2020. Self Sufficency vs Compettive advantage and Globalisation: A response. *In:* Kantarelis, D (ed.) *36th Business & Economics Society International Conference - Economic Globalization: Are There Benefits?* Worcester, MA, USA: Business & Economics Society International.

Bromby, R. 2020. *Federal Government bans second Chinese mining investment after AVZ confirms lithium project to generate $6bn* [Online]. Melbourne, Vic, Australia: Smnall Caps. Available: https://smallcaps.com.au/federal-government-bans-second-chinese-mining-investment-avz-minerals-lithium-project/ [Accessed 1 September 2020].

de Jonge, A 2016. Australia-China-Africa Investment Partnerships. A New Frontier for Triangular Cooperation? *Crticial Perspectives on International Business,* 12**,** 61-82.

Department of Foreign Affairs and Trade. 2020. *Who Invests in Australia?* [Online]. Canberra, ACT, Australia: Australian Government. Available: https://www.dfat.gov.au/trade/resources/investment-statistics/Pages/statistics-on-who-invests-in-australia [Accessed 1 September 2020].

Goodman, DS 2017. Australia and the China Threat: Managing Ambiguity. *The Pacific Review,* 30**,** 769-782.

Hofstede Insights. 2020. *Country Comparison* [Online]. Helsinki, Finland: Hofstede Insights. Available: https://www.hofstede-insights.com/country-comparison/australia,china,the-usa/ [Accessed 1 June 2020].

International Trade Centre. 2020a. *Trade Map - International Trade Statistics Exports* [Online]. Geneva, Switzerland: International Trade Centre. Available: https://www.trademap.org/tradestat/Country_SelProduct_TS.aspx?nvpm=1%7c%7c%7c%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c2%7c1%7c1%7c1 [Accessed 1 September 2020].

International Trade Centre. 2020b. *Trade Map - International Trade Statistics Imports* [Online]. Geneva, Switzerland: International Trade Centre. Available: https://www.trademap.org/tradestat/Country_SelProduct_TS.aspx?nvpm=1%7c%7c%7c%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c1%7c2%7c1%7c2%7c1%7c1%7c1 [Accessed 1 September 2020].

Johanson, K, Coles, A, Glow, H & Vincent, C 2019. Controversy, Uncertainty and the Diverse Public in Cultural Diplomacy: Australia-China Relations. *Australian Journal of International Affairs,* 73**,** 397-413.

Jose, N 2013. Deconstructing the Dumpling: Australia, China, Lived Connections. *Journal of Australian Studies,* 37**,** 116-129.

Medcalf, R 2019. Australia and China: Understanding the Reality Check. *Australian Journal of International Affairs,* 73**,** 109-118.

Statistics Section Trade & Investment Economics Branch 2020. *Composition of Trade Australia 2018-19,* Canberra, ACT, Australia, Department of Foreign Affairs and Trade.

Suri, N 2020. Australia-China Relations: The Great Unravelling. *ORF Issue Brief*, 1-16.

White, H 2005. The Limits to Optimism: Australia and the Rise of China. *Australian Journal of International Affairs,* 59**,** 469-480.

Workman, D. 2020. *Australia's Top 10 Imports* [Online]. Ontario, Canada: World's Top Exports. Available: http://www.worldstopexports.com/australias-top-10-imports/ [Accessed 1 September 2020].

Economics of Agriculture

Analysis of the current state of cultivation of medicinal plants in Slovakia

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Abstract: The paper deals with the analysis of the cultivation of medicinal plants in individual regions of the Slovak Republic in the period of 2009 - 2020. Based on the research, we can state that the best conditions for growing medicinal plants are mainly in the mountain and foothill areas of Slovakia, specifically in the Prešov region (average yield 2441 t) and Žilina region (average yield 207 t) due to their suitable soil and climatic conditions. For all monitored indicators (sown area, harvested area, production, fertility) we observe a growing trend in all regions of the Slovak Republic. The fact that medicinal plants are gaining in importance in the sowing process of the country, it is also evidenced by the fact that the volume of subsidies provided and the associated hectares, as well as the number of successful subsidy applicants, is also increasing.

1 Introduction

The development of the land fund in Slovakia in 2019 was marked by a decrease in agricultural and arable land in favour of forest, non-agricultural and non-forest land and an increase in forest land. Based on the data, the total area of the land fund in Slovakia on 1.1.2020 was at the level of 4,903,407 ha. This area has hardly changed in recent years. Agricultural land amounted to 2,376,712 ha. Compared to previous years, we record a gradual decline. Only healthy soil, which fulfills all its functions to the optimal extent in a specific use, is a basic prerequisite for the stability of the ecosystem and is also a basic prerequisite for sustainable agriculture. (Makovníková, 2020). Areas suitable for the cultivation of selected species of medicinal and spicy plants include soils with high production potential and are included for the most part in the primary soil fund. This fact allows the inclusion of these plants in the cultivation of organic farming, where quality soil is the basis for successful plant cultivation (Pekárová, Kováčiková, 2008).

Primary agricultural production differs from the production of inanimate tangible goods in that, its products, place, environment, production processes but also the product itself, which is living matter is more closely linked to nature, the natural environment or are directly part of it. The processes used in primary agricultural production are influenced by many factors that are not predictable or often influenced (Šlinský, 2020). Slovakia is dominated by rural areas, of which agriculture and production performance are an integral part. Despite the application of the CAP to reduce regional disparities after Slovakia's accession, regional disparities persist in Slovakia (Chrastinová, Belešová, Jenčíková, 2019). As a result of the expanding interest in medicinal and aromatic plants, new income generating opportunities are opening up for rural populations. With many of the MASP gathered from the wild, the recollection and sale of MASP is providing a complementary source of income for many rural households (Barata, Rocha, Lopes & Carvalho, 2016).

The Slovak Republic is a part of the EU and follows the principles and rules of the CAP, which provides income support to farmers. All types of support to the agricultural sector were implemented through Agricultural paying agency. The aid is classified into five main groups: direct payments, aid under market organizations, rural development aid, state aid with national measures and general services (Ďuricová, 2020). Support under the rural development program includes several payments for different areas, one of which is the payment for organic farming, and it is this payment that can be granted for medicinal, spice and aromatic plants.

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Medicinal and aromatic plants play a significant role in meeting the needs of the traditional medicine which, are found both in domestic and foreign markets. The structure of global market of medicinal and aromatic plants is mostly competitive (Roosta, Moghaddasi, Hosseini, 2017). Medicinal and aromatic plants have been consumed for centuries by people to protect against various diseases such as cancer, as antioxidants and to benefit from their nutritional value. Researchers have given great interest to the medicinally, aromatically, and nutritionally important plants due to the presence of essential nutrients, aromatic, and bioactive phytochemical compounds. So called plant species are used quite often among public and people are progressively more interested in the existence of specific compound groups with health beneficial properties, by that giving rise to the production of functionalized food products (Yilmaz, 2020). Porhajaš (1998) states, that the cultivation of medicinal plants with large-scale technology can be considered the youngest sector of plant production in Slovakia. If we want to talk about the economic efficiency of growing plant drugs, we must know all the basic growing requirements for a given plant. Creating a competitive medicinal plant economy requires ideal natural conditions at the place of cultivation. An important factor in the cultivation of medicinal plants is the annual amount of precipitation, their distribution and form. The direction, strength and frequency of wind movement also significantly affect their cultivation. Type, species and structure of the soil, soil pH, as well as its nutrient content (medicinal plants with a high need for nutrients such as Mentha piperita, Levisticum officinale, plants with a small amount of nutrients such as Achillea millefolium, Sinapis alba , Hippophae rhamnoides, Calendula officinalis), topsoil thickness and groundwater indicators are also important factors in choosing a place to cultivate. According to Habán et al. (2017), the most frequently medicinal plants from nature Rosa Canina, Aesculus hippocastanum, Sambucus nigra, Tilia cordata, Tilia platyphyllos, Achillea millefolium. Among the top 5 medicinal plants harvested from clutivation areas, the authors included Silybum marianum, Plantago lanceolata, Matricaria chamomilla, Calendula officinalis, Melissa officinalis. Medicinal, aromatic and spicy plants are still the centre of attention worldwide, especially in the areas of their final use. MASP cultivation must follow this trend. On a global and European scale, cultivation is gaining an importance nowadays, not so much in terms of quantity, but especially in terms of growing demands on product quality (Prošková, 2007).

2 Methods

The aim of the paper is to analyze the current state of cultivation of medicinal plants within individual regions of the Slovak Republic (sown areas, harvested areas, yield, fertility). In the article we present the development of subsidies provided for the cultivation of medicinal plants, as well as the purchase prices of medicinal plants.

We made an analysis of the cultivation of medicinal plants for the period 2009 - 2019. Some data were also available for the year 2020, we also present this year. The sources of data during the research were publications published by the Statistical Office of the Slovak Republic. We worked on the background of two publications:

➢ Inventory of areas sown with agricultural crops to the date of 20 May of the given year - the publication is always published in July of the given year;
➢ Final data on crops and vegetables – data are updates to the date of 31 December of given year and the publication is published in March of the following year

Data on subsidies provided to growers of medicinal plants were drawn from the Agricultural Paying Agency of the Slovak Republic, purchase price list of medicinal plants valid from 1 May 2020 was given to us by the company LEROS (Rajecká Lesná repurchase). In the paper, we quantify the index as a share of individual years to determine the year-on-year increase / decrease of the monitored indicator. In the article, we also calculate the average value of each indicator.

We used the following abbreviations in the tables: dash - the phenomenon did not occur; D - means a reliable data, which according to Act No. 540/2001 Coll. as amended does not provide

3 Research results

In Table 1 we can see the development of areas sown with medicinal plants within individual regions of the Slovak Republic in the years 2009 - 2020. In some regions this data is not provided for its confidentiality, therefore it is not possible to comprehensively assess the development and comparison between individual regions of the Slovak Republic. Based on the facts given in Tab. 1 we see differentiations between regions in western and eastern Slovakia. In the Bratislava Region, the sown area of medicinal plants is minimal, we believe that this is due the not very favourable conditions for medicinal plants cultivation. In the Trnava as well as the Nitra Region, we observe a relatively significant increase in sown areas. We recorded the largest areas sown with medicinal plants in the Prešov Region. We believe that this is due to suitable soil and climatic conditions in this part of the Slovak Republic. In this region, we recorded an increase of almost 4.5- times between 2010 and 2020. We are also seeing a positive trend in other regions, e.g. in the Žilina Region, between 2012 and 2020, the sown area of medicinal plants increased 8-times, in the Košice Region we even record a more than 75-times increase in these areas during the observed period.

Table 1 Development of sown areas of medicinal plants in the years 2009-2020 in ha (regions of the Slovak Republic)

Region/Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average
BA	-	D	15.67	D	-	D	D	D	D	D	D	D	15.67
TT	D	D	21.49	19.99	D	D	D	154.67	220.14	234.78	150.46	D	133.59
TN	169	168.95	D	D	D	D	D	254.24	D	266.75	131.34	166.82	192.85
NR	D	213.73	103.92	151.05	59.79	D	586.3	535.11	297.34	278.27	303.52	485.98	301.50
ZA	10	10	D	118.29	143.21	155.71	307.53	592.6	579.46	628.99	900.48	947.28	399.41
BB	D	D	D	D	255.96	D	22.51	D	202.46	224.18	D	562.78	253.58
PO	D	468.9	D	D	D	1,266.76	D	1,022.62	960.7	1,119.67	1,739.44	2,087.2	1,237.90
KE	11,05	13.97	15.99	50.6	139.31	141.7	216.05	197.31	355.85	D	776.72	846.76	251.39
SR	622.09	905.22	851.41	1,326.95	1,817.86	2,222.17	2,649.58	2,816.79	2,881.14	3,117.93	4,464.31	5,482.53	2,429.83

Source: Statistical Office of Slovak Republic, own processing

*BA= Bratislava Region, TT= Trnava Region, TN= Trencin Region, NR = Nitra Region, ZA = Žilina Region, BB = Banská Bystrica Region, PO = Prešov Region, KE= Košice Region, SR = Slovak Republic

Based on data from the Statistical Office, we made an analysis of individual year-on-year changes in the area of sown areas with medicinal plants for the period 2009 - 2020. The largest year-on-year increase was recorded in 2012 compared to 2011, namely 56%. The index was lower than 1 in 2011, when it reached the value of 0.94, which means that the area of sown areas decreased by 6% compared to the previous year.

Table 2 Index of change of areas sown of medicinal plants during the years 2009-2020

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sown area in ha	622	905	851	1,327	1,818	2,222	2,65	2,817	2,881	3,118	4,464	5,483
Index	-	1.45	0.94	1.56	1.37	1.22	1.19	1.6	1.2	1.8	1.43	1.23

Source: Statistical Office of Slovak republic, own processing

Table 3 Development of harvested areas of medicinal plants during the years 2009-2020 in ha (regions of the Slovak Republic)

Region/Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
BA	-	D	-	-	-	-	D	D	25.64	13.97	102.21	47.27
TT	16.85	D	19.99	19.99	D	42.7	119.64	154.67	57.09	201.87	397.88	114.52
TN	169	168.95	154.02	153.44	143.98	177.07	225.86	253.64	234.04	266.6	131.34	188.90
NR	132.78	84.32	121.48	145.35	D	248.08	553.27	519.89	278.56	252.35	290.6	262.67
ZA	10	10	D	118.29	146,67	148.58	221.35	181.32	545.72	614.19	900.94	289.71
BB	1	1	D	0.8	255.96	167.29	D	D	148.5	152.05	484.11	151.34
PO	157.32	451.86	562.46	837.21	1,028.74	1,265.65	1,224.02	971.77	942.05	1,087.33	1,794.11	938.41
KE	10.83	9.42	12	48.6	111.42	141.7	215.56	196.91	330.22	331.69	741.7	195.46
SR	497.78	741.91	947.58	1,323.68	1,786.05	2,191.07	2,588.83	2,337.54	2,561.82	2,920.05	4,842.89	2,067.20

Source: Statistical Office of Slovak Republic, own processing

Table 3 shows the hectare areas of harvested areas of medicinal plants in individual regions of the Slovak Republic. During the whole period, the harvested areas in some regions show a fluctuating character, but in all regions of the Slovak Republic we recorded an increase in the harvested areas of medicinal plants until 2019 compared to 2009. The largest harvested area of medicinal plants was in the Prešov Region, in this part of the Slovak Republic are the most suitable conditions for medicinal plants cultivation. We recorded the largest harvested areas in this region in 2019, namely 1,794 ha. The area of this region represented 37% of total harvested areas in a given year. On the other hand, the lowest area of medicinal plants is recorded in the Bratislava Region. In this region, medicinal plants were not cultivated at all or data on harvested areas were not published due to their confidential nature. In 2017 and 2018, we recorded an area in this region of only 26 respectively 14 hectares.

Table 4 Index of change of medicinal plants harvested area during the years 2009-2019

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Harvested area in ha	498	742	948	1,324	1,786	2,191	2,589	2,338	2,562	2,92	4,843
Index	-	1.49	1.28	1.40	1.35	1.23	1.18	0.90	1.10	1.14	1.66

Source: Statistical Office of Slovak Republic, own processing

As with sown areas, based on data from the Statistical Office of the Slovak Republic, we also made an analysis of the year-on-year development of harvested areas for the period 2009 - 2019. The index of year-on-year change increased by 66%. On the other hand, an index smaller than 1 was recorded in 2016, namely 0.9, which means that harvested areas decreased by 10% year-on-year.

Table 5 Development of medicinal plants yield during the years 2009-2019 in t (regions of the Slovak Republic)

Region/Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
BA	-	D	-	-	-	-	D	D	294.1	1,8	92.9	129.60
TT	28.9	D	36	37	D	126.6	152.4	177.2	41.4	134.6	416.9	127.89
TN	24.1	5.3	4.1	2.1	2	43.1	46.8	93.7	58.4	55	5.1	30.88
NR	64.4	9.7	89.2	98.4	D	249.5	227.5	246.7	93	100.8	203.9	138.31
ZA	7.7	7.8	D	86.7	106.9	148	234.3	224.1	221.1	414.3	621.1	207.20
BB	5	1.5	D	0.1	70.4	120.9	D	D	48.4	60.1	235.4	67.73
PO	1,301.8	689.2	3,593.5	5,063.8	1,746.9	6,375.3	2,883.3	1,726.2	625.1	1,183.6	1,662.1	2,440.98
KE	5.9	0.7	25.2	15.1	42.5	126.3	125.1	79.6	271.2	247.8	394.9	121.30
SR	1,437.8	730.3	3,769.3	5,303.20	2,177.8	7,189.7	3,679.9	2,558.8	1,652.7	2 198	3,632.3	3,120.89

Source: Statistical Office of Slovak Republic, own processing

Table 5 clearly shows significant regional differences in the development of the yield of medicinal plants in individual regions of Slovakia. We record the highest yield during the observed period in the Prešov Region. The production of medicinal plants in this region is several times higher in comparison with the production in other regions of Slovakia. The highest value was reached by the yield of medicinal plants in the Prešov Region in 2014 - 6,375.3 t, which in a given year represented almost 89% of the total production. Based on this finding, it follows that the best conditions for medicinal plants cultivation are in this area of Slovakia. On the other hand, in the Bratislava Region, no production of medicinal plants was recorded during the observed period, or this data were not published due to its confidential nature, until in the last two years of the observed period a yield of 294 t was reported in 2017 and 1.8 t in 2018.

Table 6 Index of change of medicinal plants yield during the years 2009-2019

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Yield in t	1,438	730	3,769	5,303	2,178	7,19	3,68	2,559	1,653	2,198	3,632
Index	-	0.51	5.16	1.41	0.41	3.30	0.51	0.70	0.65	1.33	1.65

Source: Statistical Office of Slovak Republic, own processing

Based on data from the Statistical Office, we also made an analysis of the year-on-year development of the yield of medicinal plants for the period 2009 - 2019. Table 6 shows that the highest year-on-year growth was recorded in 2010, when yield increased by 416% compared to the previous year. Index less than 1, we recorded a year-on-year decrease in the yield of medicinal plants in 2010, 2013, 2015, 2016 and 2017. The highest year-on-year decrease in yield was recorded in 2013, namely by 59%.

Table 7 Development od medicinal plants fertility in t/ha during the years 2009-2019

Region/Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
BA	-	D	-	-	-	-	D	D	11.47	0.13	0.91	4.17
TT	1.72	D	1.8	1.85	D	2.96	1.27	1.15	0.72	0.67	1.5	1.47
TN	0.14	0.03	0.03	0.01	0.01	0.24	0.21	0.37	0.25	0.21	0.04	0.14
NR	0.49	0.12	0.73	0.68	D	1.01	0.41	0.47	0.33	0.4	0.7	0.53
ZA	0,77	0,78	D	0,73	0,73	1	1.06	1.24	0.41	0.67	0.69	0.81
BB	5	1.53	D	0.1	0.28	0.72	D	D	0.33	0.4	0.49	1.11
PO	8.27	1.53	6.39	6.5	1.7	5.4	2.36	1.78	0.66	1.9	0.93	3.25
KE	0.54	0.07	2.1	0.31	0.38	0.89	0.58	0.4	0.82	0.75	0.53	0.67
SR	2.89	0.98	3.98	4.1	1.22	3.28	1.42	1.9	0.65	0.75	0.75	1.91

Source: Statistical Office of Slovak Republic, own processing

Based on Tab.7, it is clear that during the entire monitored period, the highest fertility was achieved in the regions of eastern Slovakia (Prešov and Košice Regions), as well as in the north of our country (Žilina Region). In these regions, the climatic conditions are suitable for medicinal plants cultivation. At the beginning of the period under review, we also recorded high fertility in the Banská Bystrica Region, but later it felt or information about it is not available due to its confidential nature. We also observe a high average fertility in the Bratislava Region, but we consider this figure to be skewed, given that data on fertility in this region were only available in the last three years of the analyzed period.

Table 8 Development of subsidies, determined areas and supported applications for the cultivation of medicinal plants

Year	Number of supported applications	Direct support (€)	Determined area (ha)
2009	3	3,322	15
2010	5	113,848	280
2011	8	129,328	319
2012	10	139,070	369
2013	11	128,560	342

2014	8	137,042	365
2015	7	121,209	322
2016	19	433,888	892
2017	18	533,507	1,009
2018	19	537,760	1,035
2019	15	545,418	909
Total	**123**	**2,822,952**	**5,857**

Source: Agricultural Paying Agency, own processing

Based on the data provided by the Agricultural Paying Agency of the Slovak Republic, it can be stated that over the last decade the volume of subsidies provided for the cultivation of medicinal plants has increased several times. Subsidies for medicinal plants are paid under the sub-measure Organic Agriculture in the cultivation of vegetables, medicinal, spices and aromatic plants. Also on the basis of this indicator, it can be stated that the cultivation of medicinal plants in Slovakia is a current topic that is experiencing a boom. Furthermore, based on the data provided, we can see that the amount of subsidies provided is conditioned by an increase in the yield per hectare for which it is provided, as well as a constant increase in the number of successful applicants.

There are very few companies in the Slovak Republic that deal with the purchase of medicinal plants. We have a purchase price list of medicinal plants from the company Leros, which has its repurchase facility in Rajecká Lesná open since September 2018. When purchasing medicinal plants, the purchased price varies depending on the part collected. The average price in 2020 for a flower is 21.55 €, root 3.88 €, leaf 2.65 €, haulm 2.47 €. We record a year-on-year increase in almost all collected parts. In 2019, the average price of the collected parts was as follows: flower 9.96 €, root 4 €, leaf 2.07 €, haulm 2.14 €. We believe that this increase is due to the ever-increasing popularity of medicinal plants among the population of the Slovak Republic.

4 Conclusions

Medicinal plants have been used in ancient times by our ancestors and knew that they were beneficial from the point of view of human health. Medicinal plants have their use in many spheres, currently we record in Slovakia about 200 - 250 species. In this paper, we focused on the analysis of the cultivation of medicinal plants in individual regions of the Slovak Republic. Significant differences in terms of acreage of areas sown with medicinal plants are recorded in the regions of western and eastern Slovakia. However, the Bratislava Region, which from the point of view of agriculture belongs to the regions operating in better natural conditions, does not have favorable conditions for the cultivation of medicinal plants. On the contrary, the regions to the north or east of the country such as Žilina or Prešov Regions are the regions with the largest average area sown with medicinal plants. By 2019, we recorded an increase in the harvested areas of medicinal plants, which shows the growing interest of people in this commodity. We recorded the highest average acreage of harvested areas for the analyzed period again in the Žilina and Prešov Regions. The volume of subsidies for medicinal plants increased several times by 2019 compared to 2009, which also indicates that the cultivation of medicinal plants is booming and is currently an actual issue. There are very few companies in Slovakia that focus on the purchase of medicinal plants. However, even from the point of view of the development of purchase prices, we record an increasing trend in this commodity.

References

Barata, A.M., Rocha, F., Lopes, V., Carvalho, A.M. (2016). Conservation and sustainable uses of medicinal and aromatic plants genetic resources on the worldwide for human welfare. Industrial Crops and Products. Vol. 88, p. 8-11. DOI: https://doi.org/10.1016/j.indcrop.2016.02.035

Ďuricová, I. (2020). Support in Agriculture in the SR in the years 2010-2017 and monitoring of support in OECD countries Agricultural Economics. Roč. XX, č. 1. s. 20-37. ISSN 1338-6336.

Habán, M. a kol. (2017). Medicinal Plants in the SR. Available online: https://pelero-cz.cz/_files/200000539-c72ccc826a/8.pdf.

Chrastinová, Z., Belešová, S., Jenčíková, J. (2019). Economic and Socila aspects of Agri-Food. Agrilural Economics. Roč. XIX., č. 1. s. 5-29. ISSN 1338-6336.

Makovníková, J. (2020). Soil and its position in agroecosystem services. In Proceedings of scientific works Elimination of degradation processes in soil by restoring biodiversity. Bratislava : NPPC. s. 26 - 32. ISBN 978-80-8163-035-4.

Pekárová, E., Kováčiková, I. (2008). Spatial definition of the suitability of environmental conditions for the cultivation of selected species of medicinal, aromatic and spicy plants with respect to the soil. Scientific work of the Research Institute of Soil Science and Soil Protection no. 30. Bratislava.p. 93 - 99. ISBN 978-80-89128-51-8.

Policies to support medicinal plants in the border regions of Slovakia and Hungary. (2018). Herbaland. SKHU/160/4.1/150 project. European fund of regional development. 281 p. ISBN 978-615-00-4211-4.

Porhajaš, V. (1998). Perspectives of medicinal plants culivation in SR. Available online: http://www.agris.cz/zemedelstvi/perspektivy-pestovania-liecivych-rastlin-na-slovensku?id_a=106241.

Prošková, J. (2007). Analysis of the current state of cultivation of medicinal, aromatic and spice plants (MASP) in organic agriculture in the Czech Republic, opportunities and competitiveness in this sector. Prag: VÚZE. 17 s. Available online: http://eagri.cz/public/web/mze/zemedelstvi/rostlinna-vyroba/rostlinne-komodity/lecive-aromaticke-a-koreninove-rostliny/pestovani-lakr-v-ekologickem-zemedelstvi.html.

Šlinský, J.(2020). Agrocircle system - an example of growing vegetables in an ecological way. A word from practice. In Proceedings of scientific works Elimination of degradation processes in soil by restoring biodiversity. Bratislava:NPPC. p. 5 - 18. ISBN 978-80-8163-035-4.

Statistical Yearbook on the Land Fund in the SR(2020). Bratislava: UGKK SR. 130 s. ISBN 978-80-89831-10-4.

Štatistical Office of SR. (2009-2019). Final data on crops and vegetables in SR fot the years 2010 – 2018. Bratislava: SO SR. Available online: www.slovak.statistics.sk.

Štatistical Office of SR. (2009-2020). Inventory of areas sown with agricultural crops. Bratislava: ŠÚ SR. Available online: www.slovak.statistics.sk.

Roosta, R.A., Moghaddasi, R., Hosseini, S.S. (2017). Export target markets of medicinal and aromatic plants. Aromatic Plants. Vol. 7, December 2017, p. 84-88. DOI: https://doi.org/10.1016/j.jarmap.2017.06.003.

Yilmaz, M.A.(2020). Simultaneous quantitative screening of 53 phytochemicals in 33 species of medicinal and aromatic plants: A detailed, robust and coprehensive LC-MS/MS method validation. Industrial Crops and Products. Vol. 149. July 2020. p.1-13. DOI: https://doi.org/10.1016/j.indcrop.2020.112347.

Development of the Economy of Cow Milk Primary Production in Slovakia

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Abstract: Livestock production in Slovakia has a long tradition and is one of the key aspects of food self-sufficiency. The milk market is very dynamic, and its economic situation is constantly changing. The situation on the milk market in Slovakia is influenced by foreign trade, and hence the situation on the European market. In this article, we assess the development of the economic situation of the main producers of cow's milk during the period from 2009 to 2018. In some Member States, milk production is a very important part of the agricultural economy. Agricultural cooperatives were formed, often employing entire municipalities in the area. In today's globalized world with an open economy, fewer people are employed in agriculture.

1 Introduction

Slovakia has a long-term and varied history of agricultural activity. The population has been cultivating crops and raising animals for generations and has been self-sufficient. Görözd and Dianová (2018) state that milk production has been part of agriculture for thousands of years and that milk is produced in each EU Member State without exception and represents a significant proportion of the value of EU agricultural production.The European Union is a major player in the world market for milk and milk products. In some member states, milk production forms a very important part of the agricultural economy. A high-quality dairy cow produces a lot of milk and the main objective for dairy farmers is to sell as much milk as possible with maximum economy, but on the other hand also with animal welfare.

Agricultural cooperatives were formed, which often employed entire municipalities in the area. In today's globalized world with an open economy, and fewer people are involved in agriculture. Employment in agriculture is unattractive, plant and animal products are imported from abroad, thus reducing the country's food self-sufficiency. These effects are particularly felt by livestock farmers and primary milk producers. Livestock production is often at a loss that must be compensated by crop production.

Bobeková (2006) states that dairy farming is one of the most cost-effective sectors of animal production in terms of the intensity of deposits. This is mainly due to the very nature of these animals – high feed consumption, high investment intensity of breeding, number of products, special processing requirements. Ryba (2018) points out that persistent droughts in several countries of the European Union have significantly affected the production of arable crops and thus animal feed. In addition, the decline in forage production has a particular effect on the yields of livestock farmers, since in the event of a shortage of feed in the later months, their input costs will increase.According to the data of the Agricultural Paying Agency (APA), as of 30 June 2018, 424 breeders were engaged in primary milk production in Slovakia, which is 17 primary milk producers less than in the same period last year.According to estimates by the RIAFE (Research Institute of Agricultural and Food Economics), the production of cow's milk will decrease by 2020.This decrease is influenced by several reasons:

Price reasons, the amount of the purchase price of cow's milk is constantly below the level of the average price of cow's milk for the EU-28.Purchase prices often do not cover rising prices for inputs. Increased administrative burden on livestock production in the area of legislation. Lack of interest in creating sales organisations that could significantly affect purchase prices.Lack of capital linkages between primary milk producers and the processing industry and related sales problems. Growing import of dairy products to the market of the Slovak Republic from Poland, the Czech Republic and Germany.Social reasons such as the level of the consumer price of milk or as an example, vegan milk alternatives on the market (e.g. soy, almond, coconut, rice, oat milk) and positive advertising from the point of view of a healthy diet

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against negative statements about the harm of eating cow's milk by doctors and nutritionists, as a result of which even people who do not have medical reasons decided to stop consuming milk are interested in these alternatives.

Repta and Mudroň (2018) report that the crisis around 2009 caused a decrease in the price of milk and its production at that time was unprofitable. Later, similar problems were caused by sanctions for the export of food to Russia. Thus, the surplus of milk remained on the European market, the value of which naturally decreased.As a result, over the past 25 years, we have reduced the stock of high-quality dairy cows from about 600 to 125 thousands. The decline of livestock is dramatic and the sometimes not properly addressed cattle morbidity contributes to this. In the circumstances that govern here today, we are at risk of having to import basic food to an ever greater extent.

The main goal of the paper is to evaluate the economics of raw cow's milk production in Slovakia in years 2009 to 2018 on the basis of microeconomic and macroeconomic aspects and to forecast the development in the next three years. To achieve this goal, it is important to follow the direction of development of the number of dairy cows and their milking. The literature shows that the number of dairy cows decreases and milking increases. The aim is to find out what impact this will have on milk production The next step is to monitor the quantity of milk soldk and the purchase price of milk and of course, forecast thein further development. It is also neceséry to monitor the development of revenues and costs directly related to milk production. This will make it possible to monitor production efficiency, the economic reset and also forecast the economic reset.

2 Methods

The paper was prepared on the basis of acquired knowledge from the specialized literature, articles and publications dealing with the given issue. The economy of milk production is a discussed topic in several publications. Dairy cattle breeding is a specific activity, which is influenced by atypical production conditions, but also by the selected dairy cattle breeding system, or by the degree and quality of technological equipment of individual farms.

This paper offers an overview of the economic situation of primary producers of cow's milk in Slovakia and its forecast for the next years. To create an overall picture of the development of the economic situation of primary producers of mlie-ka, it is necessary to assess not only the basic economic categories, but also financial indicators.We assessed the recalculated values of costs and revenues, the economic result and the development of the purchase price of raw cow's milk. The costs are converted into euros per 100 feeding days and also per liter of milk.The data were drawn from the Situation and Outlook Reports of the National Agricultural and Food Center of the RIAFE for individual years.

The starting period for which we followed the selected indicators was from 2009 to 2018.We performed a forecast of the development of selected economic categories and indicators for the years 2019–2021. To make the forecast, we used the Microsoft Excel program, which allowed us to predict data not only in numerical but also in graphical form. The present paper is a synthesis of data available numerical and knowledge database, where common mathematical and statistical methods were used enriched by the method of forecasting.

3 Research results

3.1 Development and prediction of macroeconomic indicators of cow's milk production

To assess the development of the economy of raw cow's milk production in Slovakia from a macroeconomic point of view, it is necessary to assess the basic indicators. The first important aspect is the state of the number of dairy cows themselves that produce milk. Another important indicator is the average productivity, which indicates how many liters of milk are milked by one dairy cow per year. This is followed by the actual volume of milk production, which is in the millions of liters. Not all production goes on sale, so it is necessary to indicate the volume of milk sold to processors and, of course, the average purchase price at which milk was sold to processors. All these data are presented in Table 1.

Table 1 Development and prediction of basic macroeconomic indicators of raw cow's milk production in Slovakia

Period	Number of dairy cows (in thousand pcs)	Performance (l / dairy cow)	Production volume (in mil. l)	Average purchase price (in €)	Sales volume (in mil. l)
2009	165,9	5769,82	957,3	0,20	864,08
2010	161,3	5692,09	917,98	0,27	822
2011	156,1	5945,95	928,32	0,31	833,24
2012	152,4	6295,53	959,42	0,29	872,25
2013	147,4	6334,18	933,89	0,32	849,14
2014	145,9	6504,68	948,71	0,33	869,4
2015	142,2	6732,6	957,42	0,27	893,51

2016	135,9	6867,51	933,3	0,25	847,65
2017	131,3	7145,13	938	0,30	844,57
2018	128,3	7267,87	932,59	0,31	843,71
Forecast 2019	124,1	7455,87	938,92	0,31	861,16
Forecast 2020	120,0	7635,68	938,57	0,32	861,88
Forecast 2021	115,8	7815,49	938,21	0,32	862,59

Source:Situation and Outlook report for Milk (2009 - 2018), own processing

Figure 1 Development and prediction of dairy cows and efficiency in Slovakia in the years of 2009-202
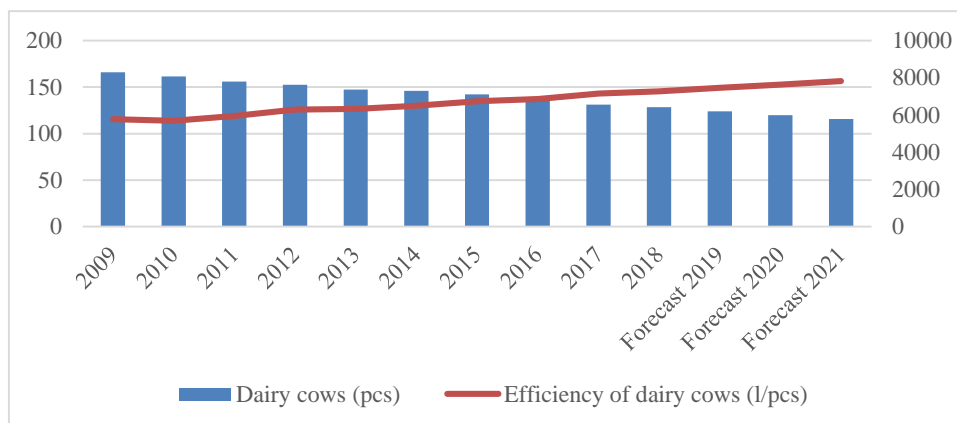
Source: own processing based on data from Situation and Outlook reports for Milk (2009–2018)

The decrease in the number of dairy cows is the result of a lack of interest in cattle breeding and the liquidation of existing farms. Despite the declining number of dairy cows, average productivity increased almost throughout the period under review. In 2009, one dairy cow milked an average of 5,769.82 liters of milk.In 2010, efficiency decreased by 1.35% to 5,692.09 liters. Since that year, efficiency has increased and in 2018 it reached the value of 7,267.87, which represents an increase of 27.68 % compared to 2010. This positive development also represents an increasingly efficient process of cow's milk production. According to the forecast, the average efficiency could reach the value of 7,815.49 in 2021, which represents an increase of 7.53% compared to 2018.

Figure 2 Forecast of the volume of cow's milk production in mil. l for the years 2019–2021
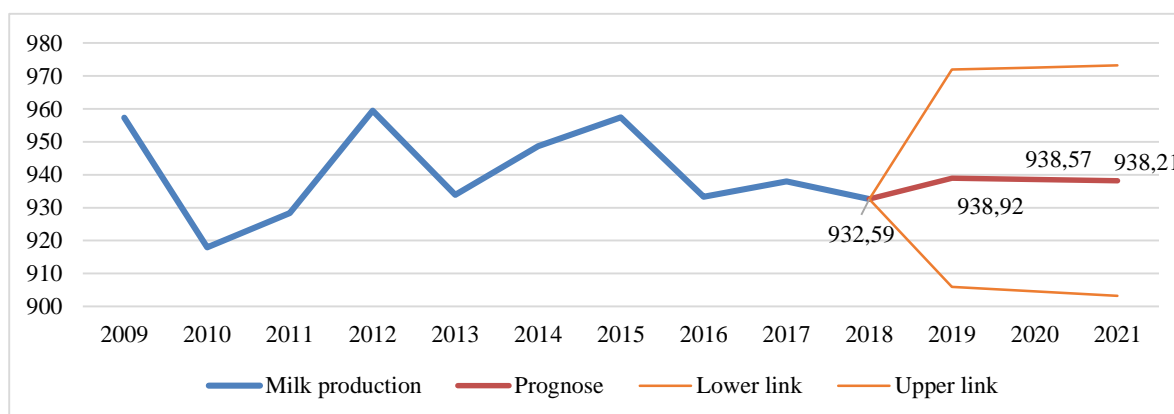
Source: own processing based on data from Situation and Outlook reports for Milk (2009–2018)

There are fluctuating developments regarding cow's milk production from the figures in Table 1. The lowest volume of production was recorded in 2010, when it reached 917.98 million liters and compared to 2009 it fell by 39.32 million liters, which represented a decrease of 4.11%.This development was due to a decrease in the number of dairy cows and also the efficiency in the given year. The graph2 shows a stable course in the last two years of the observed period. The forecast for the next years says that production should grow, and by 2021 it should stabilize at the level of approximately 938 mil. liters.

The average purchase price of raw cow's milk in 2016 was25.28 EUR / 100 kg. Compared to 2015, it decreased by 2.67 EUR / 100 kg (by 9.6%) and compared to 2014 it was lower by 8.54 EUR / 100 kg (by 25.3%). Brodová (2013) writes that in the period 2008-2010 there was a crisis in the milk market.Since 2010, the purchase price of raw cow's milk

has been gradually rising. The author claims that she still did not reach the price level in the pre-crisis period. The decrease in the average purchase price of cow's milk was reflected in a decrease in the value of purchases.In 2016, the total value of purchased cow's milk was 208,009 EUR andcompared to the previous year, it decreased by 33,634EUR (by 13.9%).

3.2 Development and prediction of microeconomic indicators of cow's milk production

For a comprehensive evaluation of the development of the economy of raw cow's milk production and for an understanding of the economic context, it is necessary to evaluate the basic microeconomic indicators, on the basis of which macroeconomic phenomena can be explained. The basic indicators for the purposes of this article are costs, revenues and economic results, calculated per 100 feeding days and also per 1 liter of milk. All these data are listed in Table 2.

**Table 2** Development and prediction of microeconomic indicators of raw cow's milk production in Slovakia

Period	Direct costs (in €)	Owncost-sper 100 FD (in €)	Own cost-sper 1 literof milk (in €/l)	Revenues per 100 FD (v €)	Reve-nuesper 1 literof milk (in €/l)	Economic resultper 100 FD (in €)	Economic resultper 1 liter of milk (in €/l)	Economic results for the year (in €)
2009	540,93	640,02	0,37	456,59	0,27	-183,43	-0,1	-669,52
2010	547,83	655,77	0,39	723,78	0,44	68,01	0,05	248,24
2011	629,5	747,01	0,43	774,21	0,47	27,2	0,04	99,28
2012	600,38	709,58	0,4	695,71	0,41	-13,87	0,01	-50,63
2013	648,42	770,27	0,42	781,35	0,42	11,08	0	40,44
2014	666,33	789,51	0,42	733,33	0,39	-56,18	-0,03	-205,06
2015	671,93	784,28	0,38	702,33	0,34	-81,95	-0,04	-299,12
2016	687	795,79	0,4	759,92	0,38	-35,87	-0,02	-130,93
2017	739,06	857,29	0,43	733,5	0,49	-123,79	0,06	-451,83
2018	707,1	839,82	0,43	811,22	0,42	-28,6	-0,01	-104,39
Forecast 2019	767,1	877,49	0,43	825,15	0,43	-51,52	0,01	-188,06
Forecast 2020	766,63	899,99	0,43	844,50	0,44	-54,56	0,01	-199,13
Forecast 2021	809,19	922,49	0,43	863,84	0,45	-57,59	0,01	-210,19

Source: Cost of agricultural products in the Slovak Republic (2009–2018), own processings

According to the calculation formula, direct costs together include all direct costs associated with dairy farming and milk production, which include consumed own and purchased feed, energy consumption, medicines, wage costs, costs of breeding and nursing services and other costs, calculated per 100 feeding days.

Figure 3 Development and prediction of direct costs per 100 feeding days for the production of raw cow's milk in Slovakia
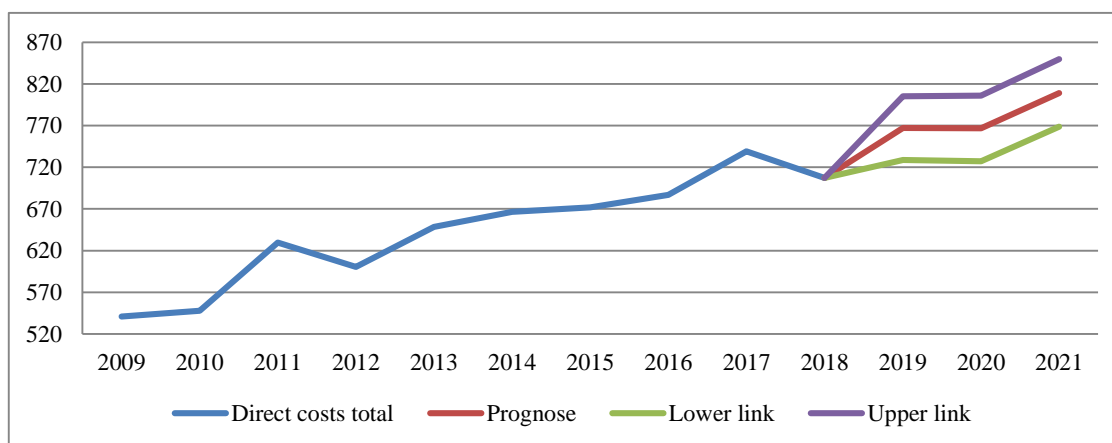
Source:own processing based on data from Situation and Outlook reports for Milk (2009–2018)

Graph 3 shows that the direct costs of dairy farming and milk production have a growing trend in the long run. A sharp increase was recorded in 2011, when direct costs increased by 14.9% to € 629.5. In the following year, they fell by 4.63% to € 600.38.The highest value was recorded in direct costs in 2017, namely€739,066. The forecast says that in the next period, direct costs should increase again and reach€ 809.19 in 2021, an increase of 14.44% compared to 2017. This trend reflects the ever-increasing prices of feed, energy, wages and services.

Own costs include total direct costs as well as production and administrative overheads. These costs are again calculated for 100 feeding days. In the following graph, we compare these costs together with the revenues also budgeted for 100 feeding days. This graph will show the economic course of dairy farming and milk production and the resulting economic result.

Figure 4 Development and forecast of own costs in € per 100 feeding days and revenues per 100 feeding days of raw cow's milk production in Slovaki
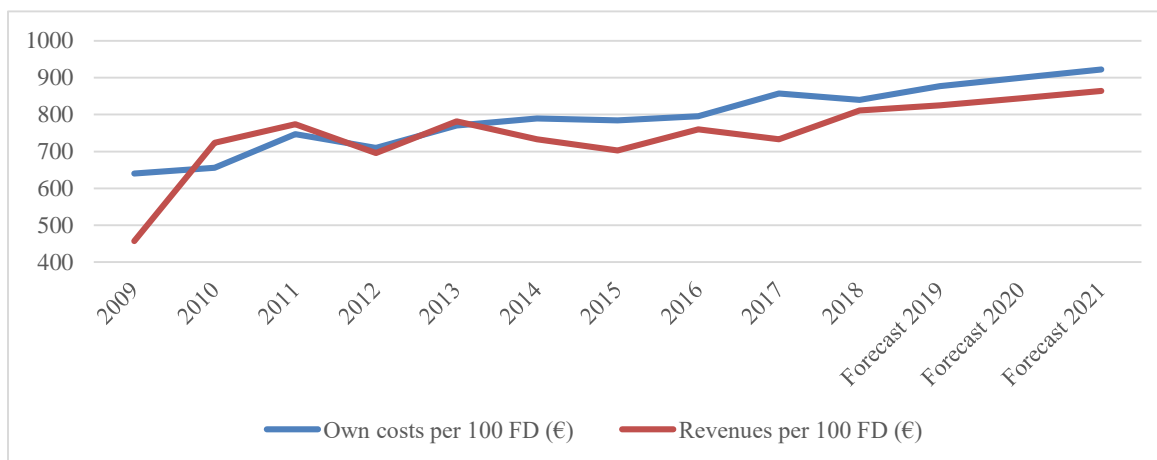
Source: own processing based on data from Situation and Outlook reports for Milk (2009–2018)

As can be seen from Graph 4, the cost per 100 feeding days is constantly increasing. In 2010, they increased by 2.46% to€ 747.01. This year, however, revenues grew faster, rising and making a profit by 58.52 % to € 774.2.Despite the declining number of dairy cows, productivity and production volume, we rate this year as the best for the period in terms of profit. The increase in yields was due to the increased purchase price of milk. After 2013, costs have been growing faster than revenues and are also expected to increase to around € 922 in the future.In 2016, revenues decreased by 6.15% and in 2017 by 4.23% to€702.33. The costs is amounted to € 784.28this year.According to forecasts, by 2021, revenues will not exceed costs. Porhajaš and Adamíčková (2011) analyzed costs and profitability in agricultural cooperatives in Slovakia and claim that reducing costs is the task of every business entity to withstand competition in Slovakia, but also in the EU.Businesses should carry out a thorough planned and actual calculation of their own costs for each sector and use it to identify cost reduction provisions.

Figure 5 The total annual economic result in €in cow's milk production in Slovakia
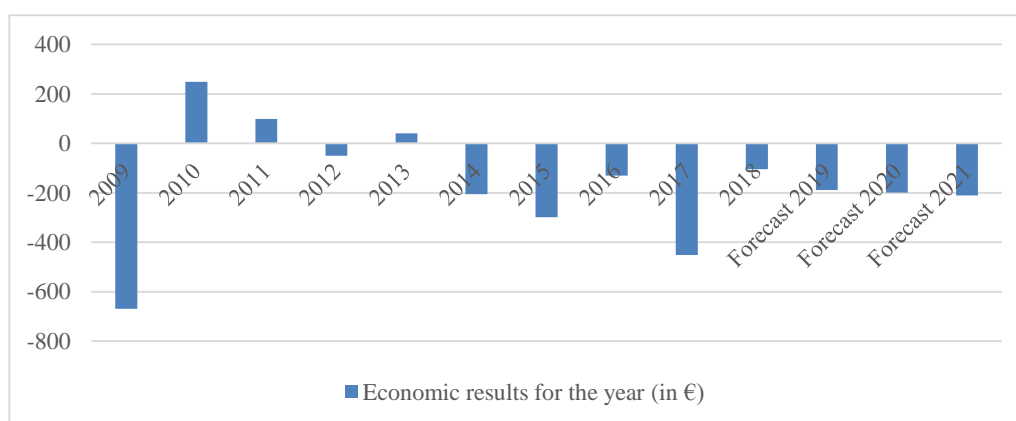
Source: own processing based on data from Situation and Outlook reports for Milk (2009–2018)

Graph 6 shows the volatility of the economic result. At the beginning of the period under review, there was a significant increase from a loss of€669.52in the first year to a profit of€268.24. The following year, the profit fell by 40 % to €99.28and then went back to a loss. Since 2013, dairy farming and milk production have been at a loss, which is the main reason for the lack of interest in dairy farming and the liquidation of farms. Cooperatives usually cover these losses with profits from crop production.

A similar course of costs and revenues can be observed for costs and revenues converted to 1 liter of milk produced. This course, together with the purchase price for 1 liter of raw cow's milk and the forecasts of further development, is shown in the graph.

Figure 6 Development and prediction of costs per 1 liter of milk and prices of 1 liter of milk in Slovaki
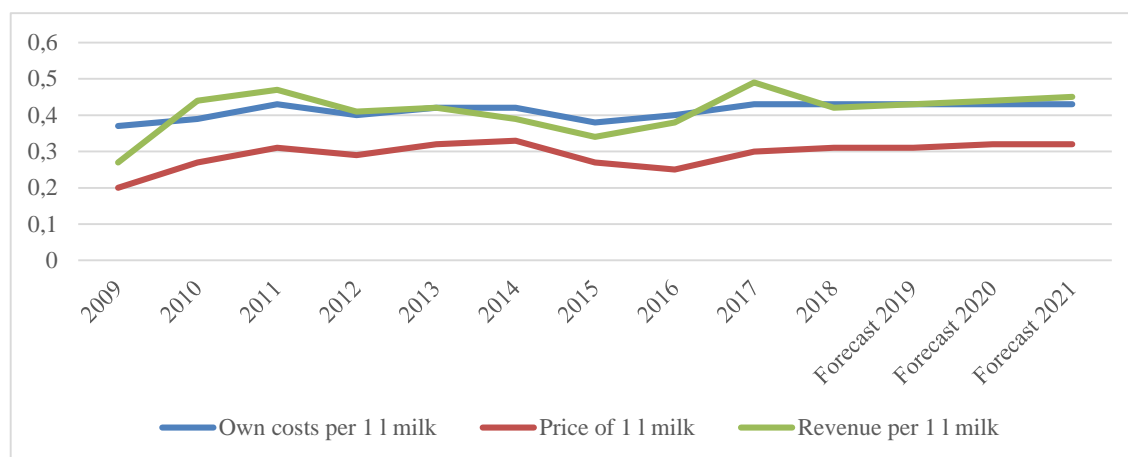
Source:own processing based on data from Situation and Outlook reports for Milk (2009–2018)

When comparing the unit costs and the purchase price, it is clear that the purchase price does not cover the unit costs in any year of the observed period. An initial increase in revenues in 2010 by 12.77 % to the level of €0.44per liter of milk and their culmination in 2011 and a subsequent decrease below the level of unit costs. The highest value was achieved by revenues in 2017, namely the value of €0.49 per liter of milk, when the costs exceeded by€ 0.06per liter of milk.The forecast speaks of a relatively stable development of unit costs and revenues and a positive economic result. The economic efficiency of agricultural commodities was also monitored by Trubačová (2014), who writes that the efficiency of animal production was adversely affected by high unit costs of production and low realization price.

4 Conclusions

Despite the fact that dairy farming and milk production have a long tradition in Slovakia, the research results show a significant decline in this agricultural sector. A significant decrease in the number of dairy cows indicates the cessation of cattle breeding, or the cessation of cooperatives and farms.Over the last 10 years, the number of dairy cows has decreased by 22.66 %. On the other hand, the efficiency of dairy cows is constantly increasing, thanks to good breeding and a suitably chosen system of dairy farming. It should be noted that each breed is unique and takes place in different production and climatic conditions.The farmer must therefore choose the most suitable breeding system, minimize costs, maximize the volume and quality of production and maintain the required level of profitability necessary for existence. However, minimizing production costs is problematic, as costs have an ever-increasing trend as a result of rising input prices.Forecasts indicate that this unfavorable situation will continue in the future. Dairy farming will continue to show a negative result in the near future. Farmers will therefore have to look for ways to maximize the efficiency of the production process. Domestic production of cow's milk is very important for increasing Slovakia's food self-sufficiency.

References

Boreková, B. (2006). *Ekonomika agroodvetví*. Nitra: SPU, 2006. ISBN 80-8069-805-8.

Brodová, M. (2013). Cenový vývoj vo vertikále výroby a spotreby živočíšnych komodít v rokoch 2008-2012. *Ekonomika poľnohospodárstva, 13(3),23 -35.*

Golian, J. a kol. (2019). *Mlieko a mliečne výrobky*. Nitra: SPU, 2019. ISBN 978-80-552-2020-8.

Porhajaš, V., & Adamíčková, I. (2011). Analýza vývoja nákladovosti a výnosnosti v poľnohospodárskych družstvách. In *Riziká a príležitosti agrosektora v podmienkach finančnej a hospodárskej krízy. Zborník príspevkov z medzinárodnej vedeckej konferencie*. Nitra: Slovenská poľnohospodárska univerzita v Nitre. pp 51 – 57. ISBN 978-80-552-0716-2.

Gőrőzdi, P., & Dianová, M. (2018). Kontrola úžitkovosti: informácie pre správne manažovanie chovu. *Roľnícke noviny Dojnice*, 7, 8-10.

Repta, F., & Mudroň, P. (2018). Rozhovor. *ARDO*, 8(1), 5-8.

Ryba, Š. (2018). Situácia na trhu mlieka a mliečnych výrobkov doma a v Európskej únii. *Roľnícke noviny Dojnice*, 7, 4-7.

Trubačová, A. (2014). Vývoj ekonomickej efektívnosti vybraných poľnohospodárskych komodít. *Ekonomika poľnohospodárstva*, 14(3), 53 -68.

Belarussian agricultural exports after Russian import ban: changes in trade specialization

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Abstract: Russian import ban of 2014 had provoked specific changes in international trade between Russia and its main trading partners. The paper focuses on changes in trade specialization of Belarus after Russian import ban for products in scope of the ban. Main results suggest increase of Belarus trade specialization after year 2013 in sectors where the country already had comparative advantage, however the pace is not uniform. Trade specialization has increased during years 2014-2016 and decreased in 2017-2018, suggesting stabilization processes. Belarus has employed import ban to strengthen its position in agricultural trade with Russia, however the effect was exhausted after 2016. Results suggest that Belarus' agricultural trade has rather benefited from Russian import ban.

Keywords: Russia, Belarus, import ban, international trade, agriculture
JEL Classification: F14, Q17, C21.

1 Introduction

Russian import ban was introduced in August 2014 as a counter action to European sanctions in connection with Russian involvement in events in Crimea and Eastern Ukraine. European sanctions were introduced in several packages, including ban of long-term financing for Russian banks, personal sanctions and travel ban for specified persons. Russia replied with so-called counter sanctions, that included import ban for specified list of foodstuff products originated in countries of European Union, United States of America, Norway, Australia and New Zealand. Products in scope of the ban included meat, fish, dairy products, fruits and vegetables. Simultaneously, re-export of European foodstuff products in scope of the ban was started through several neighbouring countries which are part of Eurasian Economic Union (EAEU). Members of EAEU has been placed in unique and favourable situation in terms of international trade in foodstuff products, and Belarus is the EAEU member with most favorable geographical position.

Current paper attempts to estimate the impact of Russian import ban on trade specialization and competitiveness of Belarus' agricultural exports. Changes in trade specialization and competitiveness can show how economics of EAEU countries adopt and react to changing trade patterns and policies of neighbouring countries.

Belarus has relatively broad agricultural sector, which has been noted in literature to date. One of the main pillars of Belarussian agriculture is dairy sector (32% of gross output) and meat sector, representing 23% of gross output (Kuznetsova, 2020). Belarus is traditionally highly specialized in butter (world's third largest exporter), milk, cheese and flax, for which the country owns 16% of the world sown area (Gusakov, 2014). As in many other post-Soviet countries, namely Russia and Ukraine, Belarus has quite significant "second agriculture" sector, which is characterized by households using small land plots to produce significant agricultural output (Yemelyanau, 2009). As in Russia, agricultural production of Belarussian households helps to smooth consumption of food for the poorest households. Regarding food security, Belarus is rated as 36th in the world and 20th in Europe according to GFSI index (Gusakov et al., 2020).

Mourao (2015) has pointed out several peculiarities of Belarusian agricultural sector connected with trade openness. Results suggested that higher trade openness of Belarusian economy is associated with growth of agricultural sector. Comparative advantage of Belarus in terms of agricultural trade in recent years was noted by Mizik et al. (2020).

Considering Russian import ban, which included dairy products in scope, Belarussian dairy sector has received obvious benefit. This benefit is two-fold. Firstly, providing more demand for Belarussian products. Secondly, providing opportunity for re-export of dairy products in scope of the ban from European producers to Russia. Despite the fact, that Russian import ban is rather unique example of unilateral food trade restrictions and Belarus is one of the closest trading partners of Russian Federation, limited attention has been given to effect of the ban on this country. The paper attempts to fill this gap and investigate the changes in Belarus trade specialization for the products in scope of the ban using the framework of revealed comparative advantage (RCA) indices.

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2 Methods

We investigate changes in trade patterns between Russian and Belarus using framework of revealed comparative advantage (RCA) indexes. Consistent review of existing RCA indexes is summarized in Sanidas and Shin (2010) and Yu et al. (2009).

As a main mean of analysis, we use Lafay index (Lafay, 1992) in the following form:

$$LFI_j^i = 100 \left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum_{j=1}^{N}(x_j^i - m_j^i)}{\sum_{j=1}^{N}(x_j^i + m_j^i)} \right) \frac{x_j^i + m_j^i}{\sum_{j=1}^{N}(x_j^i + m_j^i)} \qquad (1)$$

where x_j^i – export of product j of country i; m_j^i – import of product j of country i; N – number of items.

Lafay index is calculated for Belarussian exports of foodstuff products in scope of import ban to Russia.

Following contribution of Pavitt (1989), Cantwell (1989) and more recent works of ECB (2003), Sanidas and Shin (2010) we estimate:

$$LFI_{ij}^{END} = \alpha_i + \beta_i LFI_{ij}^{START} + \varepsilon_{ij} \qquad (2)$$

where:
LFI_{ij}^{END} – distribution of Lafay index for country i and commodities j in the end of reference period;
LFI_{ij}^{START} – distribution of Lafay index for country i and commodities j in the start of reference period;
α_i and β_i are standard linear regression coefficients;
ε_{ij} – residual term.
Coefficient β describes the change in specialization of country towards trade partner. Neutral point is β=1, when the specialization pattern has not changed between two points of time. Therefore, value of β higher than 1 shows increased specialization in sectors where the country had a competitive advantage already. Value between 0 and 1 denotes regression towards the mean, ie situation where sectors with comparative disadvantage improves its position, while sectors with comparative advantage worsen their positions (Sanidas and Shin, 2010). Regression method used in the analysis compares two cross-sections at two points of time, and there is no dynamic time component included. Despite this weakness, method allows to conclude about the change of trade specialization after specified event, such as introduction of Russian import ban.

In order to capture the change of specialization over time, we run subsequent regressions, where dependent variable always contains data for year 2013 (year before Russian import ban), and independent variable represents data for years 2014-2018. Therefore, final specification of the model is:

$$LFI_j^t = \alpha_i + \beta_i LFI_j^i + \varepsilon_j \qquad (3)$$

where:
α_i and β_i are standard linear regression coefficients;
t denotes year 2013;
i denotes years 2014-2018;
ε_j – residual term.

Additionally, we estimate the same model for pairs of consecutive years between 2012 and 2018. This allows to eliminate the bias caused by selection of base year (2013) and consider changes of trade specialization through time. Dataset for calculations is comprised of trade data for Belarus-Russia import and export for products in scope of Russian import ban on 4-digit level according to Harmonised System (HS) (United Nations Statistical Division, 2020). Data covers period of 2012-2018 and contain annual values for 47 product categories, covering all products in scope of the ban.

3 Research results

Results of the regression analysis are summarized in Table 1 and Table 2. There is a clear evidence of increase in trade specialization of Belarus in years 2014-2017 in relation to year 2013. Belarus has strengthened its comparative advantage towards Russia for products in scope of Russian import ban.

Table 1 Results of linear regression model estimation

Independent variable LFI_j^t	2013				
Dependent variable LFI_j^i	2014	2015	2016	2017	2018
α_i	0.00898	0.00538	0.01359	0.01860	0.02018
β_i	1.12255***	1.21643***	1.51024***	1.37484***	1.03562***
R^2	0.963	0.903	0.884	0.809	0.697

Source: Own processing based on United Nations Statistical Division (2020). *** - p-value < 0.01.

Linear regression model estimation for pairs of consecutive years shows additional aspects of trade specialization change of Belarus. Increase of trade specialization for products in scope of import ban has been existing already in 2013 (β_i=1.98327), then the pace has slowed in 2014-2015, however results suggest additional impulse in 2016 (β_i=1.24295).

Table 2 Results of linear regression model estimation for pairs of consecutive years in period of 2012-2018

Independent variable LFI_j^t	2012	2013	2014	2015	2016	2017
Dependent variable LFI_j^i	2013	2014	2015	2016	2017	2018
α_i	0.00215	0.00898	−0.00580	0.00679	0.00255	0.00096
β_i	1.98327***	1.12255***	1.10091***	1.24295***	0.942567***	0.80042***
R^2	0.972	0.963	0.968	0.982	0.98	0.974

Source: Own processing based on United Nations Statistical Division (2020). *** - p-value < 0.01.

Years 2017-2018 suggest rather stabilization of comparative advantage of Belarus, as coefficient β_i moves in the range of 0.80-0.94, which is lower than unity. As was mentioned before, it represents the regression towards mean in the sense, that country has slightly increased its comparative advantage in relatively weak products and decreased comparative advantage in products which were relatively strong. To some extent, this can be regarded as stabilization, and distance from the unity can give an insight into the pace of the stabilization.

Aggregated indexes cannot provide the insight into how the basket of Belarussian export commodities has changed in relation to Russia. As can be seen on the Table 3, Lafay index has been increasing since 2013 for many commodities, but the biggest increase was in HS 0406 Cheese and curd. Belarussian producers of cheese, which is a product with relatively high added value, have used the advantage of Russian import ban and has increased exports of these goods to Russia. At the same time, such significant increase in exports should be supported by respective increase of production. Taking in consideration rather long investment cycles in milk processing industry, it is important to consider the effect of re-export of European cheese to Russia via Belarus.

Table 3 Changes in absolute values of Lafay index for Belarus for selected commodities in 2012-2018 (2012 is a base year).

HS code	Commodity	2012-2013	2012-2014	2012-2015	2012-2016	2012-2017	2012-2018
0201	Meat of bovine animals; fresh or chilled	0.1799	0.3579	0.4390	0.5085	0.4770	0.4259
0202	Meat of swine; fresh, chilled or frozen	0.0684	0.0582	0.1022	0.2333	0.1620	0.1516
0207	Meat and edible offal of poultry	0.0783	0.1490	0.1806	0.2042	0.1783	0.1674
0305	Fish, dried, salted or in brine; smoked fish	0.0371	0.1023	0.1484	0.1934	0.1715	0.1397
0401	Milk and cream; not concentrated	0.0962	0.1491	0.1552	0.1578	0.2016	0.0971
0402	Milk and cream; concentrated	0.4388	0.3988	0.3642	0.5040	0.2899	0.0032
0403	Buttermilk, curdled milk and cream, yoghurt, kephir	0.0421	0.0669	0.0970	0.1377	0.1942	0.1891
0404	Whey and products consisting of natural milk constituents	**-0.0056**	**0.0146**	**0.0011**	**0.0403**	**0.0257**	**-0.0364**

0405	Butter and other fats and oils derived from milk	0.1336	0.2314	0.2467	0.4619	0.4898	0.2935
0406	Cheese and curd	**0.3111**	**0.4788**	**0.6802**	**0.9814**	**0.9841**	**0.7913**
1601	Sausages and similar products of meat, meat offal or blood	0.0846	0.1322	0.0351	0.0953	0.1062	0.0683
1901	Malt extract; flour/groats/meal/starch/malt extract products	-0.0160	-0.0058	-0.0009	0.0614	0.1280	0.1178

Source: Own processing based on United Nations Statistical Division (2020).

It is rather interesting to consider the changes for HS 0401 and 0402 in the period of 2012-2018. The first category has showed weak performance in terms of Lafay index, while the latter has shown significant growth in years 2012-2017. In other words, producers of concentrated milk have been enjoying higher demand than producers of non-concentrated milk. This fact is not surprising, if logistics aspect is taken into consideration, however it is important in order to understand the structure of Belarusian comparative advantage. The weakest performance in terms of Lafay index has been shown by HS 0404 Whey and products consisting of natural milk constituents (decrease of 0.0364).

During the period of 2012-2018, the basket of commodities for which Belarus had comparative advantage has changed. Belarus has been gaining advantage in milk products before Russian import ban, but as it is seen in the changes of Lafay index for years 2014-2018, Belarus has also received advantage in meat products. In addition to milk and dairy products, products in category HS 0201 (meat of bovine animals) has been acquiring larger portion of exports in relation to imports (increase of 0.4259), together with another meat categories HS 0202 and HS 0207. Interestingly, trade specialization in dried, salted and smoked fish has increased too, suggesting the effect of re-export, as there are simply not enough fish production in Belarus.

4 Conclusions

All in all, results suggest that Belarus agricultural trade has rather benefited from Russian import ban. In comparison to year 2013, trade specialization in foodstuff products has been increasing for at least 5 years, from 2014 to 2018. At the same time, comparison of trade competitiveness for each two consecutive years in period of 2012-2018 has shown, that increase of trade competitiveness has started already in 2013, in the year before Russian import ban. Such increase cannot be associated with Russian import ban, which was introduced in August, 2014.

At the same time, Russian import ban has changed the basket of commodities that are exported from Belarus to Russia. In addition to milk and dairy products, for which Belarus has already had shown trade specialization, trade specialization in beef, pork and poultry has been increasing in the period of 2014-2018. Therefore, Russian import ban has two effects: firstly, it has added new momentum to trade specialization in milk and dairy products, secondly, it has increased trade specialization in meat products.

For Belarus trade specialization, trend that has been set by Russian import ban are relatively visible. Further research can be focused on distinguishing between effect of re-export and other economic conditions on comparative advantage that Belarus has obtained after Russian import ban.

Acknowledgement

References

European Central Bank (2003), Working paper N 249, Trade Advantages and Specialization Dynamics in Acceding Countries, by Andrea Zaghini, Working Paper Series, August, 2003

Gusakov, V. (2014) Nekotopye principial'nye voprosy tekušego i dolgosročnogo rasvitija APK » [Quelques questions principales sur le développement actuel et de long terme des APK], Agrarnaja èkonomika , 5, 2-9.

Gusakov, G., Karpovich, N., Yonchik, L., Lobanova, L. & Gusakova, I. (2020) International assessment of food security: global values and rating positions of Belarus. *Proceedings of the National Academy of Sciences of Belarus-Agrarian Series*, 58(3), 268-282.

Kuznetsova, A. (2020) Prospects for the Development of the Dairy Industry in the Republic of Belarus and in the Russian Federation, Proceedings of International Scientific Conference on Hradec Economic Days, Hradec Kralove, Czech Republic, 2020.

Lafay, G. (1992), "The Measurement of Revealed Comparative Advantages", in M.G. Dagenais and P.A. Muet eds., International Trade Modeling, Chapman & Hill, London.

Mourao, P. (2015) The complex relation between Belarusian trade openness and the agricultural sector, *Land Use Policy*, 43, 74-81

Mizik, T., Gal, P. & Torok, A. (2020) Does agricultural trade competitiveness matter? The case of the CIS countries, *Agris On-line Papers in Economics and Informatics*, 12(1), 61-72

Pavitt (1989) K.L.R., "International Patterns of Technological Accumulation", in N.Hood and J.E. Vahlne (eds.), Strategies in Global Competition, Croom Helm Publisher, London.

Sanidas E, Shin Y (2010) Comparison of Revealed Comparative Advantage Indices with Application to Trade Tendencies of East Asian Countries. Paper Presented at the 9th Korea and the World Economy Conference, Incheon, 2010

Yemelyanau, M. (2009) Second agriculture in Belarus and Ukraine: subsistence or leisure? *BEROC Working Paper Series 08*, Belarusian Economic Research and Outreach Center (BEROC), available online: http://beroc.by/upload/iblock/06d/06dd194efb8cce145a84b922ec3e9a71.pdf.

Yu, R., Cai, J. & Leung, P. (2009) The normalized revealed comparative advantage index. *Annals of Regional Science*, 43, 267-282.

United Nations Statistical Division. (2020). Data retrieved February 10, 2020 from http://comtrade.un.org/

Development of the size and intensity of agricultural production in the V4 countries after 2004

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Abstract: The paper deals with issues of agricultural development in the Visegrad Group countries after accession to the European Union in 2004. The basic characteristics of the overall development trends of the agricultural sector in Central Europe is specified in more detail in terms of size, structure and intensity of agricultural production, as well as selected plant and animal commodities which also reflect the application of the given framework of the common agricultural policy of the EU in individual countries. For this purpose, in the Czech Republic, Hungary, Poland and Slovakia, indicators are analysed and compared: the value of total agricultural production and the values of total crop and livestock production in 2005–2016 in millions of euros. The results generally confirm the growth of production values in all V4 countries. The use rate of the utilized agricultural area (UAA) can be assessed in more detail using these indicators converted into a UAA hectare. The use of basic indexes for the above indicators converted to UAA hectares creates a basis for evaluating the dynamics of the development of the intensity of agricultural production of the V4 countries in the context of differentiation of structural changes in agriculture in the period under review.

Keywords: agriculture, value of total agricultural production, value of total crop and livestock production, production intensity, Visegrad Group
JEL Classification: G32, G33, C35.

1 Introduction

The accession of the Visegrad Group countries to the European Union took place at a time which can be called, for agriculture, a period of fundamental reform steps in the level and forms of support under the Common agricultural policy (CAP). Based on the mid-term review of the CAP, the stabilization of the agricultural budget for the period 2006 to 2012 and the Health Check in 2008 and other measures after 2013, relatively fundamental reform steps were implemented within this policy. From the point of view of the original concept of the CAP, measures were taken during this period, especially in the area of market organization, aimed at limiting the impact of instruments that directly affected the agricultural market and hindered its liberalization.

The key to the overall concept was, in essence, the decoupling of farm support from the specific production structure and volume of production provided, based on single direct payments for agricultural land, in order to create more scope for choosing measures to support the growth of agricultural competitiveness. At the same time, there was an increasing emphasis on supporting non-productive functions of agriculture, environmental protection and consumer safety. Significant changes in the business environment related to the processes of globalization of agricultural markets, the formation of agribusiness and food verticals also had a significant impact on the overall development (Bečvářová, 2005).

However, a realistic assessment of the agricultural situation and the differentiation of its development within the Community and an analysis of the overall and commodity development of Member States production show that the common market, due to the concrete implementation of the CAP rules, had relatively different manifestations and consequences. It was in the new accession countries, including the V4, that the structural imbalance of agriculture deepened further, partly due to the gradual implementation of the instruments of the CAP and its financing. Paradoxically, despite the overall favourable impact of the CAP on the income position of agricultural holdings, ensured mainly by EU support (SAPS phasing), changes began to manifest themselves mainly in the structure of production. Successful entry into the common market was largely conditioned by the growth of competitiveness, related to increasing the intensity of agricultural production, labour productivity and capital efficiency, which was reflected in interactions within commodity verticals and affected the conditions of production. The question of the extent to which these assumptions were met is also answered by the evaluation of the development of agriculture in the V4 countries after accession to the EU presented by this study (UZEI, 2019).

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2 Methods

The aim of the research is to analyse the development trends of the agricultural sector in Central Europe after accession to the European Union in 2004. It is an assessment and comparison of size, structure and intensity of agricultural production and selected plant and animal commodities in the V4 countries (the Czech Republic, Hungary, Poland and Slovakia).

The paper analyses the dynamics of the development of the value of agricultural production in the V4 countries between 2005-2016 on the basis of the development of indicators of the value of total agricultural production and the value of total crop and livestock production in millions of euros at current prices. These indicators are then converted in selected years (2005, 2007, 2010, 2013 and 2016) per hectare of Utilized agricultural area (UAA) and analysed using basic indexes, which provides an opportunity to assess the dynamics of the development of the intensity of agricultural production in the V4 countries in the context of structural differentiation and changes in agriculture in the period under review.

The paper also contains an analysis of the dynamics of the development of the volume and intensity of selected plant and animal commodities. For plant commodities (wheat, potatoes, sugar beet and oilseed rape) the production intensity is calculated per hectare of arable land, for animal commodities (beef, pork and chicken) it is expressed in selected years in relation to the UAA hectare.

Data for the contribution are obtained from the EUROSTAT database. The analysis of statistical data is performed using MS Excel software.

3 Research results

Analysis of indicators of total agricultural production, total crop production and total livestock production show their growth character in all V4 countries between 2005 and 2016. There is a significant oscillation of values together with a significant growth difference.

All indicators show a decline in 2009, when the financial crisis peaked. The fact remains, however, that livestock production has suffered significantly less in terms of production volume than crop production.

The highest values in the examined indicators are reached by Poland, followed by Hungary and the Czech Republic. The lowest values are found in Slovakia.

Table 3 Development of indicator values: total values of agricultural production, values of total crop production and values of total livestock production

Total values of agricultural production in Million euro												Basic indexes
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2016/2005
CZ	3455	3608	4328	4801	3700	4058	4834	4861	4936	4976	4711	4760	137,77
HU	6116	6001	6682	7843	5854	6122	7753	7499	7805	7957	8022	8130	132,93
PL	15338	16405	20260	22129	17797	20226	23145	22892	24308	24247	23305	23572	153,68
SK	1693	1770	2016	2356	1858	1887	2295	2397	2407	2392	2161	2273	134,26
Total crop production in Million euro												Basic indexes
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2016/2005
CZ	1678	1746	2391	2506	1934	2252	2857	2850	2920	2885	2743	2952	175,92
HU	3314	3333	3896	4656	3216	3476	4676	4339	4596	4712	4682	5015	151,33
PL	7094	7953	10772	11835	9076	10523	12493	12121	12338	11846	11190	11443	161,31
SK	753	793	951	1108	851	868	1203	1196	1211	1273	1127	1364	181,14
Total livestock production in Million euro												Basic indexes
Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2016/2005
CZ	1602	1686	1770	2101	1604	1617	1766	1790	1805	1872	1703	1683	105,06
HU	2235	2141	2255	2564	2137	2178	2526	2638	2665	2708	2760	2693	120,49
PL	7697	7849	8836	9509	8088	9015	9937	10091	11249	11744	11458	11634	151,15
SK	766	781	889	1038	813	805	877	959	952	871	767	787	102,74

Source: EUROSTAT, own processing

The results show that in the case of the value of total agricultural production, Poland achieved the highest increase between 2005 and 2016 (+ 53,68 %), the remaining Visegrad countries achieved growth in this range of 32,93 – 37,77% for the same period. The value of the indicator of total crop production was highest in Slovakia (+ 81,14 %) and the Czech

Republic (+ 75,92 %). The value of livestock production increased the most between 2005–2016 in the case of Poland, while the indicator stagnated in the Czech Republic and Slovakia.

In terms of the basis of calculations, i.e the Utilized agriculture area (UAA), for all V4 countries, after using basic indexes (2005 = 100 %) in the period 2005–2016, it was found to oscillate around 100, and therefore it is possible to specify on this basis basic development tendencies of structural development in individual countries in the monitored period and specify the basic differences in its use.

In terms of agricultural land use, the ratio between UAA and arable land has long been the highest in Hungary, where the degree of plowing consistently exceeds 90 % of UAA. The second highest share, despite a certain decline, is recorded in Poland at 75 % (2016). On the contrary, a more significant decrease in the degree of plowing occurred during the observed period in the Czech Republic, from 74 % to 72 % UAA. The lowest share of arable land in the UAA is also reported in Slovakia due to soil conditions. Specific data are given in Table 2.

Table 4 Development of values of UAA and arable land

Share of arable land in UAA (%)						UAA (1000 ha)				
	2005	2008	2010	2013	2016		2005	2008	2010	2013	2016
CZ	74,22	73,86	73,10	71,74	72,27	CZ	3558	3518	3484	3941	3455
HU	84,53	106,13	91,93	92,90	92,76	HU	4267	4229	4686	4657	4671
PL	76,64	77,36	75,29	74,67	75,01	PL	14755	15477	14447	14410	14406
SK	70,18	69,67	71,44	71,67	71,27	SK	1879	1937	1896	1902	1890

Source: EUROSTAT, own processing

In terms of use, therefore in the case of the conversion of indicators total values of agricultural production, values of total crop production and values of total livestock production per UAA hectares, it is possible to see a decrease in 2010 in all V4 countries except Poland.

In the last monitored year 2016, Hungary achieves the best results in the case of total agricultural production and total crop production per hectare of UAA, followed by Poland in the case of total agricultural production, and the Czech Republic in the case of total crop production. Slovakia reaches the lowest values in the last year in all monitored indicators per hectare of UAA.

Figure 2 Development of indicators: values of total agricultural production, total crop and livestock production per hectare of UAA
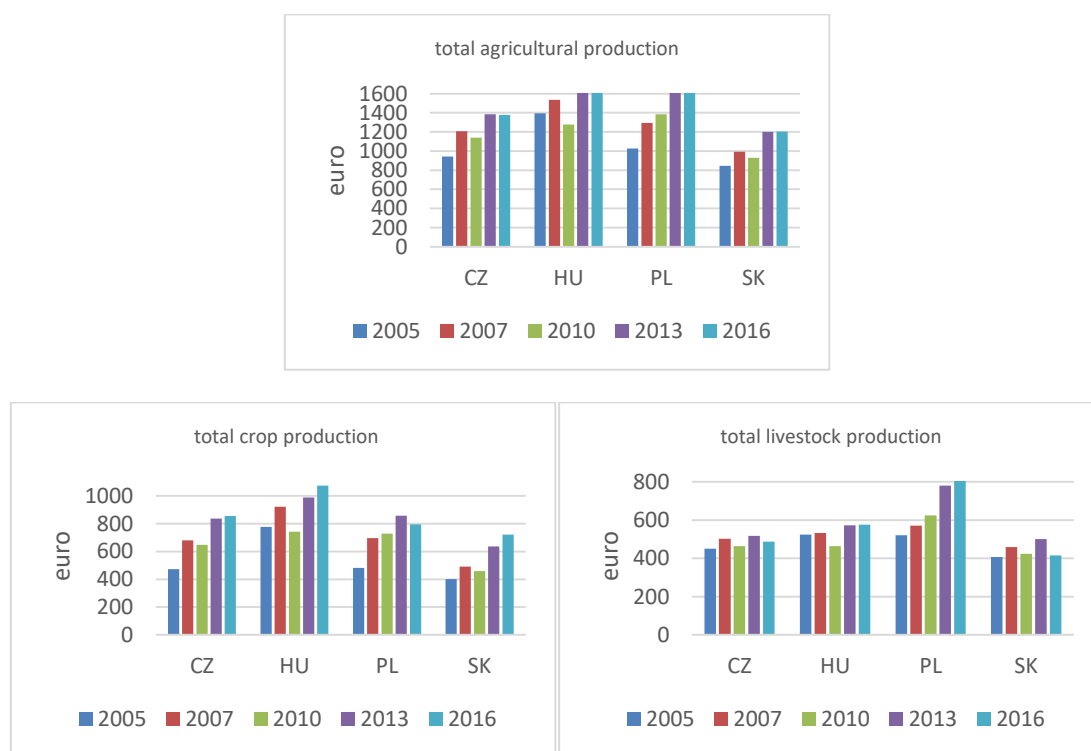
Source: EUROSTAT, own processing

The analysis of basic indexes (Table 3) showed the highest increase between 2005-2016 in the indicator of the value of total agricultural production per hectare of UAA in Poland (+ 59 %), the lowest growth in Hungary (+ 25%). The value of total crop production per hectare of UAA reached the highest increase in the case of the Czech Republic (+ 81%), after in Slovakia (+80 %), the lowest again in Hungary (+ 38 %). Hungary achieves the highest increase among the monitored years in the case of the value of total livestock production per hectare of UAA (+ 55 %). The remaining V4 countries achieved growth of up to 10 %.

From the above, there is a noticeable trend of Czech and Slovak agriculture - reducing the share of animal production in the structure of the agricultural sector.

Table 5 Basic indexes of total values of agriculture production, total crop and livestock production per UAA hectare

Total agricultural production						Total crop production						Total livestock production					
Country	2005	2007	2010	2013	2016	Country	2005	2007	2010	2013	2016	Country	2005	2007	2010	2013	2016
CZ	100	128	121	147	146	CZ	100	144	137	177	181	CZ	100	112	103	115	108
HU	100	110	92	117	125	HU	100	119	95	127	138	HU	100	109	120	150	155
PL	100	126	135	163	159	PL	100	145	152	178	165	PL	100	102	89	109	110
SK	100	118	110	142	142	SK	100	123	114	159	180	SK	100	113	104	123	102

Source: EUROSTAT, own processing

Given that the development in crop production will be evaluated in more detail in the next section, it is appropriate to focus in more detail on the level and development in animal production. Specifically, it concerns the production of beef, pork and chicken per hectare of UAA. From the evaluation of the overall development, the growing position of Poland is indisputable, which in the last year of the evaluation achieves the best results (beef 35 kg/ha, pork 136 kg/ha and chicken 157 kg/ha). On the contrary, a more detailed analysis draws attention to fundamental changes in the structure of this production in other countries. It is in the Czech Republic and Slovakia that a significant and permanent decline in pork and poultry production is recorded, which is also documented in the following graphs in the figure. At the same time, they show that there is a significant decrease in Slovakia also in the case of a beef production.

Figure 3 Amount of production per hectare UAA of the bovine meat, pig and poultry meat

Source: EUROSTAT, own processing

From the point of view of the analysis of the development of the crop production, where the commodities wheat, rape, potatoes and sugar beet were selected for a more detailed comparison, the growth of production intensity is typical for all studied commodities, with some oscillation caused mainly by weather to crop production in specific years.

Source: EUROSTAT, own processing

A basic overview of the share of production of monitored commodities on arable land in individual countries is given in Table 4.

Table 6 Share of selected plant commodities on arable land (%)

	wheat					potatoes					beets					oilseed rape				
	2005	2008	2010	2013	2016	2005	2008	2010	2013	2016	2005	2008	2010	2013	2016	2005	2008	2010	2013	2016
CZ	31,07	30,88	32,73	33,11	33,62	1,37	1,15	1,06	0,93	0,94	2,48	1,94	2,21	2,49	2,43	10,12	13,74	14,48	16,72	15,74
HU	31,35	25,19	23,46	25,21	24,10	0,70	0,57	0,48	0,48	0,38	1,71	0,21	0,32	0,44	0,37	3,39	5,50	6,02	4,57	5,92
PL	19,61	19,03	19,69	19,87	21,88	5,20	4,42	3,57	3,13	2,78	2,53	1,57	1,90	1,80	1,88	4,87	6,44	8,70	8,56	7,61
SK	28,50	27,69	25,26	26,98	31,01	1,47	1,06	0,81	0,66	0,61	2,51	0,82	1,32	1,49	1,59	8,14	12,07	12,11	10,02	9,24

Source: EUROSTAT, own processing

The above overview shows that differences in structural development can also be specified in crop production, where there is generally an increase in the share of cereals and rape at the expense of the share of root crops with this characteristic.

Wheat has long achieved the highest share of arable land in the Czech Republic, in 2016 almost 34 %. There was also the highest increase in production between 2005-2016, a total of 32 % (total production in 2016 was 5454 thousand tons). In the other V4 countries, we also see a predominant growth trend in the share of arable land and wheat production.

The commodity of potatoes reaches the highest share of the V4 countries for the entire period of monitoring on arable land in Poland, namely 2,8 %, its total production is also the highest among the V4 countries in 2016 (8624 thousand tons). Between 2005 and 2016, however, the share of arable land and production itself decreased by about 50 % in all countries.

The share of sown areas of sugar beet on arable land in 2016 is the highest in the Czech Republic 2,43 %, where the total production also increased the most, by 17 %. The growth trend, despite the decline in the share, is recorded in Poland (+ 14 %). On the contrary, production is declining in Hungary and Slovakia.

The commodity oilseed rape occupies the highest share of arable land in 2016 in the Czech Republic, namely 16 %. In other countries, the share is below 10 %. In the Czech Republic, throughout the observation period, we observe a progressive growth trend both in the mentioned share of arable land and in the value of total rapeseed production.

4 Conclusions

The analysis show that the accession of the V4 countries to the EU, generally positively assessed on the basis of the overall increase in agricultural income, mainly due to the possibility of using CAP funds, had a number of negative consequences in terms of structural development, which were often justified by lower competitiveness of domestic commodity production. in the common market in both horizontal and vertical agribusiness contexts. Not only the reduction of animal production, but also changes in the structure of crop production proved to be risky, which is also reflected in the overall development and results of this sector in individual member states.

It is indisputable that the role of agriculture and food is becoming increasingly important in the current crisis situation. It confirms that this is indeed a strategic sector, not only of the domestic economy, related to the availability of quality food and the provision of nutrition to the population (EC, 2020). It is conditioned by a new phase of technological development, precision agriculture and related processes of efficient division of labour and cooperation of economic activities from the use of scarce natural resources for agricultural production, their evaluation and finalization to the form required by the final consumer (Svobodová, 2011).

At present, the EU's multifunctional agriculture is facing a new programming period (EC, 2018). To meet the requirements of sustainable development, the 2030 Strategy defines four basic unifying long-term priorities within the perspective of sustainable development, which are further specifically and in a corresponding degree of complexity implemented into strategic priorities of individual sectors and sub-areas, namely (1) competitive and sustainable agriculture, food , forestry and water management; (2) sustainable food security and adequate self-sufficiency; (3) sustainable management of natural resources and climate action (4); balanced territorial development of the economy and communities, including job creation. In this context, knowledge of the starting points and contexts of supporting the competitiveness of agriculture and food in the global market is considered a decisive factor for the food self-sufficiency of countries, which is currently significantly discussed and targeted by the nation states (MZe, 2015).

References

Bečvářová, V. Podstata a ekonomické souvislosti formování agrobyznysu. Brno: Mendelova zemědělská a lesnická univerzita, 2005. ISBN 80-7157-911-4.

Bervidová, L. Business efficiency as presumption of competitive agrarian sector. Agris on-line [online]. 1999 [cit. 2020-09-23]. Dostupné z: http://www.agris.cz/clanek/103896/efektivnost-podnikani-jako-predpoklad-konkurenceschopnosti-agrarniho-sektoru

Ec.europa.eu. The common agricultural policy at a glance: The common agricultural policy supports farmers and ensures Europe's food security. [online]. 2020 [cit. 2020-09-23]. Dostupné z: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en

Ec.europa.eu. An environmentally sustainable CAP [online]. [cit. 2020-09-23]. Dostupné z: https://ec.europa.eu/info/food-farming-fisheries/sustainability/environmental-sustainability/cap-and-environment_en

Edward, M. a C. Schultz. Reframing Agribusiness: Moving from Farm to Market Centric. Journal of Agribusiness 23: Agricultural Economics Association of Georgia [online]. 2005 [cit. 2020-05-26]. Dostupné z: https://ageconsearch.umn.edu/record/59611/

Eurostat.com [online]. [cit. 2020-09-23]. Dostupné z: https://ec.europa.eu/eurostat/home?

Evropský Parlament. Společná zemědělská politika po roce 2020. Europarl.europa.eu [online]. 2018 [cit. 2020-23-09]. Dostupné z: http://www.europarl.europa.eu/factsheets/cs/sheet/113/spolecna-zemedelska-politika-po-roce-2020

MZe (2015) Strategie pro růst Ministerstva zemědělství České republiky do roku 2030. Ministerstvo zemědělství ČR, Praha. Dostupné z: www.eagri.cz [cit. 2020-23-09].

Podkladové analýzy pro přípravu SZP v programovém období 2021+ [online]. Ústav zemědělské ekonomiky a informací [cit. 2020-09-23]. Dostupné z: http://eagri.cz/public/web/file/654805/B01_Konkurenceschopnost_Zemedelstvi.pdf

Reichl, J. Budoucí Společná zemědělská politika: Ministerstvo zemědělství bude usilovat o zrušení navrhovaného povinného zastropování [online]. 2018 [cit. 2020-09-23]. Dostupné z: https://ekonomickydenik.cz/budouci-spolecna-zemedelska-politika-ministerstvo-zemedelstvi-bude-usilovat-zruseni-navrhovaneho-povinneho-zastropovani/

Sinabell, F. Roles of Agriculture in the Rural Economy: An Exploration Exemplified by Austria [online]. Vienna, 2009 [cit. 2020-23-09].

Svobodová, E. Intenzita zemědělské výroby v České republice v období vstupu do EU [online]. Brno, 2011 [cit. 2020-09-23]. Dostupné z: https://is.mendelu.cz/lide/clovek.pl?id=2031;zalozka=7;zp=34002;studium=24160;lang=cz

Asymmetric Price Transmission as a Consequence of the Uneven Distribution of Market Power in the Food Commodity Chain

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Abstract: The paper deals with the analysis of price transmission within the food commodity chain. The aim of the study is to evaluate the price transmission within the commodity chain of butter production in the period of January 2008 – August 2018 in the Czech Republic and to assess, to what extent the results are affected by the distribution of market power within the analysed commodity chain. Methodologically, the analysis of the intensity of price transmission is based on the calculation of the elasticity of price transmission coefficients (EPT). The intensity of the dependence of positive and negative inter-market price differences was evaluated and the time lag was tested as well. The existence of greater market power of the finalizing stage in the commodity chain, i.e. trade, was confirmed. This is evidenced by the asymmetric price transmission and the better price transmission in the case of price increases than in the case of price decreases. At the same time, inelastic price transmission in the demand direction was found, i.e. from the retail market towards the agricultural market.

1 Introduction

At present, the world economy is significantly affected by globalization processes, which permeate the entire structure of society and also affect the functioning of agri-food markets. Globalization trends cause market effects, which mean both opportunities and threats. They bring the possibility of exchange of know-how, mutual knowledge and experience, the possibility of sharing certain types of services, complementarities between particular areas and links of solidarity. The huge technical progress and the constant increase in the living standards of the population, when incomes are increasing, mean a challenge for the global agribusiness to satisfy all the requirements of the population (Svatoš et al., 2011).

As indicated by a number of studies (e.g. Saitone and Sexton, 2017; Lloyd et al., 2015; OECD, 2014; Blažková et al., 2019), the demand orientation of food commodity chains is strengthening, which leads to changes in the requirements for the structure of food products in terms of quality and differentiation, significantly affects the food technology and in many ways also the agricultural production (Sexton, 2013). The main features of the current market environment of agribusiness are the changes of firms´ structure and the growth of market power, especially in the food processing and retail sector (Hanf and Belaya, 2008; Dries et al., 2004; Weiss and Wittkopp, 2005). According to Saitone and Sexton (2017), the growing concentration of food producers and retailers is still relevant today due to its impact on market power and the overall performance of the agri-food system. The authors also emphasize the significant effect of market structure changes on price transmission in food verticals. The assessment of price transmission enables to deal with the magnitude, speed and asymmetry of the price adjustments (Commission of the European Communities, 2009) and assess the vertical price interconnections through relations between agricultural producer prices, industrial producer prices and consumer prices (Vavra and Goodwin, 2005; Dudová a Bečvářová, 2015), which may provide useful information on the distribution of market power within the commodity chain.

The aim of the study is to evaluate the price transmission within the commodity chain of butter production in the Czech Republic and to assess, to what extent the results are affected by the distribution of market power within the analysed commodity chain.

2 Methods

The data in the form of monthly prices for the period January 2002 – August 2018 published by the Czech Statistical Office (ČSÚ, 2019) and the Ministry of Agriculture of the Czech Republic (2014) were used for the analysis of price transmission within the commodity chain of butter production, i.e. farm-gate prices (FP), processors prices (PP) and

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consumer prices (CP). The intensity of price transmission was assessed with the use of the coefficients of price transmission (EPT_{ij}), as used e.g. by McCorriston (2002), Blažková and Syrovátka (2012) or Dudová and Bečvářová (2015):

$$EPT_{ij} = \frac{\frac{\delta p_j}{p_j}}{\frac{\delta p_i}{p_i}} = \frac{\delta p_j}{\delta p_i} \times \frac{p_i}{p_j} \tag{1}$$

where:
p denotes prices (FP, PP, or CP)
i and j denotes particular market levels

The results are arranged in a matrix of EPT_{ij} coefficients, as shown in Table 1.

Table 1 Matrix of EPT_{ij} coefficient

	FP of milk	PP of butter	CP of butter
FP of milk	x	EPT_{12}	EPT_{13}
PP of butter	EPT_{21}	x	EPT_{23}
CP of butter	EPT_{31}	EPT_{32}	x

Source: Own processing

Then the intensity of the dependence of positive and negative inter-market price differences was evaluated and the time lag was tested. Methodologically, these analyses were based on the value of correlation coefficient. Verification of regression models estimated for the purpose of price transmission coefficients calculation was performed with the use of squared multiple determination coefficient and F-test (Hušek, 2007).

3 Research results

The results are presented in Tables 2, 3 and 4. In Table 1, the values of the coefficients of price transmission (EPT_{ij}) are shown in the form of matrix reflecting the elasticity of price transmission in the supply direction (above the diagonal) and in the demand direction (below the diagonal). Table 2 presents the values of correlation coefficient indicating the intensity of the dependence of positive and negative inter-market price differences. The results of the analysis of the time lag of price changes (based on the values of correlation coefficients) are shown in Table 3.

Table 2 EPT coefficients within the commodity chain of butter production

	FP of milk	PP of butter	CP of butter
FP of milk	x	0.89	0.93
PP of butter	1.04	x	0.27
CP of butter	0.18	0.70	x

Source: Own processing

The supply direction shows an inelastic price transmission. The change in farm-gate prices by 1% affected the price on the processor market by 0.89% (EPT_{12}) in the observed period. EPT_{13} had the value of 0.93, i.e. a price change in the market of agricultural producers by 1% brought a price change in the consumer market by 0.93%. The change in the agricultural price is thus transformed into the final product price better than into the price of the intermediate goods. EPT_{23} showed that a change in the price on the processors´ market by 1% brought about a price change in the consumer market by 0.27%, i.e. prices are not transmitted proportionally.

In the demand direction, an elastic price transmission was observed between processors and farm-gate prices – when the processors price changed by 1%, the farm-gate price changed by 1.04%. The inelastic price transmission was demonstrated in the direction from the consumer price towards the prices on the lower level of the commodity chain, i.e. the processors price and the farm-gate price. Therefore, it can be assumed that firms in the retail market have stronger economic position within the commodity chain and may exercise greater market power, since they are able to set prices more independently of the previous stages of the commodity chain.

Table 3 Dependence of positive and negative price differences

	FP - PP	PP - CP
Price increase	28%	65%
Price decrease	21%	60%

Source: Own processing

As seen in Table 3, the price increase is better transmitted than price decline within the analysed commodity chain, both in the case of price transmission from the farmer to the processor and from the processor to the consumer. If prices rise at the previous stage of the commodity chain, this is better reflected in downstream prices than in the case of a fall in prices, which suggests the possibility of greater market power of the downstream chain levels. However, the differences in correlation coefficients are not significant.

Table 4 Coefficients of determination for various time lags

	no time lag	1 month time lag	2 months´ time lag	3 months´ time lag	4 months´ time lag
FP - PP	34%	9%	5%	4%	1%
PP - CP	71%	41%	17%	5%	1%

Source: Own processing

In terms of time lag, Table 4 demonstrates the nature of the perishable products. Within both stages of the commodity chain, the highest degree of price determination is without time lag, and at the same time, the price transmission decreases with the extension of the timeline.

4 Conclusions

Based on the results of the analysis of price transmission within the butter production chain in the period of January 2008 – August 2018 in the Czech Republic, the existence of greater market power of the finalizing stage in the commodity chain, i.e. trade, can be confirmed. This is evidenced by the asymmetric price transmission and the better price transmission in the case of price increases than in the case of price decreases. At the same time, inelastic price transmission in the demand direction was found, i.e. from the retail market towards the agricultural market.

Within the analysed commodity chain of butter production, an uneven distribution of economic forces can be observed, as the agri-food market is characterized by imperfect competition, which can fundamentally affect the asymmetry of price transmission between the particular stages of the commodity chain. This arises not only from the possibility of the abuse of market power in the commodity chain, but also, e.g. due to the government subsidies, inventory management or increased marketing costs. As a result of various events in the sub-markets of the commodity chain, the distribution of market forces between the individual stages of the commodity chain changes. The changes and fluctuations within the commodity chain may be caused by the European Union policy, fluctuations in supply or demand, changes in the political situation, changes in foreign markets, animal diseases or adverse weather conditions.

Acknowledgement

References

Blažková, I., Dvouletý, O., & Machek, O. (2020). What drives total factor productivity and its growth in post-communist countries? The case of the Czech food industry. *Journal of Agribusiness in Developing and Emerging Economies*, 10(3), 285-305. https://doi.org/10.1108/JADEE-04-2019-0050.

Blažková, I., & Syrovátka, P. (2012). Price formation and transmission along the food commodity chain. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, LX(4), 31-36.

Commission of the European Communities (2009). *Analysis of price transmission along the food supply chain in the EU*. Commission Staff Working Document. [Online]. Available at: http://www.uni-mannheim.de/edz/pdf/sek/2009/sek-2009-1450-en.pdf (cit. 15/04/2019).

Czech Statistical Office (2019). Ceny výrobců – časové řady. [Online]. Available at: https://www.czso.cz/csu/czso/ipc_cr (cit. 23/04/2019).

Dries, L., Reardon, T., & Swinnen, J. F. (2004). The rapid rise of supermarkets in Central and Eastern Europe: Implications for the agrifood sector and rural development. *Development policy review*, 22(5), 525-556.

Dudová, B., & Bečvářová, V. (2015). The Character of Price Transmission Within Milk Commodity Chain in the Czech Republic. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 63(3), 887-892.

Hanf, J. H., & Belaya, V. (2008). Retail internationalization and its impact on the Russian agri-food business. *Journal for East European Management Studies*, 3, 239-252.

Hušek, R. (2007). *Ekonometrická analýza*. 1. vyd., 368 p., Praha: Oeconomica.

Lloyd, T. A., McCorriston, S., & Morgan, C. W. (2015). Experience of food inflation across the EU. In McCorriston, S. (ed.), *Food Price Dynamics and Price Adjustment in the EU*. Oxford: Oxford University Press.

McCorriston, S. (2002). Why should imperfekt competition matter to agricultural economists. *European Review of Agricultural Economics,* 29(3), 349-371.

Ministry of Agriculture of the Czech Republic (2014). *Situační a výhledová zpráva Mléko – prosinec 2013*. [Online]. Available at: http://eagri.cz/public/web/file/285568/svz_mleko_2013.pdf (cit. 25/05/2019).

Organization for Economic Co-operation and Development – OECD (2014). *Policy Roundtables: Competition Issues in the Food Chain*. [Online]. Available at: https://www.oecd.org/daf/competition/CompetitionIssuesintheFoodChain-Industry.pdf (cit.08-01-2020).

Saitone, T. L., & Sexton, R. J. (2017). Agri-food supply chain: evolution and performance with conflicting consumer and societal demands. *European Review of Agricultural Economics*, 44(4), 634-657.

Sexton, R. J. (2013). Market power, misconceptions, and modern agricultural markets. *American Journal of Agricultural Economics*, 95(2), 209-219.

Svatoš, M, Smutka, L., & Rosochatecká, E. (2011). *Globalizační procesy v zemědělství a role EU v rámci globálního trhu*. Praha: Powerprint. ISBN 978-80-87415-26-9.

Vavra, P., & Goodwin, B. K. (2005). *Analysis of Price Transmission along the Food Chain*. OECD France, Agriculture and Fisheries Working Papers, No. 3, OECD Publishing; doi:10.1787/752335872456.

Weiss, C. R., & Wittkopp, A. (2005). Retailer concentration and product innovation in food manufacturing. *European Review of Agricultural Economics*, 32(2), 219-244.

Intensity as a key factor in the sustainability of sugar beet production in the agricultural market

Martin Vaněk[1], Věra Bečvářová[2]

Abstract: The paper characterizes the key factors influencing the development of the dimension of sugar beet production as a traditional segment of European agriculture, their manifestations, and consequences on the market in six member states of the European Union. The comparison took place for the period 2000-2018, which was characterized by significant events in this sector (accession of new Member States to the EU, the impact of the common organization of the sugar market (CMO), reform in 2006, end of quotas in 2017). Based on the performed analyzes, it was confirmed that the main criterion of sustainability of this sector is mainly related to the growth of production intensity as a prerequisite for competitiveness and usage of potential of sugar beet for non-food use, including the possibility of performing non-production functions.

Keywords: sugar beet, intensity, European Union, Common agricultural policy, agricultural market
JEL klasifikace: Q10, Q18

1 Introduction

Sugar beet is generally still perceived as a traditional crop of European agriculture. Its production, which is linked to the sugar beet processing industry in the form of sugar production in sugar factories, is primarily assessed as a raw material for sugar production (Jůzl, 2014). It is this role that has made sugar beet one of the strategic crops that have been included in key measures to promote competitiveness since the creation of the common market in the European Community since 1962. The Common Organization of the Sugar Market (CMO) set the objective of ensuring a sufficient quantity of sugar within the EU during the period, while ensuring a sufficient income for sugar producers in the form of guaranteed prices. The internal market was protected through intervention prices, import quotas and export subsidies (Šustrová, 2014). The overall development of the environment and the growth of production subsequently led to adjustments of regulatory measures and support strategies, which were reflected in the subsequent reforms of the Common Agricultural Policy (CAP). It was, for example, on measures in the form of sugar quotas for sugar production, minimum buying-in prices for sugar beet, intervention prices for sugar and others, aimed at protecting the internal market from cheap imported sugar (Hanák, 2004; Krouský, 2006). With the reform in 2017, production quotas and other support measures in the form of guaranteed minimum prices ended. As part of this reform, import duties on imported sugar and import quotas were preserved. Since 2017, after more than 58 years, a free market with sugar has re-emerged in the EU, with competitiveness in production playing an important role (Trnková, 2017).

With the development of biofuels, there is also an alternative use of sugar, which would help it to maintain in sowing procedures. Thanks to the high content of sugar, sugar beet is able to produce 6000 - 7500 liters of bioethanol from 1 hectare. Nowadays, its use for biogas production is already being tested (Pulkrábek, 2007). During the processing of sugar beet, waste products are also used in the form of sugar beet pulp, which is fed in animal production, which is also important for the sustainability of agriculture. As another waste product, molasses is used for the production of potable alcohol or for the production of yeast (Urban, 2016).

Moreover, in recent years, when agriculture is understood in a multifunctional concept with a significant contribution to the preservation and development of the landscape, the role of this commodity is demonstrace. In addition to technical use, sugar beet has a very good effect on maintaining the condition of soil in a good state, which supports a deep root system that aerates the soil and promotes mineralization. At the same time, a large amount of post-harvest residues helps to supply the necessary organic matter to the soil (Jůzl, 2000; Pavlík, 2016). The performed analysis focused on the development of production of this commodity in selected European countries shows what role the intensity of production played here.

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2 Methods

The paper deals with the evaluation of the development of sugar beet production in six member states of the European Union, which have suitable agroecological conditions for the cultivation of this commodity, for the period between 2000 – 2018. Within the analysis, it presents the key factors and their manifestations in the indicators characterizing the size of production, specifies the assumptions and factors related to the enforcement in the competition of horizontal and vertical links of the sugar market. In addition to the Czech Republic, data on developments in another 5 EU Member States were monitored, which, due to the share of sown areas of sugar beet on arable land, relatively significantly exceed the EU average, namely France, Italy, Germany, Austria and Poland. Data for the evaluation of the examined dimensional and performance parameters were obtained from the Eurostat database, Cefs sugar statistics (CEFS).

3 Research results

Sugar beet is a very specific commodity, the cultivation of which in a given state is, in addition to suitable soil conditions, also influenced by the availability of the subsequent processing industry. It is a large-volume commodity, so the distance and the demands of transporting this raw material for further processing play an important role. The successful interaction with the processor was to some extent one of the limiting preconditions for the development and size of sugar beet production and the share of sown areas of this commodity in the acreage of arable land in individual states. Undoubtedly, the strategy and application of the measures of the Common Agricultural Policy in this sector also had a significant influence on the development of this area in the monitored period.

3.1 Development of sown areas of sugar beet in the context of changes in state intervention in the market

Given that the intensity and size of production cannot be expressed simply by comparing the acreage of sown areas, or total yield, the ratio of sugar beet sowing area to total arable land of the country in the observed period was calculated, as documented in the following figure 1.

Figure 1 Development of the share of sugar beet sown areas on arable land in selected EU countries since 2000
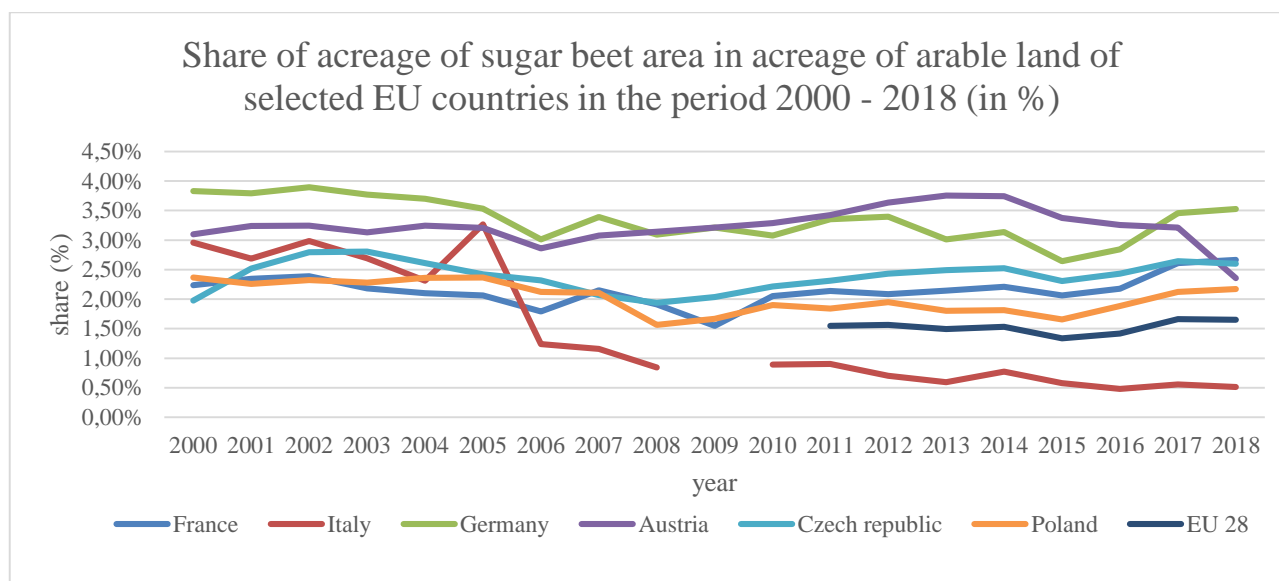
Source: Eurostat, own processing

The fugure shows that sugar beet has consistently the highest share of arable land in Germany and Austria. These countries accounted for between 3-4 % of arable land in most of the monitored period. By comparison, France, as the largest grower in terms of sugar beet production in tonnes, reaches a ratio of 2 – 2,5 % in the monitored period. In the years 2005 - 2009, its share fell below 2%.

From the figure, the development in the decline and renewal of the share of acreage in the Czech Republic can be specified. The development in the decline is also related to the entry of Poland into the common EU market. Before the key year 2004, when 10 new member states joined the EU, it can be seen that the Czech Republic was the only one to increase this monitored share in the years 2000 - 2004. Before the year 2000, our sugar sector went through a great crisis,

related to the liberalization of the sugar beet market after 1993. With minimal customs protection, our growers and processors have been exposed to tough competitive conditions. This led to low market prices within the vertical and consequently to the impossibility of modernizing growing technologies or sugar factories.

The stabilization and restart of the industry was brought about by the entry of foreign capital into sugar factories (mainly from France, Germany and Austria). Thanks to foreign capital, the number of cugar factories was reduced, but above all the existing sugar factories were modernized. This trend was supported by the application of the Common Agricultural Policy and regulations on the sugar market during the pre-accession period to the EU. These measures brought an improvement in the situation on the sugar market, which had a positive effect by increasing the monitored share of acreage from 1,98 % to 2,81 %, when we exceeded the shares in France and Poland.

In 2004, a different trend was reflected in the sugar market, with the new acceding Member States being reduced their sugar Kotas. These quotas were not reduced in any way for the original Member States. The new reform in 2006 aimed to reduce emerging sugar overproduction in the EU and gradually reduce support in the form of minimum purchase prices in order to prepare countries for the liberal sugar beet and sugar market. This reduction was also reflected in the reduction of quotas for all states. To support the reduction of sugar production, so-called compensatory payments were used, which were paid if the country renounced part or all of its sugar quota (in the Czech Republic sugar quotas were allocated to sugar factories, when the British company Eastern Sugar used this option, sold its quota, ie 20 % of the total quota of the Czech Republic).

This option was feasible between 2006 and 2008, when in this period this ratio decreased for most of the monitored countries. A large drop in the observed share of sugar beet on arable land occurred in Italy, which sold the vast majority of its sugar quota as a compensatory payments.

Since 2008, thanks to the possibility of purchasing part of the quotas, we can see a gradual increase in the share of sugar beet areas on arable land in almost all countries. After 2015, there is a further increase in this share in most countries, with Germany reaching the highest value in 2018 (3,5 %). France is in second place with a significant gap (2,67 %) and the Czech Republic is in third place with a share of 2,6 %. This increase was related to the abolition of quotas, which was originally scheduled to take place in 2015, but eventually the measure did not enter into force until 2017. By rating sugar beet as an improving crop with a positive impact on soil and landscape, growers have taken advantage of the opportunities offered by the processing industry to process sugar beet for bio-alcohol production, which is supported throughout the EU.

3.2 Prices of sugar beet

Undoubtedly, the prices of agricultural sugar beet producers also had a certain influence on the overall development in production. Their level was regulated through minimum purchase prices under the CAP and the first reforms. Agricultural producer prices are shown in figure 2.

Figure 2 Price of agricultural producers of sugar beet in euros per tonne
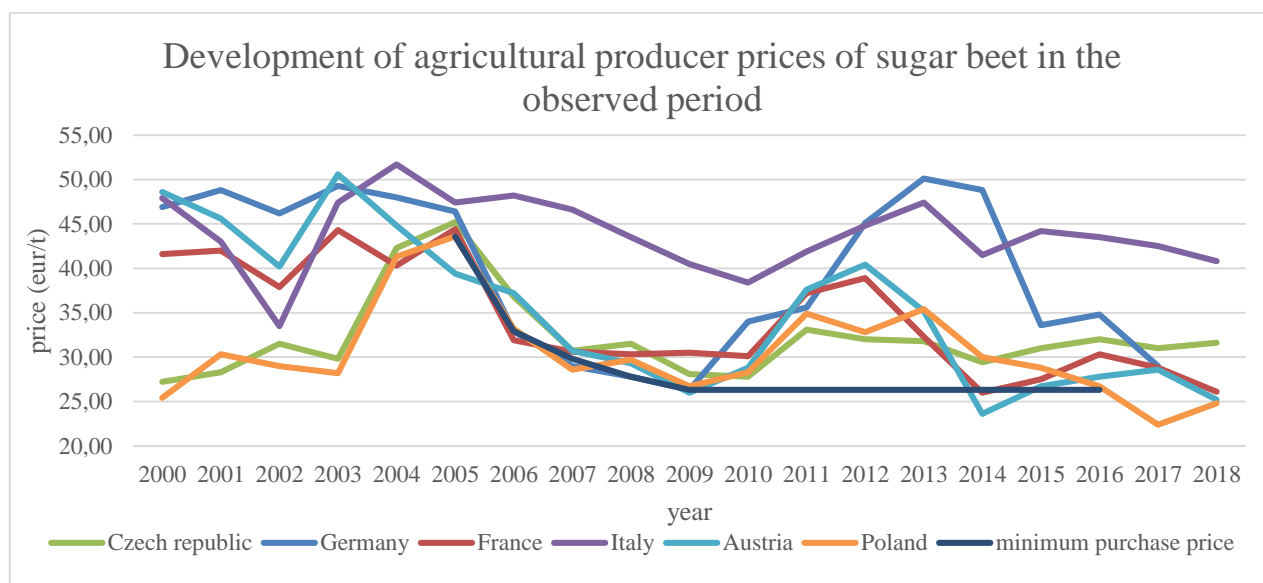
Source: Eurostat, own processing

The different approach in market support and regulation between the original and new Member States at the beginning of the reference period is characterized by the data in figure 2, which compares the prices of sugar beet agricultural producers. In the Czech Republic, together with Poland, at the beginning of the monitored period, the price of agricultural producers was about half as low as at that time in the EU Member States, which were subject to the rules of the Common Organization of the Sugar Market.

Accession to the EU in 2004 meant security for the newcomers in the form of a minimum purchase price, which was significantly higher than the current price of sugar beet in those countries. However, since the 2006 reform, the minimum purchase price of sugar beet has been declining, when it was abolished in 2017. As can be seen from the figure, most countries achieved prices slightly higher than the minimum price. The price was significantly higher in Italy, which, however, negatively affected the demand in competition in the common market and led to a decrease in sown areas in this country (see chart 1). After the end of the 2006 reform, ie since 2009, when the compensatory payments ended, the price of agricultural producers has been rising, which has been falling again since 2012.

It is clear that with the end of quotas, the beet market has found itself in a liberal environment, with prices forming between supply and demand with great pressure for the lowest possible price. In this respect, growers who achieve a higher level of yield per hectare of area, and thus compensate for the lower prices paid to producers, have a competitive advantage.

3.3 Hectare yields and sugar content of sugar beet

The development of the business environment and the specific reactions of producers and processors were undoubtedly reflected in the intensity of sugar beet production in all selected countries. The following table 1 provides basic information on the development of the average annual yield per hectare of this commodity and its sugar content in selected countries.

Table 1 Average yield per hectare and sugar content of sugar beet in selected countries in the years 2000 - 2017

Year		Czech republic	Germany	France	Italy	Austria	Poland
2000	yield (t/ha)	45,8	61,7	76,0	46,4	61,5	39,4
	content (%)	-	-	-	-	-	-
2001	yield (t/ha)	45,4	55,2	62,6	44,5	62,0	35,8
	content (%)	-	-	-	-	-	-
2002	yield (t/ha)	49,5	58,3	76,4	51,8	68,1	44,3
	content (%)	-	-	-	-	-	-
2003	yield (t/ha)	45,2	53,2	73,4	33,3	57,5	41,0
	content (%)	16,13	16,96	18,5	13,23	16,48	-
2004	yield (t/ha)	50,3	61,7	80,1	45,6	64,9	42,8
	content (%)	18,2	17,92	18,8	15,92	17,15	17,9
2005	yield (t/ha)	53,3	60,2	82,3	56,0	70,9	41,6
	content (%)	18,53	17,84	18,1	16,23	17,29	17,7
2006	yield (t/ha)	51,4	57,7	78,8	52,3	63,3	43,8
	content (%)	18,7	18	18,8	15	17,1	18,9
2007	yield (t/ha)	53,2	62,4	84,4	54,1	62,8	51,3
	content (%)	18,4	17,6	17,3	15,3	17,9	16,6
2008	yield (t/ha)	57,2	62,3	86,8	71,0	17,1	46,5
	content (%)	16,5	17,5	18,5	16,6	16,6	17,1
2009	yield (t/ha)	57,9	67,6	93,7	54,6	70,2	54,3
	content (%)	18	18,04	18,8	15,5	17,1	16,9
2010	yield (t/ha)	54,4	64,4	83,1	56,6	69,8	48,3
	content (%)	16,9	18,2	19,5	16	16,2	16,8
2011	yield (t/ha)	66,8	74,3	97,0	57,0	74,2	57,4

	content (%)	16,7	17,3	18,1	15	17,3	16,4
2012	yield (t/ha)	63,3	68,9	86,4	54,9	63,2	58,3
	content (%)	17,3	18	18,7	16,6	17,9	18
2013	yield (t/ha)	60,0	63,9	85,7	53,0	68,2	58,0
	content (%)	17	18,2	18,1	16,2	16,7	17,3
2014	yield (t/ha)	70,3	79,9	93,3	72,8	83,9	68,2
	content (%)	17,5	17,7	18	15,7	17,4	17,6
2015	yield (t/ha)	59,4	72,2	87,0	57,3	62,8	52,0
	content (%)	16,5	17,3	17,7	14	15,2	17,1
2016	yield (t/ha)	67,8	76,2	85,5	63,4	81,3	66,5
	content (%)	18,2	18	18,3	15	17	17,67
2017	yield (t/ha)	66,6	83,7	95,2	64,6	70,1	67,9
	content (%)	-	-	-	-	-	-

Source: Eurostat, CEFS, own processing

The overall comparison shows that in the long run the highest yield per hectare is achieved by France, which, due to this intensity, is not forced to further expand the sown area and enjoys a competitive advantage in the vertical compared to other monitored countries. In terms of hectares of yields, France is followed by Germany and Austria, followed by the Czechia, Italy and Poland. In terms of hectares of yields, there are year-on-year fluctuations in all monitored countries, which are caused by the weather, when sugar beets are suitable for even rainfall throughout the year, or the irrigation systém. However, in the long-term development, an increase in the intensity of production can be recorded in all monitored countries, which is confirmed by a comparison of the development of average yields per hectare in figure no. 3.

Figure 3 Development of sugar beet yields in t/ha in the monitored countries in individual years of the period 2000 - 2017
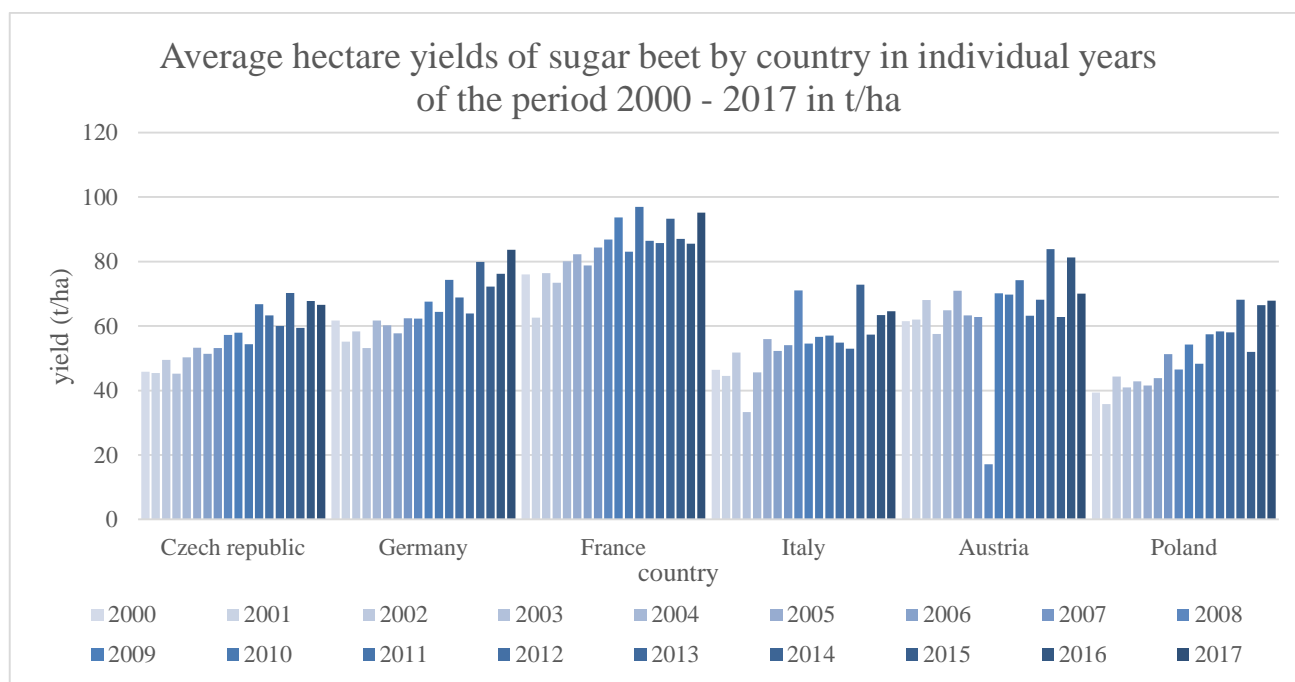
Source: Eurostat, CEFS, own processing

The second monitored indicator for sugar beet is its sugar content, which is important in the subsequent production of sugar. Sugar content expresses the percentage of sucrose in sugar beet. In the sugar factory, sucrose is obtained from sugar beet for subsequent sugar production. The lower yield of sugar is caused by molasses-forming substances, which are naturally contained in sugar beet.This indicator is also very dependent on the development of the weather, when, for example, in a dry summer, the leaf apparatus dries out. When a rainy-rich autumn comes, the sugar beet reacts by regenerating the leaf apparatus, which leads to the consumption of sugar, instead of storing it in the root.

The most stable levels of sugar content is reached by France and Germany, with France stably ensuring a sugar content of between 18 – 19 %, Germany 17 - 18 %. Sugar content in our country luctuates between 16 - 18% year-on-year. The

lowest level of this indicator with relatively significant fluctuations by year-on-year fluctuations (13 – 16 %) is recorded in Italy.

In the overall development, the monitored parameters increase in all examined countries. The fluctuating or declining share of arable land, specified in chapter 3.1, does not mean a withdrawal from sugar beet cultivation, if it is sufficiently compensated by an increase in yields per hectare and an increase in sugar content.

The progress of these two monitored parameters of intensification in sugar beet production is also reflected in the sugar market, which is confirmed by the planned strategy for CAP reform after 2020, whose objectives include increasing the competitiveness of the sector on the European and world markets.

4 Conclusion

Although sugar beet as a traditional crop of European agriculture is evaluated primarily as the main raw material for sugar production, the examined parameters are related to the possibility of using its potential for biofuel production in the form of bio-alcohol, possibly biogas and the real possibility of active application of its non-productive impact in terms of positive impact on soil. . It is necessary to realize that sugar beet has many other positive properties that are important for soil sustainability, as a factor of production.

The importance of sugar beet was also respected in the original CAP measures, which, however, led to an increase in overproduction and, in addition, complicated the position of producers in the dynamics of the liberalizing market for this commodity in both horizontal and vertical contexts. Based on the above facts, there were significant changes in this sector between 2000 and 2018, which had a different impact on the compared countries. Although accession to the EU has significantly stabilized the sector for the newly acceded Member States, it is at the expense of reducing their production in the form of Kotas. Sugar overproduction escalated into a very radical reform in 2006, which reduced all sugar quotas for all Member States and offered financial compensation to countries that voluntarily sell off their quotas, which usually meant a dramatic reduction in sugar beet cultivation in that country, such as Italy.

The measures applied in the reforms generally sought to prepare growers and the whole sector for the end of regulations in 2017 with the transition to a free market in sugar beet and sugar. With the end of sugar quotas approaching, most countries were increasing their sown areas of sugar beet. The end of quotas thus again brought a surplus of sugar on the market, which resulted in a further fall in prices, which growers had to cope with and not always with success.

Development confirms that the harsh and globalizing market environment, related to the selection of efficient suppliers by processors, is reflected in a situation where states whose growers are unable to increase intensity and thus reduce the unit cost of its production, or find alternative uses, won't able to succeed in the European resp. global competition and will be forced to end their sugar beet production. The key starting point for success seems to be the growth of production intensity in the concept of precision agriculture using modern cultivation technologies, which lead to higher sugar beet yield per hectare and higher sugar content of tubers with a positive impact in subsequent sugar production. Of course, another option is non-food use and a share in the production of biofuels.

References

Hanák, J. (2004). Průvodce společnou organizací trhů v odvětví cukru. Praha: Ministerstvo zemědělství České republiky

Jůzl, M., & Pulkrábek, J., & Diviš, J. (2000). *Rostlinná výroba – III*. Brno: Mendelova univerzita v Brně

Jůzl, M.,& Elzner, P. (2014). *Pěstování okopanin*. Brno: Mendelova univerzita v Brně

Krouský, J. (2006). Cukerní reforma v kostce, *Konference „Úspěšné plodiny pro velký trh" – Cukrovka a ječmen"* (s. 85-87). Praha: Česká zemědělská univerzita v Praze

Pulkrábek, J. (2007). *Řepa cukrová - pěstitelský rádce*. Praha: Kurent, s.r.o.

Šustrová, M. (2014). Vývoj systému společné organizace trhu s cukrem v EU od roku 1968 po současnost. *Listy cukrovarnické a řepařské,* 130(7-8), 231-234

Pavlík, Z., & Opršal. Z. (2016). Ekosystémové služby a cukrová řepa. Listy cukrovarnické a řepařské 132(5-6), 182-184

Trnková, J., & Froněk, D. (2017). SOT s cukrem na prahu bezkvótového období, část 1. Příprava, přijetí a zrušení kvótového systému. *Listy cukrovarnické a řepařské,* 133(7-8), 217-221

Urban, J., & Vašák, J. (2016).*Zemědělské systémy II (Roslinná produkce).*Praha: Česká zemědělská univerzita v Praze

Management of Small and Medium-Sized Enterprises
in Times of Turbulent Changes

Promoting the importance of Corporate Social Responsibility in the Management of Businesses

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Abstract: The aim of this proposal is to emphasize the importance of corporate social responsibility in the management of small and medium-sized companies. Corporate Social Responsibility expresses the awareness and operation of companies according to social and environmental standards. It is addressed first to the internal environment and then to the external business environment. It operates on the basis of important concepts such as developing trust and continuous cooperation with the company's internal and external partners. The methodology used is based on bibliographic research, text analysis and linking research findings to the current situation. The expected results of the research may highlight the importance of applying the principles and values of corporate social responsibility in the context of business management and increasing the social profile of companies. The above findings are considered important because initially provide us with new data on the prevailing business situation. In addition, they lead us to the conclusion that it is necessary to fully implement the principles of corporate social responsibility with the ultimate goal of improving the internal and external business environment.

1 Introduction

Every business in its attempt to initially survive and then grow uses various actions. One of the actions used by companies in recent years is corporate social responsibility. Corporate social responsibility shows the responsibility and business ethics of each company. As Corporate Social Responsibility is considered the policy implemented by companies, which usually concerns actions of social, environmental and educational work that correspond to the External Corporate Social Responsibility, as well as actions, which concern the fair management of human resources, the respect for workers 'rights, the application of health and safety rules, the strengthening of social dialogue, the safeguarding of workers' trade union rights and respect for collective bargaining agreements corresponding to Internal Corporate Social Responsibility (Hohnen, 2007). In 1999, it was almost the time when voices against globalization and international entrepreneurship increased significantly, restoring, among others, Corporate Social Responsibility at the forefront (Masaka, 2008).

2 Methods

Based on the above reports, the aim of this work is to promote the importance of Corporate Social Responsibility in the Management of Businesses. The research methodology used is based on bibliographic research, text analysis and the linking of the research findings to the current prevailing situation in the field of small and medium-sized enterprises. Each company is considered to be an integral part of society, as it incorporates employees, customers and therefore resources. Therefore, if it disclaims even a limited responsibility, its interests may be affected by consumer boycotting, negative advertising, loss of social well-being or even legislative initiatives. The areas of implementation of Corporate Social Responsibility programs can be distinguished from those relating to the business environment and those relating to the external environment (Dahlsrud, 2006).

During the process of acceptance by the employee of his work role, a type of contract is concluded between himself and the representatives of the undertaking, specifying the obligations which someone undertakes to carry out (Sdrolias et al., 2003). Many businesses attempt to identify all those factors that may affect employees' feelings, their way of thinking, their values, their beliefs, their interpersonal relationships and their behavior in order to achieve what makes workers

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more effective at work, to be satisfied with their work in order to stay in a particular company for a long time (Belias et al, 2014). A successful management must lead the employees towards achieving the company's goals. This can be achieved by meeting the human needs of employees (Sdrolias et al., 2017). Workplace conditions are considered to be particularly important because workers who have a strong understanding of lack of understanding and support from high-ranking executives feel deeply disappointed (Sdrolias et al., 2016). Safety, hygiene, human working conditions, productivity incentives, educational initiatives, volunteering, human resources management, recruitment and utilization of skilled human resources, lifelong learning, equal opportunities are part of Corporate Social Responsibility actions (Aspridis et al., 2014).

Internal Corporate Social Responsibility mainly concerns employees who are related to issues such as human resources, the employees' health and safety conditions as well as the companies' environmental responsibilities regarding the management of natural resources used in the production process, having as an ultimate goal an improved competitiveness (Porter & Kramer, 2006). In terms of human resources, it is an important issue for every company to attract specialized staff. In this light many companies have included lifelong learning programs for their employees, which aim at training the staff, acquiring new skills and specialized skills. At the same time, they try to provide employees with more complete information about the company's operational needs, trying to balance work, family and leisure. It is important for every company to provide equal pay and the same development prospects for all staff (Porter & Kramer, 2006).

3 Corporate Social Responsibility and Occupational Health and Safety

Regarding the issues of Health and Safety at work, there is a legal framework that provides for the establishment of the safety technician, who within the framework of his duties, prepares an occupational risk study and takes care of the prevention and avoidance of accidents in the company. The services of an Occupational Physician include important responsibilities such as: regular preventive examination of employees, creation of medical records of staff, assessment of ability to work in terms of health, development of a vaccination program, contribution to the development of a list of procedures for safe work execution, training and informing employees with regard to the protection from biological, physical and chemical agents and guidelines for the prevention of musculoskeletal disorders. Furthermore, the Occupational Therapist provides advice to those in charge of the company and the employees, written in the instruction book or orally, regarding the measures to be taken for the employees' physical and mental health. In addition to the above, the Occupational Physician advises on important issues such as: design, planning, modification of the production process, construction and maintenance of facilities in accordance with the workers' health and safety rules, taking measures to protect the import and use of materials and equipment, work psychology, the organization of the productive process, and the organization of a first aid service. In addition to the Obligations of the Occupational Physician, a series of actions are included. The most important of these are: Visits to each business facility at specified dates and times. During his visits, he carries out inspections in all areas and workplaces in relation to occupational health and safety and the prevention of accidents at work. He prepares and update each employee's individual medical file. He issues the employees' certificates of suitability. He explains the need for the proper use of personal protective equipment. He arranges for medical examinations and records the results in the employee's personal medical file and is bound by medical confidentiality. The employee shares his personal information with the Occupational Physician. Therefore, medical confidentiality is an important principle in occupational medicine, where the disclosure of information may have personal, social or legal implications (On line available at https://www.gepgroup.gr/%CE%B9%CE%B1%CF%84%CF % 81% CE% BF% CF% 83-% CE% B5% CF% 81% CE% B3% CE% B1% CF% 83% CE% B9% CE% B1% CF% 83 / accessed on 22-06-2020).

With regard to the management of environmental impacts and the consumption of natural resources in the context of corporate social responsibility, it is necessary to reduce the consumption of resources or pollutant emissions and waste during their productive operation, in order to reduce environmental burdens. Adequate environmental education would help in the future for the proper use of natural resources (Koukoumbliakos & Nousia 2008).

External Corporate Social Responsibility refers to the extension of the company's responsibility to the local community and concerns a wide range of stakeholders who are employees, shareholders, business partners, suppliers, customers, and public authorities representing local communities (Porter & Kramer , 2006). Regarding local communities, corporate social responsibility concerns the integration of companies in their local environment. Companies contribute to local communities by providing paid jobs as well as taxes. On the other hand, companies depend on the residents' health, stability and well-being in the local communities in which they operate. There is also an interaction between companies and their local natural environment. Many companies rely heavily on a clean environment for their production process. As far as business partners, suppliers and consumers are concerned, it is advisable to continuously build relationships of trust with business partners and suppliers, which is expected to lead to better prices, as well as high quality materials, products, not to mention reliable delivery. Those companies that build lasting relationships with their customers, focusing

their entire organization on understanding their customers' needs and desires and providing them with high quality, security, reliability and service, are expected to be more profitable in the long run. (Online available at https://el.wikibooks.org/wiki/%CE%97 accessed on 22-06-2020).

4 Dimensions of Corporate Social Responsibility

Corporate Social Responsibility can be divided into three categories (Kolter, 2009; Hunger, Wheelen, Thomas, 2004) which are the following:

A. Strategic Corporate Social Responsibility

Strategic Corporate Social Responsibility combines social benefits with the immediate strategic goals of a business. Through the Corporate Social Responsibility Strategy, the company implements community support programs (through sponsorships and donations) with the aim of strengthening their long-term financial goals. Therefore, the companies' socially responsible behavior aims to maximize profit. This particular business behavior may initially have meant short-term losses in terms of a business budget. However, in the long run the benefits of the business can be recorded from the financial data such as results of use, due to the company's image improvement towards society. For this reason, the Strategic Corporate Social Responsibility is treated as an investment in building a good reputation towards customers and potential customers who are the ones who enhance the company's financial performance by proving that companies which invest in Corporate Social Responsibility benefit in the long run. (Kolter, 2009; Hunger, Wheelen, Thomas, 2004). Managing a project is one of the most important management tools in many businesses. Companies running project management plans are in a position to predict their future. In particular, project managers are able to identify upcoming problems for the company and prepare themselves in advance (Rehor and Vrchota, 2017). Strategic management represents the current direction of administration and management and applies to all types of companies including small and large enterprises (Rolínek et al., 2014). Strategic management is a process that aims to ensure a long-term prosperity of managed issues. Its condition is based on the project executives (management, owners, key interest groups) who define the strategic objectives and then a resource management strategy while taking into account the external factors (Rolínek et al.,2015).

B. Ethical Corporate Social Responsibility

The purpose of Ethical Corporate Social Responsibility is, in addition to meeting the financial and legal obligations of the society as a whole, to include actions that help to avoid any harm to society, whether financial, spiritual or psychological. Any company that does not fulfill its ethical duties operates irresponsibly. Business executives know that there is a need for business ethical compliance, even if the immediate positive effect is not discernible in the short term. However, everyone understands that if any company takes action that ignores these good practices (eg environmental pollution of the local community) in the future there will be a reduction in its profits, as the overall picture degrades the company's reputation and prestige. (Kolter, 2009; Hunger, Wheelen, Thomas, 2004). A company that is based on ethics, acquires greater solvency and creates an image of trust towards customers, suppliers and employees.

C. Humanitarian Corporate Social Responsibility

With Humanitarian Corporate Social Responsibility, the company aims not only to avoid creating social harm, but also to strengthen efforts to improve and eliminate social problems, such as low living standards and lack of education. The above contribute to the existence of social inequality and degrade living conditions. (Kolter, 2009; Hunger, Wheelen, Thomas, 2004). Humanitarian Corporate Social Responsibility includes policies and actions that aim at the immediate intervention of the organization through the allocation of resources based on existing social needs. Such actions of the Humanitarian Corporation are the environmental protection policies, the donations to charities, the company's participation in employment programs for the long-term unemployed, as well as various other activities aimed at improving the living conditions (On line available at https: //el.wikibooks.org/wiki/%CE%97 accessed on 22-06-2020).

According to the European Corporate Social Responsibility Network, in order for a company to responsibly implement policies expressed by the principles and values of Corporate Social Responsibility, it must follow some specific steps that will help it get closer to the meaning, but also to the importance of Corporate Social Responsibility and in the long run to benefit from the goals achievement. The key steps are:

1. Determining the business' purpose and vision. 2. Appointment of a person responsible for Corporate Social Responsibility. 3. Setting priorities. 4. Identification of stakeholders. 5. Defining a business plan. 6. Application - Application monitoring - Measurement. 7. Communication - Disclosure (Carroll, 2007; Kolter, 2009)

1. Defining the company's purpose and vision: In addition to maximizing profits, the company should incorporate reasonable goals that are favorable to people and the wider environment. It is important for a socially responsible company to enjoy the appreciation of its associates, the existence of good inter-company relations with the employees but also the

continuous acceptance of the local community. In this way the local community will treat the company as part of the local active manpower and not as a potentially polluting environmental factor. It is therefore important for every responsible company to seek the satisfaction of all stakeholders.

2. Appointment of a person in charge of Corporate Social Responsibility: One of the executives of the company should undertake the coordination and control of the actions of Corporate Social Responsibility within the company. The manager's role is very important. His main goal is to transmit to all the company's departments the principles of Corporate Social Responsibility and to coordinate all of the departments action guided by the specific area of responsibility. (Carroll, 2007; Kolter, 2009)

3. Prioritization: Depending on the sector in which the company operates, priorities should be set. For example, a company operating in an area that is burdened by the local environment must give immediate priority to any environmental issues that may arise. Priorities are set by working groups that identify and analyze hazardous areas or behaviors that could jeopardize the business's reputation and identify responsibilities. It is also necessary to consider the possibilities provided by the implementation of Corporate Social Responsibility for innovation, greater efficiency and higher productivity. A Corporate Social Responsibility timetable should therefore be established that includes short-term priorities and long-term goals (Carroll, 2007; Kolter, 2009).

4. Identification of stakeholders: It concerns all those who are affected by the activities of the company and are the stakeholders. The main stakeholder groups are the employees, the community, the consumers, the environment, the society at large. For each of them a scheme should be designed that reflects the relationship that the company has with it. Frequent stakeholder consultation can really improve the business reputation at a very low cost. In addition, through dialogue, goals of mutual interest can emerge that can then be applied to Corporate Social Responsibility strategies (Carroll, 2007; Kolter, 2009).

5. Defining a business plan: Defining a specific business plan, depending on the group of stakeholders, includes the business' specific commitments. The company's commitment to Sustainable Development is taken for granted by meeting today's needs without undermining future generations. It is necessary to have programs to control the use of energy, water and raw materials and emissions into the environment. The use and production of recyclable materials is also considered important, increasing the durability of products and minimizing packaging through efficient design. At the same time there could be compensation for polluting emissions, such as carbon, with an equivalent reduction through regular local tree planting (On line available at https://el.wikibooks.org/wiki/%CE%97 accessed on 22-06-2020).

6. With regard to corporate social responsibility, the existence of social programs that encourage employee volunteering and help local communities can be promoted. This could be achieved first by implementing specific programs and then by monitoring their progress, which presupposes all employees' participation (Carroll, 2007; Kolter, 2009).

7. Communication - Disclosure: The disclosure of how a company operates, in the context of Corporate Social Responsibility, indicates that it has taken its social and environmental responsibilities seriously. Communicatively, the disclosure of the company's good practices improves relations with stakeholders, positively motivates staff and improves access to new markets and business partnerships. Disclosures must be based on a genuine commitment to implementing Corporate Social Responsibility and a willingness to further improve actions (Carroll, 2007; Kolter, 2009). Corporate governance includes all the instruments and the non-typical mechanisms that govern the relationships between those who manage the business and those who invest in it. In addition, corporate governance includes all those principles and rules associated with improving corporate governance (Aspridis, 2015).

Then, in order to allow the proper functioning of the social units, an organizational chart should also be used, through which the strategic planning of the activities of the organization can be drawn up and these particularities can be promoted. In organizing the company, it would be useful to take into account the following three elements:

- The project and the actions required to achieve the goals set by the company.

- The use of an organizational chart is considered necessary to determine the appropriate link between the work required to be completed and the workers' ability to be responsible for completing this work.

- To make full use of facilities and available materials needed to complete the actions (Casey and Goldma, 2010).

5 Research results

Based on the above, it is understood that businesses should be led to the need to take initiatives to improve the quality of Corporate Social Responsibility for companies.

A company that has taken care to develop a Social Responsibility program reaps significant benefits which are accompanied by the following benefits:

First, on the part of consumers. It is estimated that one in two Europeans is willing to pay more to buy products that respect society and the environment.

Secondly, on the part of the employees. Socially responsible companies are more likely to attract and retain high quality staff than other companies.

Third, on the part of investors. There has been a sharp rise in socially responsible investment, with the result that more than 200 funds have been created in almost all of Europe from purely ethical business subscriptions and assets of 11 billion euros (On line available at https://el.wikibooks.org/ wiki /% CE% 97 available 22-06-2020).

In addition, the need for changes in corporate organizational structures becomes more imperative in order to gain greater responsibility as Corporate Social Responsibility contributes to improving employee attitudes, thus improving their image and overall image of the business itself. The implementation of Corporate Social Responsibility helps in the overall achievement of development plans, reducing future economic, environmental and social costs, while strengthening economic competition. Sustainable production and consumption aims to produce more and better goods with as few resources as possible, increasing the net gains of prosperity from economic activities by reducing resource use, and life cycle pollution. Sustainable production and consumption improves the quality of life. It therefore requires an approach and cooperation between actors operating in the supply chain from producer to consumer. It presupposes the involvement of consumers through information on sustainable consumption and sustainable lifestyle. This is made possible by providing them with adequate information through standards and labeling systems (On line available at https://www.csrhellas.net/ available 23-06-2020).

6 Conclusions Suggestions

Corporate Social Responsibility is gaining momentum in the field of companies, which invest in both internal and external Corporate Social Responsibility. In this way, companies create expectations for citizens and show their benevolent behavior towards employees, customers and suppliers. Social corporate actions, if done with organization, method, planning and bring favorable results, are accepted by society with satisfaction. They play an essential role in consolidating a company's positive reputation, which contributes to increasing their profitability. All enterprises are small or large entities that are closely linked to the societies in which they operate and are influenced by the circumstances of the time and sometimes their area of action. They must, therefore, recognize their responsibility in the course of their work, towards society and the environment in which they operate. This recognition of their corporate responsibility can be expressed through a variety of actions. It is most significant when the companies themselves during their production show respect for the principles and values that govern and characterize our culture. In particular, the recognition of their corporate responsibility can be expressed when the companies themselves attach particular respect to humanity, human dignity, improving the standard of living and quality of life of all, and respect for the natural environment. In this way, the principles and values of Corporate Social Responsibility of enterprises are gradually being implemented (Koukoumpliakos, et al. 2018).

Diagram 1 The results of the research

CONCLUSIONS – RECOMMENDATIONS
An enterprise benefits from the implementation of Corporate Social responsibility principles in the long run As long as the Corporate Social responsibility principles are not implemented only for marketing reasons, there are significant benefits both for the consumers and the wider social context, as well as the environment itself

ADVANTAGES	DISADVANTAGES
The companies which implement Corporate Social responsibility bring more favorable results and they become more easily accepted in the society They maintain a good reputation They gain more customers They increase their profits They achieve business longevity	The companies which implement Corporate Social responsibility principles increase their operating costs in the short run Sometimes Corporate Social responsibility is implemented for marketing reasons and with a view to improving the business profitability

Source: Personal data proceccing

Corporate Social Responsibility is considered a key part of modern communication and marketing. Properly designed and implemented, it pays off, both for the company and for the society itself that benefits from it. It is, in essence, a situation where both sides gain benefits and win (win - win situation). As long as resources are not available for advertising purposes, and end up being translated into social programs, there is virtually no reason to question the value of Corporate Social Responsibility. Under these conditions, society's trust in business increases and a relationship of cooperation of common goals is cultivated (On line available at https://el.wikibooks.org/wiki/%CE%97 available 22-06-2020).

References

Aspridis, G. (2015). *Corporate Social Responsibility – The view of human resources.* Athens : Association of Greek Academic Libraries, p. 33 – 38. ISBN 978-960-603-397-1, Retrieved from https://repository.kallipos.gr. On line available in the website http://repository.kallipos.gr/handle/11419/4801.

Aspridis, G., Vasiliadis, L., & Grigoriou, S. (2014). Corporate Social Responsibility – The view of human resources. *Mediterranean Journal of Social Sciences,* Vol. 5 (4), pp 11-20.

Belias, D., Koustelios, A., Sdrolias, L., Koutiva, M., Zournatzi, E., Varsanis, K. (2014). Motivation and job satisfaction among Greek bank employees. *PRIME*, Vol. 7: 71-81.

Carroll, A. (2007), A history of corporate social responsibility: concepts and practices, in The Oxford Handbook of Corporate Social Responsibility, eds A. Crane, A. McWilliams, D. Matten, J. Moon & D. Siegel, Oxford University Press, Oxford.

Casey, A. & Goldman, E. F. 2010. *Enhancing the Ability to Think Strategically: A Learning Model*. Management Learning, 41(2):167–185.

Dahlsrud, A. (2006). How corporate social responsibility is defined: An analysis of 37 definitions. *Corporate Social Responsibility and Environmental Management,* 15, 1-13.

Frank, R., Le,s G. & Masoud, A. (2007). *Operations Management in Context*, 2nd Edition, Published by Elsevier Ltd.

Hunger, J. David, Wheelen, Thomas L.,(2004), Εισαγωγή στο Στρατηγικό Μάνατζμεντ. Εκδόσεις ΚΛΕΙΔΑΡΙΘΜΟΣ, Αθήνα

A guide to Corporate Social Responsibility, Corporate Social Responsibility (CSR), http://www.ecrc.org.eg/Uplo-ads/documents/Articles_A%20guide%20to%20corporate%20social%20responsibility.pdf

Hohner P., (2007), " An overview of CSR", Corporate Social Responsibility, An Implementation guide for business, pp 1-12

Kotler P., (2009), CORPORATE Corporate Social Responsibility "How to offer the best possible to the company and the purpose of your choice", Economia Publishing Publications.

Koukoumpliakos I. Nousia M. (2008) The human growth and the healthy environment as a condition of balanced development for the course of human. *Journal of Engineering Science and Technology Review* 1 (2008) 49-52.

Koukoumpliakos, I. Petr Rehor, Labros Sdrolias, Dagmar Skodova Parmova, (2018). «The Role of Corporate Social Responsibility in the management of Small and Medium – Sized Enterprises (SMEs)», The International Scientific Conference INPROFORUM 2018, Ceske Budejovice, Czech Rebublic, 01-02 November 2018,, ISBN 978-80-7394-726-2, (80-83).

Masaka, D. (2008). Why enforcing corporate social responsibility (CSR) is morally questionable, *Electronic Journal of Business Ethics and Organizational Studies,* 13(1), 13-21.

Porter, M. & Kramer, M. (2006). Strategy & society: The link between competitive advantage and corporate social responsibility. *Harvard Business Review*, 84(12), 78–92.

Porter M., Kramer M., (2006), " Mapping Social Opportunities", Strategy and society- The link between competitive advantage and corporate social responsibility, pp 1-16

Rehor,P., Vrchota,J. (2017) Influence of project approach implementation on the occurrence and perception of crisis in agricultural enterprises in the Czech Republic, *ACTA Universitatis Agriculturae et Silviculturae Mendelianae Brunesis*, Vol. 65 108(3).

Rolínek, L., Cudlinova, E., Klufova, R., Leitmanova, F.I., Jilek, M., Rehor, P. (2015) Model strategy for village development in the Czech Republic, *Journal of Central European Agriculture*, 16(1), p.148-158.

Rolínek, L., Holátová, D., Březinová, M., Kantnerová, L., (2014) Behavior of small and medium-sized enterprises in terms of their strategic management and their goals. *Mathematical Methods in Engineering and Economics* p.92.

Sdrolias, L., Mourgas, A., Sahinidis, A., Kakkos, N., Skodova -Parmova, D., Alina Hyz, Belias, D., Peros, N., Perou, P. (2016) Complaints Management Strategies in Greek Hotel Units. *Proceedings of the 6th International Conference on Tourism and Hospitality Management*, 1-3 June, Athens, Greece, p. 103.

Sdrolias L., Anyfantis I, Koukoubliakos I., Nikova D., Meleas I., (2017), The Importance of Human Resource Management for the Development of Effective Corporate Culture in Hotel Units, in: Katsoni V., Upadhva A., Stratigea A. (Eds.), Tourism, Culture and Heritage in a Smart Economy, Part II, Technological Educational Institute (T.E.I) of Athens, *Springer International Publishing*, Athens, Greece, pp.183-188.

Sdrolias, L., Terzidis, K., Polyzos, S. (2003) The psychological alienation of the business personnel from the working environment. Conceptual Approach - Causes - Symptoms of the phenomenon. *Inspection of economic sciences* (3), pp. 101-118.

On – line sources

On line available at https://el.wikibooks.org/wiki/%CE%97 accessed on 22-06-2020 (in Greek).
On line available at https://www.csrhellas.net/ available 23-06-2020 (in Greek).
On line available at https://www.gep-group.gr/%CE%B9%CE%B1%CF%84%CF%81%CE%BF%CF%83%CE%B5%CF%81%CE%B3%CE%B1%CF%83%CE% B9% CE% B1% CF% 83 / accessed on 22-06-2020 (in Greek).

Determination of key competencies for Industry 4.0

Julie Čermáková, Ladislav Rolínek

Abstract: Based on the research of the professional literature, the aim of this article is determination of key competencies for Industry 4.0 and the level of key competencies for Industry 4.0 of experts – the managers and the employees according to the size of the organization. There is the more pronounced agreement in the occurrence characterizing Industry 4.0 for the key competencies problem solving, digital competencies, creativity, innovation, teamwork and collaboration, communication skills, lifelong learning, decision making and leadership.

The benefit of this work is the determination of key competencies in conditions of Industry 4.0 based on the method of comparative analysis of literary resources and based on self-evaluation from the questionnaire survey. Statistical research shows that the managers and the employees in conditions of Industry 4.0 have the lowest level of self-evaluation of the key competency leadership (6.65 on the 10point scale). On the other hand, the highest level of self-evaluation of key competencies was found collaboration and teamwork (8.17 on the 10point scale). According to the Kruskal-Wallis test, the average and p value, there aren´t statistically significant competencies in the case of the size of the organization. The lowest average is visible of leadership and digital competencies in case of the middle organization.

Keywords: Key competencies in conditions of Industry 4.0, human resource management
JEL Classification: O30, O32

1 Introduction

The constant pressure to improve the key competencies and the qualifications in the conditions of Industry 4.0 is a topical issue that will determine the main competitive advantage of organizations at all levels in the next five years. Hecklau et al. (2016) refer the term Industry 4.0 to the fourth industrial revolution. Industry 4.0 is introducing rapid and epochal changes and challenges especially in digital world. In order to succeed in the Fourth Industrial Revolution based on the research by Vrchota et al., (2019), organizations need to prepare their employees for the following competencies—using new methods and technologies that will be the key elements of industrial work 4.0, improving new forms of organizational structures related to processes and personnel issues, enabling new human role for Industry 4.0.

"The key competencies are observable or potential behavior, whereby managers and employees could demonstrate not only their knowledge, skills, attitudes or the synergy among them, but also their personal attributes, adding value and better results to themselves, other individuals and teams, departments, organizations or networks, in harmony with the context, available resources and adopted strategy." (Freitas, 2018) Based on various definitions that were developed in recent years, we use the term competency to define the managerial and employee dispositional ability and readiness to act successfully and self-organized when facing novel, unstructured or complex tasks and the ability to develop solutions for future situations that are characteristic for Industry 4.0. (Čermáková, Slabová, Rolínek, 2020)

2 Methods

The following research questions and partial goals are answered in the article. To fulfill them, the study of professional literature is used.

The following research questions are answered in the article:

1. Is it possible to define the key competencies in conditions of Industry 4.0?

2. Is it possible to evaluate the level of competencies of experts in conditions of Industry 4.0?

The article specifies the following partial goals:

1. Determination of the key competencies in conditions of Industry 4.0 based on the comparative analysis of the scientific literature.
2. Self-evaluation of the level of the key competencies of experts in conditions of Industry 4.0.
3. The determination the development of selected competencies of the managers and the employees according to the size of the organization.

The first partial goal: Determination of the key competencies based on the comparative analysis of the scientific literature. The authors proceeded according to Tonelli et al. (2016) and evaluated the occurrence of the individual competencies from the computer search in the articles listed in the following 4 databases: ScienceDirect, Scopus, Emerald and Web of Science. To define the key competencies for Industry 4.0, the authors selected publications dated from 2011, when the term Industry 4.0 was first officially introduced in Hannover. The authors' strategy was to identify those articles that included "Industry 4.0", "The fourth industrial revolution", "Competency" or "Skills" as the main subject headings or text words in the title or in the paper. To collect the broadest array of relevant studies, the authors included keywords that were directly related to their research, as well as the synonyms of each concept. Additionally, the authors took into account the various synonymous of each of these terms. A single search consisted of a keyword combined with the term "Industry 4.0", "Competency" or synonyms of this term using "AND".

For the determination of the key competencies for Industry 4.0, the authors used the systematic literature review to identify, classify and analyze current knowledge and proposing recommendations for future research in this area. Authors proceed similarly to Hecklau et al. (2016) in Patalas-Maliszewska, J., & Kłos, S. (2018) who analyzed the defined sets of competencies and described the significance of each competency through references.

Based on this study, and in order to describe the key competencies for Industry 4.0, the survey data were collected from 45 managers and employees of selected occupations from the Czech Republic participated in the questionnaire https://docs.google.com/forms/d/1zpViGAl42XUXxDOQZTnhJYB42uYY3ZDOyPkhZXJzBn0/edit. The total sample of 76 managers and employees was subjected to the thorough inspection for inclusion into the research.

At first, persons whose job position in the organization was not included in the one of the following groups were excluded: top management represented by directors and owners of organizations; middle management represented by, for example, financial manager; specialists represented by, for example, project manager, marketing specialist; administration staff represented by, for example, an accountant, a technical assistant, etc.

This was followed by the major part of the inclusion of managers and employees who work with software systems dated since 2011, when the term Industry 4.0 in science and industry was more occurred and stabilized. It is mainly about working with new software systems and programs that managers and employees not worked with before 2011.

Conceptually and empirically, the measures are based on the evaluating the utility of the key competencies in condition of Industry 4.0. Key competencies are measured on the least ordinal scale (in our case 10-point scale). The specific quantitative results of the assessed key competencies are presented as the average of all assessments of the given respondents. We proceeded similarly to Mitchelmore & Rowley (2010) taking an antecedent perspective by attempting to delineate key knowledge or abilities thought to reflect the key competencies, based on reviews of literature, and then having respondents self-assess their own level of mastering their key competencies. In the survey according to Deutskens et al. (2004) for added validity, the respondents were also given the opportunity to write an absent key competencies from the survey. (Čermáková, Slabová, Rolínek, 2020)

The non-parametric Kruskal – Wallis test at a significance level of $\alpha = 0.05$ will be used to fulfill the third partial goal: The determination the development of selected competencies of the managers and the employees according to the size of the organization.

3 Research results

As the part of the research on the fulfillment of the first goal, determination of the key competencies based on the comparative analysis of the scientific literature, is compiled. There are competencies that are identified in the literature as key for Industry 4.0. Defining the key competencies is part of this partial goal. This research is based on the scientific databases, in particular ScienceDirect, Scopus, Emerald and Web of Science.

Table 1 Frequency of occurrence according to authors of the scientific articles of key Competencies for Industry 4.0.

Key competencies for Industry 4.0	Literature source*																			
	Hecklau, F. et al. (2016)	Morgan, J. (2015)	Mitchelmore, S. et al. (2010)	Pellegrino, J. et al. (2013)	Collet, Ch. et al.(2015)	Shatunova, O. et al. (2019)	Patalas-Maliszewska, J., & Kłos, S. (2017)	Liboni, L.B. et al. (2019)	Kinkel, S. et al. (2017)	Kaasinen, E. et al. (2020)	Bogoviz, A.V. et al. (2019)	Imran, F., & Kantola, J. (2018)	Vodenko, K.V., et al. (2018)	Grzelczak, A. et al. (2017)	Spottl, G. (2017)	Kravcik, M. et al. (2018)	Fareri, S. et al. (2020)	Vrchota, J. et al. (2019)	Prinz, Ch. et al. (2016)	Gudanowska, A.E., et al. (2018)
Digital competencies	*		*		*	*	*	*	*		*	*		*	*	*	*	*	*	*
Inovation									*	*	*			*	*		*	*		*
Creativity	*				*	*	*		*	*	*							*		
Problem solving	*		*	*			*		*	*		*	*	*		*	*	*	*	*
Communication skills	*	*		*	*		*	*		*		*	*	*	*	*		*	*	*
Cooperation, teamwork	*			*	*	*	*	*	*			*	*	*	*	*		*		*
Decision making	*		*				*					*	*	*	*			*		*
Lifelong learning	*	*		*	*		*									*		*		*
Leadership	*		*	*	*		*							*			*		*	*

Source: Own processing

Figure 1 Frequency of occurrence in the scientific literature of key Competencies for Industry 4.0.
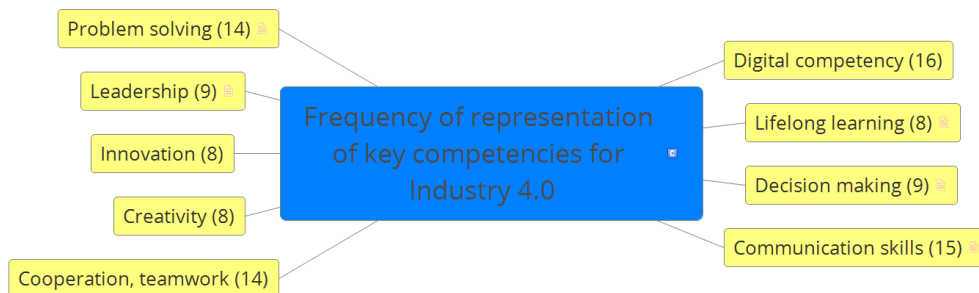
Source: Own proceeding

These key competencies for Industry 4.0 are most often mentioned in the literature: communication skills, problem solving, digital competencies, cooperation and teamwork. These key competencies for Industry 4.0 occur the least: creativity, innovation and lifelong learning.

Digital competencies

As mentioned by the authors Motyl et al. (2017), the term "digital skills" includes all skills from basic - in the form of digital literacy, through general skills of workers to specific digital skills for professionals in the field of ICT (Information and communication technologies). The authors approach to enhance digital competency in terms of the ability to use information and communication technology tools. Technical competencies require strong analytical skills (numerical and higher mathematical knowledge), these skills are among the so-called "hard." These skills are necessary to understand the understanding of industry standards and comfort working with computers, because without these skills employees could not design, simulate and testing product or processes. Fitsilis at al. (2018) mention in their research most important challenges to be faced in Industry 4.0 development: Lack of digital culture and training (50% of the respondents), lack of a clear digital operations vision and support / leadership from top management (40%), unclear economic benefit and digital investments (38%).

Lifelong learning

Hecklau et al. (2016) approach to readiness of continuous learning and training with motivation for employees to more educate themselves. This view extends Prifti et al. (2017) for being able to always adapt the latest technologies and make the most out of them, managers and employees should apply lifelong learning. It includes high level of knowledge management which can secure being focused on business strategy and reacting on always changing business models. Morgan

et al. (2015) mention that more frequent work related change makes it mandatory for employees to be willing to learn. According to Vrchota et al. (2019) lifelong learning is a prerequisite for the development of knowledge and better preparedness of employees for new technologies and processes. Similarly the authors approach to lifelong learning as the competency for monitoring and implementing own educational needs and the ability to learn from their own mistakes.

Creativity and innovation

„Ability of innovative competency contributes to develop new methods and tools, improving production processes together with a constant improvement of production machines performance" (Gudanowska, Prieto, a Törmänen 2018) Jackson et al. (2006) settle some components of creativity: imaginative, original or inventive offers able to adapt and improvise; curious and resourceful things beeing seen differently. Fitsilis et al. (2018) states the importance of re-changing proceses in innovative way in case of dynamic infrastructure and operations. This implies a change from physical administration controlled infrastructures to virtual, cloud infrastructures controlled by software. Kaasinen et al. (2019) contribute with the idea that however, exploiting the flexibility and creativity of human workers is becoming more important to gain a competitive advantage in today's business. The authors summarize the concept of innovation as the ability to create original, useful and appropriate innovations. The concept of creativity as an ability to think creatively.

Problem solving

Grzelczak, Kosacka & Werner-Lewandowska (2017) in their study evaluated the competency for Industry 4.0. Among the competencies with the highest importance, respondents indicated the competency problem solving (69, 84 %) as a big importance for the digital revolution. Hecklau et al. (2016) include the "problem solving" competency, where managers and employees must be able to identify sources of errors and be able to improve processes. The authors of this article define the competency problém solving as a way to eliminate and effectively resolve conflicts.

Comunnication skills

Hecklau et al. (2016) claim that within the technical challenge, communication skills are very important for the growth of companies. In terms of efficiency for this growth, this skill is the key to building communications networks as technologies companies must be able to deal efficiently with a huge amount of data (big data). Mitchelmore Siwan&Rowley Jennifer (2013) included it in the group conceptual and relationship competencies. The competency effective communication is very important for operation the whole system. It is very important in the field of relationship building and networking. The authors mention the competency effective communication as the ability to listen, ask questions, express ideas and concepts effectively.

Cooperation and Team work

The fourth industrial revolution lead to a dynamic, international and interdisciplinary work environment. As reported Hecklau et al. (2016), an organization's performance and competitiveness depend to a large extent on how its employees are managed. For this reason, it is necessary to cooperate and support mutual ties in the organization, not only in groups. This competence should cover the following areas: improving the efficiency and effectiveness of individuals, improving the efficiency and effectiveness of the organizations, developing knowledge, skills, abilities, increasing human potential and personal growth. „The pressure on empoylees in the new era is specific to communication. They should have highly developed communication sets, be dedicated to the exact completion of the task and be able to work independently and in a team. They should also be open to the exchange and sharing of knowledge and experience." (Gudanowska et al. 2018) The authors of the article characterize the competencies cooperation and collaboration as the ability to work with different people, teams and the ability to actively participate in achieving common goals.

Leadership

Leadership and its importance as the competency in the 21st century has only recently emerged. There is no doubt about its importance and how it mention Collet, Hine&Plessis (2015), There are key leadership skills that are essential for people management, business leadership, technical management, etc. This capability is particularly significant in the industrial sector charged with bringing technological innovation through R&D and commercialization to the marketplace. Leadership is also coming to the fore, especially for "learning organizations", which seek to use the potential in the field of education and skills of employees to achieve their own goals. The authors mention among the characteristic features of the competency leadership the ability to implement a strategy, compile a budget, lead, mentor and delegate others.

Decision making

In order for decision-making competency to be of good quality, the human factor must be taken into account. In order for decision-making to be effective and set in the right direction, it is necessary to know what this competency contains. Not only in management people make decisions on the basis of information but also on the basis of inner feeling. The factor

of self-confidence is also decisive. As state Parker&Fischhoff (2005) people with insufficient self-confidence may needlessly hesitate or doubt about their abilities to identify sound courses of action. Mitchelmore&Rowley (2010) state in their publication that the competency decision making was marked as a one of the most significant competency for managers. The authors approach to the competency decision-making as the ability to make good, unambiguous and fast decisions on the basis of incomplete information and to be responsible for it.

3.1 Self-evaluation the level of key competencies in conditions of Industry 4.0

Based on the research with 45 experts, the lowest level of self-evaluation of the competency leadership was found. In Table 1 below, the average value of the 10point scale for the leadership competency is only 6.65. This means that the experts have the least confidence in mastering this competency leadership. On the contrary, experts in self-evaluation believe the most in mastering the competency cooperation and teamwork, where the average value of this competency is 8.17. (Čermáková, Slabová, Rolínek, 2020)

Table 1 Self-evaluation the Level of Key Competencies for Industry 4.0.
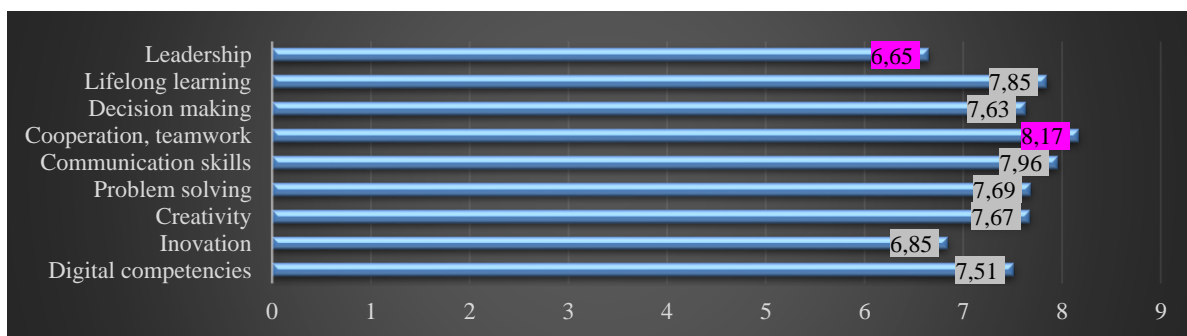
Source: Čermáková, Slabová, Rolínek, 2020

3.2 The determination the development of selected competencies of the managers and the employees according to the size of the organization.

The authors suggested, the size of the organization is divided to the micro (up to 10 employees), small (11 – 50 employees), middle (51 – 250 employees), large (251 and more employees).

Table 2 The average, p value Kruskal-Wallis test: self-evaluation of the level of the key competencies for Industry 4.0 according to the size of the organization

Competency / The size of the organization	Micro (up to 10 employees)	Small (11 - 50 employees)	Middle (51 - 250 employees)	Large (251 and more employees)	Average for the whole sample	Kruskal-Wallis test p value
Digital competency	7.83	7.53	5.67	7.88	7.57	p =0,5760
Innovation	7.71	6.53	6.00	7.00	6.84	p =0,4695
Creativity	7.86	7.95	8.67	7.13	7.69	p =0,4099
Problem solving	8.71	7.58	7.67	7.50	7.73	p =0,3259
Communication skills	8.57	8.16	8.00	7.44	7.96	p =0,3363
Cooperation, teamwork	7.43	8.79	9.00	7.63	8.18	p =0,2694
Decision making	8.29	7.26	8.33	7.63	7.62	p =0,3418
Lifelong learning	8.14	8.00	7.67	7.63	7.87	p =0,8401
Leadership	8.00	6.42	5.67	6.75	6.73	p =0,2122

Source: Own processing

According to the Kruskal-Wallis test, all key competencies are statistically insignificant in the case of the size of the organization, The lowest average is visible of leadership and digital competencies in case of the middle organization.

4 Discusion

Similar to Liboni et al. (2019) we found that the topic "competencies for Industry 4.0" is the central theme of the literature analyzed and is accomplished through the development of employment, qualifications, skills and learning frameworks. (Čermáková, Slabová, Rolínek, 2020)

This research and the article are unique in the point of view that similar research focused on the literature research and subsequent statistical analysis of the key competencies for Industry 4.0 has not yet been appeared in any article.

No research articles offer similar survey as here in this article. The authors, who are introduced separately for each key competence, deal with the similar topic and offer the similar survey of the key competencies for Industry 4.0. These

authors do not offer the similar statistical analysis (Grzelczak et al., 2017; Gudanowska et al., 2018; Hecklau, 2016; Vrchota J. et al., 2019). These authors carried out the statistical survey that focused on the specific area that differs from the area mentioned in this work.

5 Conclusions

Human capital is one of the areas that organizations are actively engaged in and will continue to pursue in the future especially in the inevitable era in conditions of Industry 4.0. The business environment places high demands on professionals working in the organization at all management levels. Managers and employees are expected to have a high-quality educational background, professional competencies, ability to solve unexpected situations and creative thinking for the development of the organization. It is for this reason that the core requirements are placed on the competencies that an individual should be equipped with and must be able to use.

The research questions are summarized in this part of the article. Based on the scientifical literature research, the key competencies in conditions of Industry 4.0 were defined on the basis of the comparative analysis of the literature research. There is the more pronounced agreement in the occurrence characterizing Industry 4.0 for the key competencies problem solving, digital competencies, creativity, innovation, teamwork and collaboration, communication skills, lifelong learning, decision making and leadership.

For answering the second question, which is focused on evaluation the level of competencies of experts in conditions of Industry 4.0, the authors of the article used the non-parametric Kruskal – Wallis test. Statistical research shows that the managers and the employees in conditions of Industry 4.0 have the lowest level of self-evaluation of the key competency leadership (6.65 on the 10point scale). On the other hand, the highest level of self-evaluation of key competencies was found collaboration and teamwork (8.17 on the 10point scale). According to the Kruskal-Wallis test, all key competencies are statistically insignificant in the case of the size of the organization, The lowest average is visible of leadership and digital competencies in case of the middle organization. This article is the contribution to the study of more integrated research of key competencies for Industry 4.0. It is clear that more work needs to be done in this area of research.

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References

Bogoviz, A. V., Gulyaeva, T. I., Semenova, E. I., & Lobova, S. V. (2019). Transformation Changes in the System of Professional Competencys of a Modern Specialists in the Conditions of Knowledge Economy's Formation and the Innovational Approach to Training. In E. G. Popkova, Y. V. Ragulina, & A. V. Bogoviz (Eds.), Industry 4.0: Industrial Revolution of the 2first Century (Vol. 169, pp. 193–200). Springer International Publishing. https://doi.org/10.1007/978-3-319-94310-7_19

Čermáková, Slabová, Rolínek (2020). Self-evaluation of the level of key competencies for Industry 4.0. Conference Dokbat in Zlin.

Collet, C., Hine, D., & du Plessis, K. (2015). Employability skills: Perspectives from a knowledge-intensive industry. Education and Training, 57(5), 532–559. Scopus. https://doi.org/10.1108/ET-07-2014-0076

Deutskens, E., de Ruyter, K., Wetzels, M., & Oosterveld, P. (2004). Response Rate and Response Quality of Internet-Based Surveys: An Experimental Study. Marketing Letters, 15(1), 21–36. https://doi.org/10.1023/B:MARK.0000021968.86465.00

Fareri, S., Fantoni, G., Chiarello, F., Coli, E., & Binda, A. (2020). Estimating Industry 4.0 impact on job profiles and skills using text mining. Computers in Industry, 118, 103222. https://doi.org/10.1016/j.compind.2020.103222

Fitsilis, P., Tsoutsa, P., & Gerogiannis, V. (2018). *INDUSTRY 4.0: REQUIRED PERSONNEL COMPETENCES* (No. 3). *3*, 4.

Freitas, P. F. P. D., & Odelius, C. C. (2018). Managerial competencies and results in research groups. RAM. Revista de Administração Mackenzie, 19(5), Article 5. https://doi.org/10.1590/1678-6971/eramg180034

Grzelczak, A., Kosacka, M., & Werner-Lewandowska, K. (2017). Employees competencys for industry 4.0 in Poland–preliminary research results. 24th International Conference on Production Research (ICPR 2017), Faculty of Engineering Management, Poznan University of Technology, Strzelecka 11 street, Poznan, Poland.

Gudanowska, A., Prieto, J., & Törmänen, A. (2018). What competencies are needed in the production industry? The case of the Podlaskie Region. Engineering Management in Production and Services, 10, 65–74. https://doi.org/10.1515/emj-2018-0006

Hecklau, F., Galeitzke, M., Flachs, S., & Kohl, H. (2016). Holistic Approach for Human Resource Management in Industry 4.0. Procedia CIRP, 54, 1–6. https://doi.org/10.1016/j.procir.2016.05.102

Imran, F., & Kantola, J. (2019). Review of Industry 4.0 in the Light of Sociotechnical System Theory and Competency-Based View: A Future Research Agenda for the Evolute Approach. In J. I. Kantola, S. Nazir, & T. Barath (Eds.),

Advances in Human Factors, Business Management and Society (Vol. 783, pp. 118–128). Springer International Publishing. https://doi.org/10.1007/978-3-319-94709-9_12

Jackson, N., Oliver, M., Shaw, M., & Wisdom, J. (2006) *Developing Creativity in Higher Education: An Imaginative Curriculum*.

Kaasinen, E., Schmalfuß, F., Özturk, C., Aromaa, S., Boubekeur, M., Heilala, J., Heikkilä, P., Kuula, T., Liinasuo, M., Mach, S., Mehta, R., Petäjä, E., & Walter, T. (2020). Empowering and engaging industrial workers with Operator 4.0 solutions. Computers & Industrial Engineering, 139, 105678. https://doi.org/10.1016/j.cie.2019.01.052

Kinkel, S., Schemmann, B., & Lichtner, R. (2017). Critical Competencies for the Innovativeness of Value Creation Champions: Identifying Challenges and Work-integrated Solutions. Procedia Manufacturing, 9, 323–330. https://doi.org/10.1016/j.promfg.2017.04.021

Kravcik, M., Wang, X., Ullrich, C., & Igel, C. (2018). Towards Competency Development for Industry 4.0. In C. Penstein Rosé, R. Martínez-Maldonado, H. U. Hoppe, R. Luckin, M. Mavrikis, K. Porayska-Pomsta, B. McLaren, & B. du Boulay (Eds.), Artificial Intelligence in Education (Vol. 10948, pp. 442–446). Springer International Publishing. https://doi.org/10.1007/978-3-319-93846-2_83

Liboni, L. B., Cezarino, L. O., Jabbour, C. J. C., Oliveira, B. G., & Stefanelli, N. O. (2019). Smart industry and the pathways to HRM 4.0: implications for SCM. Supply Chain Management: An International Journal, 24(1), 124–146. https://doi.org/10.1108/SCM-03-2018-0150

Mitchelmore, S., & Rowley, J. (2010). Entrepreneurial Competencies: A Literature Review and Development Agenda. International Journal of Entrepreneurial Behaviour & Research, 16, 92–111. https://doi.org/10.1108/13552551011026995

Mitchelmore Siwan&Rowley Jennifer (2013)

Morgan, J. (2015). The Future of Work - Attract New Talent, Build Better Leaders, and Create a Competitive Organization. ADAPT UNIV PRESS, MODENA, ITALY.

Motyl, Baronio, G., Uberti, S., Speranza, D., & Filippi, S. (2017). How will Change the Future Engineers' Skills in the Industry 4.0 Framework? A Questionnaire Survey. *Procedia Manufacturing*, *11*, 1501–1509. https://doi.org/10.1016/j.promfg.2017.07.282

Patalas-Maliszewska, J., & Kłos, S. (2018). An Intelligent System for Core-Competency Identification for Industry 4.0 Based on Research Results from German and Polish Manufacturing Companies. In A. Burduk & D. Mazurkiewicz (Eds.), Intelligent Systems in Production Engineering and Maintenance – ISPEM 2017 (Vol. 637, pp. 131–139). Springer International Publishing. https://doi.org/10.1007/978-3-319-64465-3_13

Parker, A. M., & Fischhoff, B. (2005). Decision-making competence: External validation through an individual-differences approach. *Journal of Behavioral Decision Making*, *18*(1), 1–27. https://doi.org/10.1002/bdm.481

Pellegrino, J., Hilton, M. L., Education, B., Education, D., & Council, N. (2013). Education for life and work: Developing transferable knowledge and skills in the 2first century (p. 242). https://doi.org/10.17226/13398

Prifti, L., Knigge, M., Kienegger, H., & Krcmar, H. (2017). *A Competency Model for "Industrie 4.0" Employees*.

Prinz, C., Morlock, F., Freith, S., Kreggenfeld, N., Kreimeier, D., & Kuhlenkötter, B. (2016). Learning Factory Modules for Smart Factories in Industrie 4.0. Procedia CIRP, 54, 113–118. https://doi.org/10.1016/j.procir.2016.05.105

Shatunova, O., Anisimova, T., Sabirova, F., & Kalimullina, O. (2019). STEAM as an Innovative Educational Technology. Association for Social Studies Educa, 13099108, 131–144.

Spottl, G. (2017). Development of "Industry 4.0"! - are Skilled Workers and Semi-Engineers the Losers? 2017 7th World Engineering Education Forum (WEEF), 851–856. https://doi.org/10.1109/WEEF.2017.8467033

Tonelli, F., Demartini, M., Loleo, A., & Testa, C. (2016). A Novel Methodology for Manufacturing Firms Value Modeling and Mapping to Improve Operational Performance in the Industry 4.0 Era. *Procedia CIRP*, *57*, 122–127. https://doi.org/10.1016/j.procir.2016.11.022

Vodenko, K. V., Komissarova, M. A., & Kulikov, M. M. (2019). Modernization of the Standards of Education and Personnel Training Due to Development of Industry 4.0 in the Conditions of Knowledge Economy's Formation. In E. G. Popkova, Y. V. Ragulina, & A. V. Bogoviz (Eds.), Industry 4.0: Industrial Revolution of the 2first Century (Vol. 169, pp. 183–192). Springer International Publishing. https://doi.org/10.1007/978-3-319-94310-7_18

Vrchota, J., Mařiková, M., Řehoř, P., Rolínek, L., & Toušek, R. (2019). Human Resources Readiness for Industry 4.0. Journal of Open Innovation: Technology, Market, and Complexity, 6(1), 3. https://doi.org/10.3390/joitmc6010003

The importance of marketing controlling metrics in medium-sized companies

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Abstract: The content of the paper is the issue of determining the importance of marketing controlling metrics in the conditions of medium-sized companies operating in the Czech Republic. The introductory part of the text deals with the relations of marketing and controlling and the definitions of marketing controlling on the basis of available professional literature. Furthermore, metrics or groups of marketing controlling metrics are examined using secondary information. The methodological part of the paper provides information on the primary investigation of the importance of marketing controlling metrics on a sample of medium-sized companies operating in the Czech Republic. The methodology and methodology of the performed research are described here. An important part of the paper are the results of questioning the importance of individual marketing controlling metrics, the importance of which was assessed by respondents using a five-point point scale. According to the respondents, the three most important marketing metrics include sales, as well as metrics related to the launch of a new product on the market and the profitability of individual products.

Keywords: marketing, controlling, marketing controlling, metrics, medium-sized company
JEL Classification: M31, C19

1 Introduction

Experts began to deal with the topic of marketing controlling in the 1980s. The relationship between the terms marketing and controlling is therefore not clear. On the one hand, these are intertwined concepts, on the other hand, there is a discrepancy between some interpretations of these concepts, where marketing is seen as market management, while controlling is understood as results management (Link & Weiser, 2006). Some marketing and controlling definitions are similar, for example to the classic definition of marketing according to Meffert "… planning, coordination and control of all company-oriented activities in current and potential markets" (Meffert, 1998, p. 98). This definition of marketing is almost identical to any of the definitions of controlling. In both cases, targeted information gathering, planning and controlling to adapt to market and environmental conditions play a major role. However, for example, P. Horváth emphasizes the significant, generally acceptable difference between marketing and controlling. He defines both concepts as follows: Marketing – in the sense of marketing management – is the immediate role of management. Marketing is the search for decisions. Controlling has a primarily supporting role with regard to the search for decisions in the proceedings. (Horváth, 2005)

Other authors claim that marketing and controlling are not conflict-free, even though in both cases they are functionally overarching concepts. According to them, this is clear, for example, in the field of standardization and differentiation. Standardization, preferred by controlling, represents the extreme where identical products and services are offered at uniform prices through the same distribution channels using the same communication tools. On the other hand, marketing favours the opposite, that is, it seeks to adapt marketing instruments to the specific needs of individual customers. (Pepels & Auerbach, 2003)

There are also opinions that controlling is focused primarily on achieving the company's value goals, while marketing is focused more on material goals (Meffert, 1998). However, marketing ultimately also pursues value goals. Material goals are also at the forefront of strategic controlling. It follows that marketing controlling is in a way a combination of both perspectives and it is important to determine in the company which goals will play a primary role.

In recent years, the problems of marketing controlling have been dealt with in the German professional literature. For example, books by Christopher Zerres entitled Handbuch Marketing-Controlling from 2017 or Marion Halfmann entitled Marketing-Controlling from 2018 are currently available on the market.

One of the key problems in implementing the process of measuring the benefits of marketing is the introduction of a suitable methodology for evaluating these benefits. In marketing, it is possible to work with a large number of marketing metrics, which differ in their nature, whether it is a division into financial and non-financial, dynamic or static, with a focus on the customer or the competition and the like. In principle, they have one thing in common, and that is the fact that marketing specialists use them to try to compile an overview of the most necessary marketing parameters that would

be able to reliably determine the performance and direction of the company. By introducing a system of evaluation of selected marketing metrics, it is possible to radically increase the systematicity and conceptuality of the work of employees in charge of marketing tasks and in relation to internal and external processes to determine relatively precisely which activities are and will be effective for the company and which are not.

The authors J. Llonch, R. Eusebio and T. Ambler divide marketing metrics into the following groups:
- financial indicators,
- market measurement,
- measuring of customer behaviour,
- measuring the movement of customers,
- measurement of direct customers,
- measuring of innovation. (Llonch & Eusebio & Ambler, 2002)

Other authors classify selected marketing metrics into the following 9 groups:
1. Market share, competition analysis, customer perception.
2. Margins and profits.
3. Product and portfolio management.
4. Profitability of customers.
5. Sales force and channels.
6. Pricing strategy.
7. Promotion.
8. Advertising media and web metrics.
9. Marketing and finance. (Farris & Bendle & Pfeifer & Rabstein, 2006)

R. Baroudi provides a detailed overview of selected, logically sorted 17,000 key performance indicators. Among other things, a large group of indicators focused on sales and marketing. These are classified in great detail into 20 homogeneous subgroups, as follows: advertising, brand, cost and budget, customer loyalty, customer satisfaction, e-commerce, e-marketing, lead generation marketing, market share, online news, packaging, public relations, retail, sales, sales representatives, sales revenues, shareholders and investors, telephone sales, websites, access to websites. (Baroudi, 2010)

J. A. Davis defines 110 key marketing metrics also divided into the following 9 groups:
1. Financial metrics.
2. Marketing planning metrics.
3. Brand-oriented metrics.
4. Customer-oriented metrics.
5. Price-oriented metrics.
6. Advertising and promotional metrics.
7. Direct marketing metrics.
8. Distribution-oriented metrics.
9. Sales metrics. (Davis, 2013)

Marketing controlling metrics can also be broken down by market subjects or elements of the marketing mix (Kot-ler & Keller, 2006). Then, for example, four basic groups of marketing controlling metrics can be created:

1. Product-oriented metrics.
2. Price-oriented metrics.
3. Metrics focused on marketing communication.
4. Distribution-oriented metrics.

Czech professional authors, who in the past dealt with the issue of marketing control in the Czech environment in their research, identified a total of 38 used marketing controlling metrics (Lukoszová & Uhlářová & Polanecký, 2016). The measurement of the performance of business organizations using metrics (KPIs) has also been studied by foreign experts in recent years, addressing, for example, which metrics are key (Gräve, 2019).

This year, an article appeared in a scientific journal focusing on marketing on the topic of marketing metrics, in which the author dealt with the influence of marketing metrics on marketing adaptation, strengthening the market and long-term orientation of the company (Nath, 2020).

Last but not least, it is necessary to add the fact that the system of indicators is an individual matter for each company and its composition is strongly influenced by the specifics of each organization.

2 Methods

The aim of the empirical research was to determine the importance of marketing controlling metrics in medium-sized companies operating on the market of the Czech Republic.

Quantitative marketing research has its own logical process and consists of a preparatory stage and an implementation stage. The preparatory stage of marketing research is the definition of the problem and goal of the planned research, research assumptions and hypotheses. (Kozel & Mynářová & Svobodová, 2011)

These stages were preceded by an orientation analysis mapping the initial state, which was based on secondary information published in professional domestic and foreign publications dealing with marketing control, especially its used metrics.

In the preparatory phase, the author defined a research assumption focused on the importance of marketing metrics for evaluating the effectiveness of marketing activities, which is defined as follows: In evaluating marketing indicators in medium-sized companies, emphasis is placed on financial indicators, market share and customer-oriented metrics. In formulating the research assumption, its starting point was the previously published results of empirical surveys conducted in the past in the United Kingdom, Germany, Spain, France, the USA, Brazil, China and the Czech Republic.

In previous research in the Czech Republic, the dependences of categorical features were tested using Spearman's correlation coefficient. This was the size of the company, when the following pair of statistical hypotheses was established, of which the second (H1) was previously confirmed.

Hypothesis H0: The significance of the marketing metrics used does not depend on the size of the company.

Hypothesis H1: The significance of the marketing metrics used depends on the size of the company. (Uhlářová, 2014; Lukoszová & Uhlářová & Polanecký, 2016)

The last step of the preparatory phase of the research was to compile a research plan. The plan of a marketing research project focused on marketing controlling metrics is part of Table 1.

Table 1 Plan of marketing research

Activity	Realization date
Defining the problem, goals and hypotheses	September 2018
Orientation analysis of the situation, collection of secondary information	September 2018 - December 2018
Compilation of a research project plan	January 2019
Preliminary research (piloting)	January 2019
Collection of information	February – March 2019
Technical processing and evaluation of the information obtained	April - May 2019
Presentation of results	June 2019

Source: Own processing

The implementation stage of marketing research included the collection and processing of primary information, their analysis and interpretation. From the point of view of its purpose, the performed research can be described as descriptive, from the point of view of time as partially repeated (partly following the previous research from 2014), according to the method and nature of obtaining information it is primary quantitative research.

Prior to the actual collection of primary information using the questionnaire, a preliminary survey (or pilot) was conducted on a sample of 5 companies, in order to verify the comprehensibility, complexity and appropriateness of the questions used in the questionnaire. The questionnaire was supplemented by an identification question concerning the size of the company (according to the criterion of the number of employees). The survey was anonymous in order to maintain the maximum objectivity of the outputs. For the purposes of conducting the empirical survey, a basic set was defined, namely registered economic entities in the Czech Republic. According to data from the Czech Statistical Office, a total of 1,475,207 economically active registered economic entities were registered in the Czech Republic in 2017 (Czech Statistical Office, 2018).

With regard to the previously confirmed assumption that the probability of implementing controlling activities increases at the same time as the size of the company, only entities with 50 or more employees were included in the survey. As a sorting criterion of the second degree, the size of enterprises according to the number of employees was used (Uhlářová, 2014). Based on this criterion, a group of respondents was defined, namely medium-sized enterprises with 50 to 249 employees (Pohludka & Štverková, 2019). This breakdown is also based on the Criteria for classifying a specific enterprise in the size category according to Commission Regulation (EC) No. 800/2008.

The data of the Czech Statistical Office show that in 2017 a total of 29393 enterprises with 20 to 249 employees were registered in the Czech Republic. Approximately 11000 of them belong to the category of medium-sized enterprises with 50 to 249 employees (hereinafter referred to as medium-sized enterprises). the value of the base set (Štverková & Pohludka & Kurowska-Pysz & Szczepańska Woszczyna, 2018). The sample then numbered 300 respondents. The source of contact information was, on the one hand, freely available database products (European databank, ABC of the Czech economy, Kompass, Czechtrade database etc.) as well as the author's current business contacts. The sampling technique used can be described as a quasi-representative or set of suitable opportunities.

The primary survey was conducted using the method of questioning on the basis of a pre-prepared electronic questionnaire, the content of which corresponded to the established research problem and its research assumption. The questionnaire was devoted to marketing metrics in order to verify their importance for the evaluation of marketing activities in the practice of Czech medium-sized enterprises, it consisted of closed questions on commonly used metrics with a range of five possible answers up to a value of 5, which is a crucial metric used. In addition, a telephone emergency system was used to support the return on the electronic questionnaire survey. As a result, a final return of 34% was achieved, representing 102 companies. The stated return can be considered reasonable with regard to the chosen technique of electronic questioning.

In terms of statistical processing by querying the information obtained, these were evaluated using an average point value. The list of metrics evaluated by respondents in this research is based on previously found research results (Uhlářová, 2014). The method of graphical expression of statistical data and the MS Excel spreadsheet were used to evaluate the survey results.

3 Research results

The results of the primary survey of the importance of marketing controlling metrics of medium-sized enterprises in the Czech Republic are captured in the form of a table (see Table 2) and in graphical form (Figure 1), using the average points awarded. At the same time, all 38 evaluated metrics are sorted according to the assigned importance from the most significant to the least important.

The metrics in Table 2 are listed in order of importance to the business (from most significant to least significant).

Table 2 The order of marketing controlling metrics based on the average points achieved

Order	Marketing controlling metrics title	Average points
1.	Sales, sales development, profitability of sales	4,65
2.	Analysis of a new product	4,30
3.	Profitability of products	4,28
4.	Sales to customers and individual segments, ABC customer analysis.	4,22
5.	Profitability of individual distribution channels / regions / sales representatives	4,21
6.	Sales of individual distribution channels / regions / sales representatives	4,15
7.	Profit - gross profit, net profit, profit margin	4,02
8.	Profitability of customers and customer segments	3,98
9.	Sales - sales of products, product lines, product variants	3,95
10.	Sales support effectiveness	3.90
11.	Impacts of advertising campaigns	3,82
12.	Web analytics	3,78
13.	Competition analysis	3,60
14.	Profitability of marketing communication campaigns	3,45
15.	Marketing cost analysis	3,38
16.	Effectiveness of direct marketing	3,25
17.	Customer shopping habits	3,22
18.	Competitive price analysis	3,11
19.	Customer satisfaction	3,05
20.	Sales force efficiency	2,92
21.	Relative market indicators - market share, relative market share	2,90

22.	ABC analysis	2,82
23.	The average price of products, the number of discounts within the discount policy	2,65
24.	Brand analysis	2,58
25.	Customer loyalty	2,45
26.	Net marketing cover	2,40
27.	The reach of the advertising campaign	2,32
28.	Net and present value, payback period	2,25
29.	Quantitative analysis of distribution	2,10
30.	Effectiveness of public relations	2,02
31.	Absolute market indicators	1,98
32.	Portfolio Analysis - BCG, GE	1,95
33.	Customer-oriented price analysis	1,92
34.	Qualitative analysis of distribution	1,82
35.	Lead generation marketing and viral marketing	1,71
36.	Analysis of the market life cycle of products	1,25
37.	Analysis of quality, packaging, design and style	1,23
38.	Supplier analysis	1,12

Source: Own processing

As can be seen from the contents of Table 2 and the following Figure 1, the three most important marketing metrics ranked the addressed companies, especially those related to sales, as well as metrics related to the launch of a new product and thirdly the profitability of individual products. In the top ten most important monitored metrics, there were mainly financial indicators, which probably also play a major role in the area of marketing controlling. On the other hand, the least important marketing metrics that companies work with are, according to the results of the survey, those related to supplier analysis, quality analysis, design and packaging analysis. Logically, it can be concluded that the evaluation of suppliers is likely to be dealt with by the purchasing department within the organizational structure of the company, quality analysis will be more a matter of the quality department, design a question of the technical department and packaging subject to the logistics department.

Figure 1 Significance of individual marketing metrics in graphical expression by points (y)
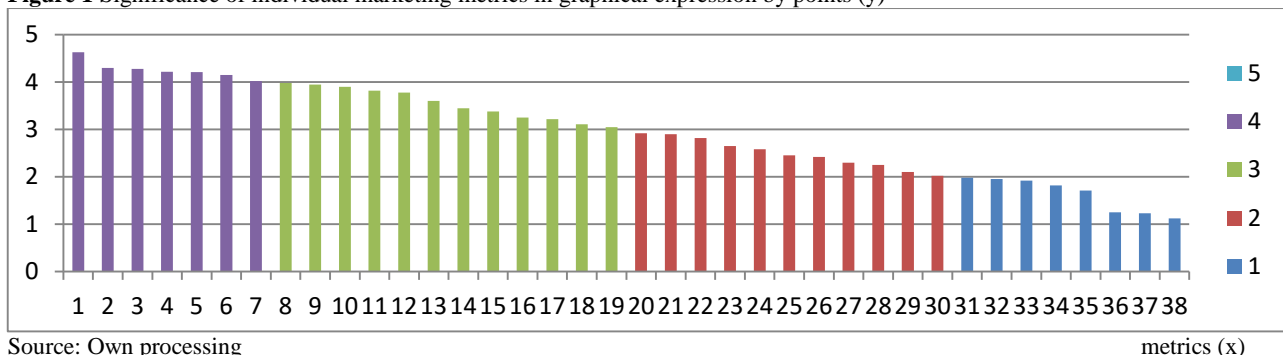
Source: Own processing   metrics (x)

4 Conclusions

Secondary sources of information show that the issue of marketing controlling, and especially its metrics, is a very current research problem today.

In conclusion, it can be stated that the primary survey largely confirmed the accepted research assumption that in the evaluation of marketing indicators, the emphasis is mainly on financial indicators, market share and customer-oriented metrics. An exception in this statement is the market share, which according to the preferences of the respondents ranked 21st.

The most important marketing controlling metrics include sales (their amount, development and profitability), new product analysis, product profitability, sales to customers and their individual segments, including ABC analysis, profitability of individual distribution channels, sales of individual distribution channels and profit (gross, net and profitable). margins). These 7 metrics were evaluated on average by more than 4 points, so according to the respondents, these are fundamental metrics of marketing controlling in medium-sized companies operating in the Czech Republic.

References

Baroudi, R. (2010). *KPI Mega Library: 17,000 Key Performance Indicators.* California: Scotts Valley.

Davis, J.A. (2013). *Measuring Marketing: 110+ Key Metrics Every Marketer Needs.* Singapore: John Wiley & Sons.

Farris, P.W., & Bendle, N.T., & Pfeifer, P.E., & Reibstein, D.J. (2010). *Marketing metrics – the definitive guide to measuring marketing performance.* New Jersey: FT Press.

Gräve, J., F. (2019). What KPIs Are Key? Evaluating Performance Metrics for Social Media Influencers. *Social Media + Society*. I-9. https://doi.org/10.1177/20563051 19865475.

Halfmann, M. (2018). *Marketing – Controlling.* Wiesbaden: Springer Fachmedien Wiesbaden GmbH. https://doi.org./10.1007/978-3-658-14517-0_2.

Horváth, P., & Partners. (2004). *Nová koncepce controllingu.* Praha: Profess Consulting.
    Kotler, P., & Keller, K. L. (2006). *Marketing Management*. 12.ed. New Jersey: Pearson Education, 2006.

Kozel, R., & Mynářová, L., & Svobodová, H. (2011). *Moderní metody a techniky marketingového výzkumu.* Praha: Grada Publishing, a.s.

Link, J., & Weiser, Ch. (2006). *Marketing-Controlling: Systeme und Methoden für mehr Markt-und Unternehmenser folg.* München: Verlag Vahlen.

Llonch, J.,& Eusebio, R., & Ambler, T. (2002). Measures of Marketing Success: a Comparison between Spain and the UK. *European Management Journal,* 20(4), 414-422.

Lukoszová, X., & Uhlářová, K., & Polanecký, L. (2016). Marketing controlling in Czech Companies. *Hradec Economic Days*, 6, 541-549.

Meffert, H. (1998). *Marketing. Grundlagen marktorientierter Unternehmensführung. Konzepte, Instrumente, Praxisbe ispiele*. Wiesbaden: Betriebswirtschaftlichen Verlag Dr. Th. Gabler GmbH.

Nath, P. (2020). Taking measure: the link between metrics and marketing´s exploitative and explorative capabilities. *European Journal of Marketing*, 54(7), 1549-1580.

Pepels, W., & Auerbach, H. (2003). *Marketing – Controlling – Kompetenz.* Berlin: Erich Schmidt Verlag.

Pohludka M., & Štverková H. (2019). The Best Practice of CRM Implementation for Small- and Medium-Sized Enter prises. *Administrative Sciences,* 9(1), 22.

Štverková, H., & Pohludka, M., & Kurowska-Pysz, J., & Szszepańska-Woszczyna, K.. (2018). Crossborder Entrepre neurship in Euroregion Beskydy. *Polish Journal of Management Studies*, 18(2), 324-337. https://doi.org./10.17512/pjms.2018.18.2.26.

Uhlářová, K.. *Marketingový controlling jako strategický prvek moderního řízení podniků.* Dizertační práce. Karviná: Obchodně podnikatelská fakulta Slezské univerzity, 2014.

Zerres, Ch. (2017). *Handbuch Marketing – Controlling.* Kassel: Springer – Verlag GmbH Deutschland. https://doi.org./10.1007/978-3-662-50406-2_11.

Český statistický úřad. *Statistika ekonomických subjektů podle počtu pracovníků.* [vid 29.6.2018]. Available at: http://vdb.czso.cz/vdbvo/tabparam.jsp?cislotab=ORG9010UC&&kapitola_id=6&voa=tabulka

Příloha I, Nařízení Komise (ES) č. 800/2008. *Úřední věstník Evropské unie* [online], ze dne 6. 8. 2008 [vid 15. 6. 2018]. Available at: http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:214:0003:0047:cs:PDF

Knowledge of Students in relation to Industry 4.0 and New Technologies

Vaněček Drahoš[1], Pech Martin[2]

Abstract: In the Czech Republic, there is a problem, whether new graduates will gain and learn the necessary knowledge and skills through the existing education system with regard to future technological development. The aim of the paper is to evaluate knowledge of Industry 4.0 and new technologies among the students. The questionnaire survey presents the attitude of a sample of secondary school of economics and the university students in the Czech Republic to new technologies. The question is, whether they know the basic concepts and technologies associated with Industry 4.0. The results show that in terms of knowledge of new technologies and Industry 4.0, the university students are better compared to the secondary school students. The research revealed that there are differences in knowledge of these problems. Expected tendency of this knowledge from first to the last year of study has not been confirmed.

Keywords: Education methods, Industry 4.0, students' knowledge, teaching factory.
JEL Classification: A22, M11, O32

1 Introduction

In preparation for Industry 4.0, the main role is adapting higher education to the requirements of new vision, especially engineering education (Coskun, Kayikci, & Gencay, 2019). The specialization they are preparing for may be less needed in just a few years. Therefore, it is necessary to promote flexibility, the ability to change their field of work and to find new opportunities in the labour market. Young people need to be prepared for these changed conditions. What consequences are expected from this scenario in relation to prepare for the profession? Currently, there is a shortage of mainly technically educated workers in the Czech Republic. The need to extend this type of education is discussed both at lower school levels and at universities. However, other experts argue that the number of technicians will not solve the situation in the future. Who knows what professions might be needed in 15 or 20 years? Therefore, it is recommended the current model of universal education, with graduates complementing the necessary knowledge after starting a particular job.

In recent years, many papers have been published on education in the context of industry 4.0. Most of the work focuses on new skill requirements for workers, Industry 4.0 subject areas to be included in the curricula or the transformation of the education itself. The most recent papers demonstrate new simulation approaches that connect the real world of factories and education in the so-called learning factories. The education system will have to answer questions on how to prepare workers for these conditions, how to evaluate, teach and train their competences for human-robot-teams (Richert et al., 2016). Advances in the systems of sensors, automation and information and communication technologies (ICT) used in production provide new opportunities for long-life education using data from production. Data is a source of practical training in the workplace and examples for decision-making in real situations. This will provide new lifelong learning models based on closer interconnection of learning activities with cyber-physical production systems using hybrid models of human/machine intelligence to support decision-making (Tvenge & Martinsen, 2018).

Especially nowadays, with Industry 4.0 and intelligent manufacturing, due to the exponential growth of new knowledge and information, the employees must update and complement the necessary knowledge. However, there are not any sufficient methodologies for conducting production management training (Yang, Hamann, Haefner, Wu, & Lanza, 2018). They recommend combining on-line training with offline training through Industry 4.0 innovation centres equipped with model devices. Young people need to be motivated by the exciting (interactive) nature of modern production, with real-life problems being dealt with in close proximity, through scientific approaches and a learning mechanism to bring a real school factory (Chryssolouris, Mavrikios, & Mourtzis, 2013). Training of employees will be designed so that people are trained and educated directly in the Intelligent Factory in the future. Using this way, it will be possible to focus on developing the skills and qualifications necessary for success in the future industrial environment (Karre, Hammer, Kleindienst, & Ramsauer, 2017).

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Recent studies point to the urgent need for future engineers and knowledge workers to adopt curricula (related to Education 4.0) in order to be prepared to meet the growing industrial demands of factories in the future (Rentzos, Doukas, Mavrikios, Mourtzis, & Chryssolouris, 2014). Based on the changes brought by Industry 4.0, it is necessary to analyse the current situation and launch new research activities to prepare multidisciplinary and university graduates (Kozak, Ruzicky, Stefanovic, & Schindler, 2018). These research activities will support new applications of technology and innovation in different industrial processes and will be a challenge for the future. Industry 4.0 will bring both new approaches, and new methods and technologies that will have to be introduced into the enterprises. The main barriers to their immediate introduction will be related to high financial costs and a lack of skilled employees, whose role will be gradually changed in enterprises (Benesova & Tupa, 2017). The EPIC project summarizes the impact on the development and management of education programs, competency requirements and training for engineers, managers and researchers, bringing modular concept for specific trainings, coaching and e-learning components to transfer knowledge to the industry (Hecklau, Orth, Kidschun, & Kohl, 2017).

There is a new kind of training in Industry 4.0, known as a Teaching Factory. This concept aims to adapt production teaching and training to the needs of modern industrial practice. The Teaching Factory focuses on two-way communication of knowledge between academia and industry (Chryssolouris, Mavrikios, & Rentzos, 2016). The teaching factory develops the autonomous learning ability of students and improves teaching results of logistics management courses (Fu, 2017). Based on a production scenario (plan) that includes both manufacturing and assembly, the learning environment supports the use of new technologies to handle a high number of product variants in small batches. The technologies used in cyber-physical production systems include interactive employee assistance systems, real-time business intelligence, and process simulation tools and total material flow (Merkel et al., 2017). The methods of Flexible Learning, e-Learning, Life-Long Learning, Learning Management Systems (LMS), Blended Learning, Flipped Class-rooms, Learning Analytics, or Massive Open Online Courses (MOOCs) have been the most common in education in the past two decades (Huba & Kozak, 2016). Similarly, the three pillars education framework at Turkish German University included curriculum, laboratory and student club (Coskun et al., 2019). These pillars are interrelated and contain technologies and learning methods focused on: GIS, CAD, CAM, 3D printing, autonomous robots, IoT, augmented reality, logistics, smart factories, product validation, drones, Big data and analysis, sensors, RFID, PLC, ERP, sensors, Cloud Computing, simulations etc.

The new manufacturing environment based on the Internet of Things, Industrial Internet, Cloud-Based Manufacturing and Smart Manufacturing also creates new requirements for operations managers operating the manufacturing system. Due to this, it is necessary to analyse and satisfy the requirements for education and training in the field of operational management, in particular with a view to ensuring efficient management of the manufacturing system in the Industry 4.0 environment (Koleva & Andreev, 2018). New knowledge of Industry 4.0 also enters other areas of education. Knowledge of chemical engineering students can be enriched with programming skills and enable future graduates to develop computing tools and software based on new technologies such as IoT, cloud computing, artificial intelligence (dos Santos, Vianna, & Le Roux, 2018). Professions such as operators, executives, and managers can be educated at universities in Industry 4.0 without neglecting their interdisciplinary qualifications (Zarte & Pechmann, 2017).

2 Methods

A part of our research discussed the attitude of a sample of secondary school of economics students in South Bohemia region and the Faculty of Economics of the University of South Bohemia students in the Czech Republic to new technologies and whether they know the basic terms and technologies related to the Industry 4.0. The aim of the paper is to evaluate students' knowledge of Industry 4.0 with regard to current and future technological development. Partial aims compare the knowledge of new technologies of secondary school and university students, including their preparation for employment with regard to rapid technological developments in the world.

The data was obtained by questionnaire survey of secondary school and university students from the Czech Republic. A part of our research discussed the attitude of the students of a secondary school of economics (93 students) and the Faculty of Economics of the University of South Bohemia (310 students) to new technologies and whether they know the basic terms and technologies related to the Industry 4.0.

A total of 403 completed questionnaires were obtained, of which 93 were at the secondary school and 310 at the University of South Bohemia. The university students are classified in a following way:

- By the type of study: bachelor (240 students); post-bachelor master's programme (70 students).

- By the year of study: 1st year bachelor (28 students); 2nd year (105 students); 3rd year (107 students); 4th year post-bachelor master's (38 students); 5th year (32 students).

The first question was general: how students evaluate school education with regard to rapid technological developments in the world (q0). Furthermore, the questions related to the knowledge of common terms related to Industry 4.0. There were the following options: 1. I know its meaning 2. I partly know its meaning 3. I do not know its meaning. In the paper, we focused only on the answers that the participant knows the term. Knowing it only partially means that the participant learned something about it, but he doesn't do not pay attention to it. Some are more general, others more focused, requiring deeper interest. In questions were the following terms related to new technologies:

- (q_1) Cloud: hardware and software solutions for Internet-connected data centre that provide services;

- (q_2) Shared economy: a person offers the use of some part of its property to other people (accommodation, car transportation, etc.);

- (q_3) Industry 4.0: The current stage of industrial development, where new technologies (digitization, robotics and artificial intelligence) are beginning to change our lives;

- (q_4) Digitization: transfer of all data and information (written, pictorial, etc.) into 1 or 0, i. e. to a computer-readable form;

- (q_5) Smart City: Applying new building technologies and city infrastructure to save all kinds of energy, to minimize waste, and to create a pleasant living environment;

- (q_6) RFID: a more advantageous way of labelling products and components through radio frequency technology as opposed to conventional bar code;

- (q_7) M2M: Machine to machine is a programmed and one-time mode of communication between machines without human intervention;

- (q_8) IoT: Internet of things is a sign for connecting various objects and devices with the environment through the Internet and their communication;

- (q_9) Bitcoin is a new form of crypto-currency cashless payments that is not dependent on any state or person and whose mechanism prevents third parties from changing activity records between supplier and recipient;

- (q_{10}) Augmented Reality is a special application providing its users with a direct or indirect view of the real environment whose parts are complemented - expanded, resp. enriched with additional digital visual elements.

The obtained results were statistically analysed using individual tests of equal and given proportions without correlation to continuity. From research questions, working hypotheses for specific statistical data sets were derived. Null working hypotheses, which form the subject matter of verification on the 5% level of significance, are following:

- $H0_1$: There is no difference in the evaluation of school education in relation to rapid technological development between secondary school and university students.

- $H0_2$: There is no difference in the knowledge of new technologies between secondary school and university students.

- $H0_3$: There is no difference in the knowledge of new technologies between the students of different years of the university.

The statistical alternative hypothesis for these working hypotheses is that in at least one case there is a difference in proportion. Regarding the working hypothesis $H0_1$, the answers "good" based on the answers to the question q_0 were statistically evaluated with Mann-Whitney U-test. For the other hypotheses, the statistical analysis was focused on "yes" answers, i.e., the students know the term (questions q_1-q_{10}). For these hypotheses was used z-test of equal or given proportions. Additional tests using Holm methods of adjusting the level of significance were performed when differences were found in multiple comparisons. Statistical evaluation was performed in software R 3.3.3 and for the results, p-values have been reported. Highlighted results are significant at the level of alpha significance of 0.05, resp. with 95% reliability.

3 Research results

In this section, we present the main results of the paper. The section is divided into four parts according to the working hypotheses.

3.1 Evaluation of Differences in School Education

At first, the school education in relation to rapid technological development in the world was assessed (q_0). Table 1 presents the results of the questionnaire survey and the differences between the different types of schools. The differences

in the answers between students of the secondary school and the university are quite minor. Dissatisfaction was higher among university students (by 5%), many of whom are more specifically considering their next career, for which the school does not provide them with adequate knowledge.

Table 1 Evaluation of school education in relation to rapid technological development

School type	Total	Answers to question q_0 (results in %)			
		Good	Average	Bad	Not reported
Secondary School	93	27.96	50.54	19.35	2.15
University	310	19.68	53.87	25.48	0.97

Source: Own processing

Regarding school preparation, the secondary school students consider the preparation to be "good" to a higher degree (27.96%) more, compared to higher education institutions (19.68%). In general, the prevailing rating is 'average', about 50% of those surveyed. On the other hand, university students consider the preparation in school to be rather poor. In addition, the difference in "good" responses were assessed statistically (Table 2).

Evaluation of H0$_1$: At the 5% level of significance, we do not reject the null hypothesis H0$_1$ for the technological development around the world. As reported by the result, there was no difference (p-value = 0.07) regarding the evaluation of school education in relation to rapid technological development in the world between the secondary school and university students.

Table 1 Differences in the evaluation of school education in relation to technological development (H0$_1$)

	U	Z	p-value	Z adjusted	p-value
Secondary School vs. University students	12 399.50	1.63	0.10	1.80	0.07

Source: Own processing (Mann-Whitney U-test)

Overall, it was not confirmed that the secondary school and university students evaluated their school preparation differently.

3.2 Difference in knowledge (q_1-q_{10}) between the secondary school and university students

The second part of the results focuses on differences in knowledge between the secondary school and university students. We expected the university students to be more advanced than the secondary school students.

Table 2 Differences in knowledge between the secondary school and university students

School type	Question (results in %)									
	q_1	q_2	q_3	q_4	q_5	q_6	q_7	q_8	q_9	q_{10}
Secondary School	52.69	23.66	19.35	63.44	61.29	2.15	5.38	3.23	68.82	29.03
University	52.90	40.00	45.16	80.65	53.23	52.58	12.58	7.42	68.06	41.29
p-value*	1.00	**0.01**	**0.00**	**0.00**	0.21	**0.00**	0.08	0.23	0.99	**0.05**

Source: Own processing

*Explanatory note: the statistically significant differences at the significance level of 5% are marked in bold

Results of difference in knowledge between the secondary school and university students are shown in Table 3. The largest difference in the knowledge of the issue was in the term RFID (q_6; 2.15% vs. 52.58%), i.e. almost 50% and then in relation to Industry 4.0 (q_3; 45.16% vs. 19.35%) with a difference of 25.81% in favour of the university students. RFID is an important part of new technologies within Industry 4.0, but it is not as well-known as the barcodes it replaces. That is why students are less informed about it. The high consciousness of Industry 4.0 shows that, the university students are much more familiar with its issues compared to the secondary school. The smallest differences among the students were found in relation to Cloud (q_1) and in bitcoin (q_9). The issue of cloud and bitcoin is often mentioned in various media, so it is not surprising that there is similar knowledge among the secondary school students and university students. Obviously, the young generation comes into contact with these two concepts and knows their meaning well.

Evaluation of H0$_2$: At the 5% level of significance, we reject the null hypothesis H02 for the knowledge of terms: Shared Economy (q_2), Industry 4.0 (q_3), Digitization (q_4), RFID (q_6) and Augmented Reality (q_{10}). As reported by the result, there was a significant difference (p-value < 0.05) in knowledge of the new terms between the secondary school and university students. On the other hand, no difference was found for Cloud (q_1), the concept of Smart City (q_5), M2M (q_7), IoT (q_8) and Bitcoin (q_9).

For most of the terms, the knowledge of university students, statistically significant in most cases, prevails as expected. The secondary school students reported better knowledge only in relation to Smart City (q5) and bitcoin (q9). The overall

knowledge of the examined issue varies considerably; it depends on the respondent's interest in technology, information and social problems.

3.2 Difference in knowledge (q$_1$-q$_{10}$) of university students in different years of study

Next part of the research focused on the difference of university students in different years. The response rate is expected to vary from year to year, gradually increasing with grades. The results are partly distorted by the uneven representation of respondents in the years, but this largely corresponds to their actual number at the faculty.

Table 3 Differences of university students in different years of study

Year of study	Total Number	Question (results in %)									
		q$_1$	q$_2$	q$_3$	q$_4$	q$_5$	q$_6$	q$_7$	q$_8$	q$_9$	q$_{10}$
1	28	64.29	50.00	46.43	75.00	46.43	7.14	10.71	3.57	89.29	46.43
2	105	53.33	29.52	43.81	77.14	47.62	67.62	5.71	3.81	70.48	35.24
3	107	52.34	29.91	36.45	83.18	50.47	41.12	11.21	5.61	66.36	47.66
4	38	52.63	84.21	44.74	73.68	52.63	60.53	21.05	13.16	63.16	44.74
5	32	43.75	46.88	78.13	96.88	87.50	71.88	31.25	21.88	53.13	31.25
p-value*		0.64	**0.00**	**0.00**	0.08	**0.00**	**0.00**	**0.01**	**0.01**	**0.04**	0.27

Source: Own processing

*Explanatory note: the statistically significant differences at the significance level of 5% are marked in bold

The results are summarized in Table 4, revealing that the assumption of increasing knowledge towards higher grades was confirmed only for the Smart City concept (q$_5$, increase from 46.4% to 87.5%) and for IoT (q$_8$, increase from 3.6% to 21.9 %). With one exception, this assumption was confirmed in terms of digitization (q$_4$) and M2M (q$_7$). Interestingly, there is the gradual reduction of knowledge of bitcoin (q$_9$, decrease from 89.3% to 53.1%) in individual grades. Irregular fluctuations are reflected in knowledge of other terms. If we compare the level of knowledge of bachelors and masters, then in most cases the masters' knowledge is greater than that of bachelors. Bachelors only dominate in the knowledge of Cloud (q$_1$) and bitcoin (q$_9$), but the differences are not large and statistically significant.

Evaluation of H0$_3$: At the 5% level of significance, we reject the null hypothesis H0$_3$ for the knowledge of terms: Shared Economy (q$_2$), Industry 4.0 (q$_3$), Smart City (q$_5$), RFID (q$_6$), M2M (q$_7$), IoT (q$_8$) and Bitcoin (q$_9$). The results show that a statistically significant difference was found in the new trends and technologies (p-value <0.05) in the knowledge of university students in different years.

Regarding the term Shared Economy (q$_2$), the significant differences was found comparing the fourth year of study and other years of study (p-value < 0.05). This result is based on teaching lean production to fourth-year students so that they are familiar with this term. Industry 4.0 (q$_3$) is far superior in fifth year of study compared to third and fourth year of study (p-value < 0.05). In case of term Smart City (q$_5$), the significant differences were found between the fifth year of study and other years of study (p-value < 0.05). It means that students of the last year have different knowledge comparing to other students. The differences between students of first study year and others are significant in knowledge of the term RFID. The students of the first study year mostly don't know the term RFID. The difference was found, both for terms M2M (q$_7$) with p-value $= 0.00$ and IoT (q$_8$) with p-value $= 0.01$ between students in fifth and third year of study. Both of these terms express interconnection and communication between different objects and are taught in parallel.

In general, the expected tendency that new technology knowledge will grow from first to last year of study is not confirmed. There is an increase; however, it is not systematic and does not show a clear tendency. Nevertheless, differences were found especially in the knowledge of students of the fifth year of study towards other years. These students are likely to have a synthesis of their knowledge throughout their studies, and in their answers to q$_3$-q$_8$ questions, their knowledge of the technologies exceeds the rest of the students.

4 Conclusions

The aim of the paper was to assess the knowledge of students in relation to Industry 4.0 and current and future technology development. The topic was addressed through research based on a questionnaire survey among secondary school and university students. Working hypotheses were formulated as a part of the research, and statistically verified. A partial goal was to compare knowledge of new technologies between the secondary school and university students, including their education at school with regard to rapid technological developments in the world.

Overall, it was not confirmed that the secondary school and university students evaluated the school education differently. The approach of secondary schools and universities to teaching new technologies is therefore similar. The results showed that in terms of knowledge of new technologies and Industry 4.0, the university students are better compared to

the secondary school students. Only in relation to Smart City, M2M and Bitcoin the students of the secondary school reported wider knowledge. However, the overall knowledge of the issues in the research varies considerably.

The differences among the university students by year of study are increasing with the grades only in three cases. Thus, the expected tendency that knowledge of new technologies would grow continuously from the first to the last year of study is not confirmed. However, there are more significant differences in the knowledge of some terms, especially among the students of the fifth year of study towards the other years. These students seem to have the advantage of synthesizing their knowledge throughout their studies, increasing their awareness of the new issue.

The research revealed that there are differences in the knowledge of new technologies and of Industry 4.0 between different student groups. These differences might be reduced in the future by actively preparing and changing the curricula and programmes of the universities and colleges so that future graduates are prepared for growing business demands. Furthermore, we aim to investigate differences in students' knowledge about Industry 4.0 in other countries. The authors expect that it will be possible to get outcomes from partnership to be able to compare universities of similar specialization.

References

Benesova, A., & Tupa, J. (2017). Requirements for Education and Qualification of People in Industry 4.0. In M. Pellicciari & M. Peruzzini (Eds.), *27th International Conference on Flexible Automation and Intelligent Manufacturing, Faim2017* (Vol. 11, pp. 2195-2202). Amsterdam: Elsevier Science Bv.

Coskun, S., Kayikci, Y., & Gencay, E. . (2019). Adapting Engineering Education to Industry 4.0 Vision. *Technologies, 7*(1), 1-13. doi: http://dx.doi.org/10.3390/technologies7010010

dos Santos, M. T., Vianna, A. S., & Le Roux, G. A. C. (2018). Programming skills in the industry 4.0: are chemical engineering students able to face new problems? *Education for Chemical Engineers, 22*, 69-76. doi: 10.1016/j.ece.2018.01.002

Fu, H. W. (2017). Integration of Logistics Simulation Technology and Logistics Learning Factory in a Two-stage Teaching Method for Logistics Management Courses. *International Journal of Emerging Technologies in Learning, 12*(9), 62-72. doi: 10.3991/ijet.v12i09.7485

Hecklau, F., Orth, R., Kidschun, F., & Kohl, H. (2017). Human Resources Management: Meta-Study - Analysis of Future Competences in Industry 4.0. In M. Rich (Ed.), *Proceedings of the 13th European Conference on Management, Leadership and Governance* (pp. 163-174). Nr Reading: Acad Conferences Ltd.

Huba, M., & Kozak, S. (2016). *From E-learning to Industry 4.0*. New York: Ieee.

Chryssolouris, G., Mavrikios, D., & Mourtzis, D. (2013). Manufacturing Systems: Skills & Competencies for the Future. In P. F. Cunha (Ed.), *Forty Sixth Cirp Conference on Manufacturing Systems 2013* (Vol. 7, pp. 17-24). Amsterdam: Elsevier Science Bv.

Chryssolouris, G., Mavrikios, D., & Rentzos, L. (2016). The Teaching Factory: A Manufacturing Education Paradigm. In E. Westkamper & T. Bauernhansl (Eds.), *Factories of the Future in the Digital Environment* (Vol. 57, pp. 44-48). Amsterdam: Elsevier Science Bv.

Karre, Hugo, Hammer, Markus, Kleindienst, Mario, & Ramsauer, Christian. (2017). Transition towards an Industry 4.0 State of the LeanLab at Graz University of Technology. *Procedia Manufacturing, 9*, 206-213.

Koleva, N., & Andreev, O. (2018). *Aspects of Training in the Field of Operations Management with Respect to Industry 4.0*. New York: Ieee.

Kozak, S., Ruzicky, E., Stefanovic, J., & Schindler, F. (2018). *Research and Education for Industry 4.0 Present Development*. New York: Ieee.

Merkel, L., Atug, J., Merhar, L., Schultz, C., Braunreuther, S., & Reinhart, G. (2017). Teaching Smart Production: An insight into the Learning Factory for Cyber-Physical Production Systems (LVP). In J. Metternich & R. Glass (Eds.), *7th Conference on Learning Factories* (Vol. 9, pp. 269-274). Amsterdam: Elsevier Science Bv.

Rentzos, L., Doukas, M., Mavrikios, D., Mourtzis, D., & Chryssolouris, G. (2014). Integrating Manufacturing Education with Industrial Practice using Teaching Factory Paradigm: A Construction Equipment Application. In H. ElMaraghy (Ed.), *Variety Management in Manufacturing: Proceedings of the 47th Cirp Conference on Manufacturing Systems* (Vol. 17, pp. 189-194). Amsterdam: Elsevier Science Bv.

Richert, A., Shehadeh, M., Plumanns, L., Gross, K., Schuster, K., Jeschke, S., & Ieee. (2016). Educating Engineers for Industry 4.0: Virtual Worlds and Human-Robot-Teams Empirical Studies towards a new educational age *Proceedings of 2016 Ieee Global Engineering Education Conference* (pp. 142-149). New York: Ieee.

Tvenge, N., & Martinsen, K. (2018). Integration of digital learning in industry 4.0. In D. Mourtzis & G. Chryssolouris (Eds.), *8th Cirp Sponsored Conference on Learning Factories* (Vol. 23, pp. 261-266). Amsterdam: Elsevier Science Bv.

Yang, S., Hamann, K., Haefner, B., Wu, C., & Lanza, G. (2018). A Method for Improving Production Management Training by Integrating an Industry 4.0 Innovation Center in China. In D. Mourtzis & G. Chryssolouris (Eds.), *8th Cirp Sponsored Conference on Learning Factories* (Vol. 23, pp. 213-218). Amsterdam: Elsevier Science Bv.

Zarte, M., & Pechmann, A. (2017). Concept for Introducing the Vision of Industry 4.0 in a Simulation Game for Non-IT Students *2017 Ieee 15th International Conference on Industrial Informatics* (pp. 512-517). New York: Ieee.

Non-Competition Clause – Instrument to Limit Competition in Labour Relations

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Abstract: Non-competition clause regulated by the Czech law is a legal instrument to limit competition in labour relations. The aim of this paper is to introduce the non-competition clause as a legal instrument enabling an employer to restrict the employee´s right to free choice of employment in order to protect his economic interests. The legal regulation of this institute is quite brief so the author has focused on questions occurring in the employers' practice the most often and solution of which in many cases is necessary to be found in judicature. When using this clause, it is need to pay attention to adequacy of protection of employer´s interests and limitation of employee´s rights. A proper use of the non-competition clause eliminates possible problems and disputes.

Keywords: non-competition clause, contractual penalty, monetary compensation, withdrawal from non-competition clause, termination of non-competition clause
JEL Classification: K12, K31

1 Introduction

Competition is a term generally expressing competitiveness or rivalry between particular subjects. Competition in economic conception lies in antagonistic, rivalizing relationship of at least two market players, which make effort in achievement of an identical aim (wikiknihovna, 2014). Market subject realizes or wants to realize its economic goals at the expense of other market subjects. At the same time of course, it wants to protect its interests and market position from other competitors, using various instruments. Kocina (2010, p. 6) says: „Restriction of competition means the prohibition of an activity normally carried out by a natural person for his own benefit or for the benefit of other persons at the expense of one whose interests it should protect and represent."

The implied duty of loyalty lasts during employment relationship, afterwards, the employee is in general free to use knowledge and skills during employment in a new job (Collins and Ewing and McColgan, 2019). The author of this paper introduces the non-competition clause (also referred to as "non-compete clause" or "non-competition agreement") as one of legal instruments, which can be used by employers to limit a competition in labour relations. The non-competition clause regulated by the Czech labour law limits an employee, more precisely said a former employee, to work for another employer or on his own account using know-how of his former employer. By providing important information to a new employer with the same subject of activity or using this information in his own business, the economic interests of the former employer may be harmed and an unjustified competitive advantage may be obtained at his expense.

The non-competition clause is a private-law institute regulated in the Labour Code (the Act No. 262/2006 Coll., as amended). It says that if the non-competition clause was agreed, the employee undertakes (for a certain period not exceeding one year after employment termination) to refrain from performance of activity being identical with the employer's business activity or that would be of a competitive nature to the employer's business activity. At the same time, the non-competition clause includes an obligation that the employer must undertake in the clause to provide adequate monetary compensation, at least in the amount of one half of the employee's average monthly earnings for each month in which the said obligation is fulfilled.

The non-competition clause is concluded in order to protect information that is of the nature of a "business secret" or it can provide the competitor with a significant competitive advantage (Pichrt and Drápal, 2015). It is assumed that the employee has obtained such information during his employment and its use in his activity after employment termination could seriously make former employer´s activities more difficult. (Vrajík, 2017). The non-competition clause can be concluded directly in an employment contract or it can become a separate agreement anytime within an employment relationship (Hloušková, P. et al., 2019; Neščáková and Jakubka, 2012; Bělina and Pichrt, 2017). The negotiation of a non-competition clause is always a mutual obligation of the employee and the employer, where the obligation of the employee to refrain from performing a certain activity for a certain period of time must correspond to the obligation of the employer to provide the employee with adequate monetary consideration. (Landwehrmann, 2016). The legal regulation of the non-competition clause gives the employee the opportunity to get rid of his obligation by paying a contractual

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penalty (Smied, 2017). By paying a contractual penalty, employee´s obligation ends. The non-competition clause may be terminated by the employee in case the employer has not paid him a monetary compensation or its part within 15 days after due date. An employer can withdraw from the non-competition clause only within duration of employment. In each individual case of the non-competition clause, it is very important to assess the question of the conformity of the employee's activity after the employment termination with the subject of activity of his former employer. Based on the only fact that the former employer and the new employer have the same business activity, it cannot be inferred that the employee's activity is "competitive". (Pichrt and Drápal, 2015). On the other hand, by the decision of the Supreme Court of the Czech Republic, an activity of an employee, the subject of which is registered in the Business Register or Trade Register does not even partially coincide with the similarly registered subject of the employer's activity is inadmissible, if his new employer and the former employer can still find themselves in a mutually competitive position and therefore this employee's gainful activity is competitive with the former employer (Supreme Court: 21 Cdo 2995/2011).

In this paper, the author analyzes characteristics of the non-competitive clause and related important questions, which can often occur in employers´ practice. Their proper solution is necessary to eliminate possible disputes and to use this clause in accordance with legal regulation.

The aim of the paper is to present the non-competition clause as a legal instrument that allows to limit the employee's right to free choice of employment in order to protect the economic interests of the employer. At the same time, the author wants to emphasize the necessary assessment of the adequacy of the employer interests´ protection with regard to the adequacy of the restriction of the employee's right and the monetary compensation that compensates it considering each case individually.

2 Methods

This paper is elaborated based on literature review and interpretation of legal regulation using relevant judicature. Knowledge gained by its analysis is applied on some problems in practice. Method of deduction is used in this paper, too.

3 Research results

In order to fulfill the aim of the paper, the following text discusses the characteristics of the non-competition clause and the problems that often appear in the application of this institute in practice.

3.1 Purpose of non-competition clause

The purpose of a non-competition clause, as it is clear from the judicature, is to protect the employer from the leakage of information to a competitor made by employee who, during his employment with the employer, becomes aware of information of a commercially confidential nature or information capable of conferring a significant competitive advantage on a competing undertaking. (Supreme court: 21 Cdo 3034/2011, Supreme court: 21 Cdo 1403/2013). As Vrajík (2017, p. 27) states: "…when negotiating the non-competition clause, there is a special condition namely the employee can be fairly required to sign it." A non-competition clause cannot be negotiated with each employee; not each employee encounters information that is competitively relevant to his employer. The nature of information, knowledge and understanding of work and technological processes must be of such nature that their use by former employee in his competitive gainful activity could make the operation more difficult for the employer. Landwehrmann (2016, p. 19) states that "this condition is usually met especially for employees in managerial positions and for employees who have specific expertise and is not met for ordinary employees without specific know-how". Considering this statement, it is necessary to emphasize that this condition has to be carefully assessed in each individual case. It is not possible to negotiate a non-competition clause for senior employees automatically or, conversely, not to automatically negotiate it with a regular employee.

It should always be borne in mind that the non-competition clause regulated in the Labour Code is connected particularly to Article 26 of the Charter of Fundamental Rights and Freedoms (Constitutional Act No. 2/1993 Coll., as amended), which guarantees business to be run freely and as results from the judgment of the Constitutional Court of the Czech Republic No. 3101/18 of 2 May 2019, this provision directly protects individuals primarily from interference by public authorities, but also affects the interpretation of legislation, which is to serve to protect business activities from harmful interference by individuals. Article 26 of the Charter of Fundamental Rights and Freedoms thus obliges ordinary courts to provide protection for business activities if they are affected in a way that, even potentially, favors competition in connection with a breach of a contractual obligation under the non-competition clause. According to the opinion of the Constitutional Court of the Czech Republic on the legal regulation of the non-competition clause, it is necessary to guarantee the employer (entrepreneur) the right to do business as much as possible. However, this right can be fully developed only in such environment that consistently prevents from the possible misuse of information acquired during the employment and from potential competitive conflict of interest that could occur between the former employer and the former employee, or a third party for whom the former employee is employed.

The negotiation of the non-competition clause is based on the premise that the employee may become acquainted with sensitive information of a competitive nature during his employment. The non-competition clause agreement cannot be conditioned by the fact the employee obtained this information before concluding it. Such understanding of the non-competition clause would be in contradiction to its purpose. The non-competition clause would be factual and practically unusable for employers. This was also confirmed by the Supreme Court of the Czech Republic in its decision (Supreme court: 21 Cdo 4986/2010).

3.2 Conformity of employer's business subject with regard to non-competition clause

The law stipulates that for an agreed period of time, the non-competition clause forbids employees to provide such activity which would be identical with the subject of the employer's activity or which would be of a competitive nature towards him. The regulation contained in the Labour Code undoubtedly requires a more detailed specification of the non-competition clause when negotiating it in order to avoid a later dispute (Landwehrmann, 2016).

The assessment of the conformity of the business subject or its competitive nature is though based primarily on the registration in the Trade Register or the Business Register. As Vrajík (2017, p. 24) claims: "…in order to assess whether a gainful activity is identical with the business activity, it is necessary to examine whether it is an activity that may lead to the possibility of acquired information misuse or a competitive conflict of interest between the former employer and new employer. The purpose of the legislation is to protect the employer from the competitive activities of the employee and not to unduly restrict the employee's gainful activity".

Therefore, in the opinion of the paper author, in each individual case, it is necessary to specify the employer´s subject of activity and the gainful activity of the employee, the performance of which would compete with the employer. It is best to define the activities that are forbidden to be made by employees, while it is also possible to specify the territory in which the activity is to be provided. This will be practical especially if the employer operates in a limited territory, not in the whole territory of the Czech Republic, and considering a competition there is no justification to forbid gainful activity in another territory. Territorial restrictions can be excluded even to a greater extent than the territory of the Czech Republic is. More Vrajík (2015).

3.3 Negotiation of non-competition clause

The non-competition clause is often agreed directly in the employment contract, which is concluded by the employer and the employee. It can also be concluded in a separate agreement. Written form is a formal condition to make the non-competition clause valid. The non-competition clause can be negotiated when an employment relationship is established as well as later during its duration. In this context, the question arises as to whether a non-competition clause can be concluded even after the termination of the employment. The paper author considers this possibility to be illogical and not making sense. As well as the conclusion of the non-competition clause at the end of employment or in connection with its termination, e.g. as part of a termination agreement (see Decision of the Supreme Court of the Czech Republic No. 21 Cdo 4986/2010 mentioned above).

Negotiating the non-competition clause primarily concerns employment relationships based on an employment contract. However, it should be noted that in practice, employers also use it in labour relations based on agreement to perform work and agreement to complete a job. In addition to the employment contract, which is a typical and most common way of establishing labour relations, Czech labour law also regulates both of these agreements. Agreement to perform work and agreement to complete a job have a complementary character to the employment contract, nevertheless it can be said that employers often use them in practice to establish labour relations. For the practice of employers, it is essential that the legal regulation of the non-competition clause does not distinguish between labour relations in terms of the way in which they arise and uses the more general term "employment". By interpreting the text of the law, it can be concluded that the legal regulation of the non-competition clause applies to labour relations based on all - employment contract, agreement to perform work and Agreement to complete a job. There is no doubt that even in jobs based on these agreements, the employee may come into contact with competitively relevant information and employers may have a legitimate interest in protecting it. The question for the legislator remains why in connection with the regulation of the employer´s withdrawal from the non-competition clause it uses the term "employment relationship", which can be used only to refer to the employment contract, and not the term "employment" as in the rest of the relevant paragraph. In the opinion of the paper author, even in case of withdrawal from the non-competition clause agreed in the labour relationship based on the mentioned agreements, the procedure will be the same as for the employment relationship with reference to the legal regulation of these agreements in the Labour Code. According to it, legal regulation of agreements is related to regulation of employment contract except the cases expressly mentioned, which, however, do not include the non-competition clause.

3.4 Mutual obligation arising from non-competition clause

As Bělina and Pichrt (2017, p. 181) states: "An essential part of the non-competition clause is the employer's obligation to provide the employee with adequate monetary consideration, which is a compensation for the fact that the employee significantly limits his future employment for the period agreed in the non-competition clause".

The legislation stipulates the minimum amount of monetary compensation at one half of the average earnings of the employee for each month of the obligation fulfillment. The employer's legal obligation to pay monetary compensation to the employee corresponds to the employee's obligation to comply with the non-competition clause. The obligation under the non-competition clause restricts the employee's right to freely choose a profession guaranteed by the Charter of Fundamental Rights and Freedoms. The consequence for employees is the inability to use or only a limited possibility to use their qualifications for a certain period of time. Such a restriction creates an unequal position of the employee and the employer. The employer gains an advantage at the expense of the employee. Therefore, the legislature clearly imposes on the employer, on the one hand, the obligation to compensate the employee for the fulfillment of the obligation under the non-competition clause by monetary compensation and, on the other hand, it determines the minimum amount of this compensation.

The Decision of the Supreme Court of the Czech Republic stipulates that the agreement on the non-competition clause is a synallagmatic obligation in which the former participants in the employment relationship provide economic benefit to each other as well as are debtors and creditors. (Supreme Court: 21 Cdo 602/2001). In practice, however, some employers argue that they have allowed employees to upgrade or improve their qualifications during their employment. The costs they have incurred for this are considered to be the financial benefit of the employee, which is then "included" in the cost of monetary compensation based on the non-competition clause. Such an argument is by no means valid. The law clearly states that adequate monetary compensation is compensation for the fulfillment of an obligation under the non-competition clause and a separate claim of the employee, which cannot be associated with facts related to other circumstances in the labour relationship. This is also confirmed by the judicature of the Supreme Court of the Czech Republic No. 21 Cdo 249/2005, which shows that the costs of increasing or deepening the employee's qualifications are spent in accordance with the needs of the employer and do not bring economic benefits to the employee in the way, which could balance its obligation under the non-competition clause. A similar conclusion was reached by the Supreme Court of the Czech Republic also in its decision No. 21 Cdo 5008/2009 in relation to the amount of earnings within the duration of the obligation based on the non-competition clause. It states that if an employee follows the ban on competition for an agreed period of time and does not perform gainful activity of a competitive nature towards the business of the former employer, he is entitled to financial consideration, regardless of how long it took him to find new job or what earnings he achieved during the period agreed in the non-competition clause.

Likewise, the redundancy payment provided to employees at the end of their employment cannot be considered the compensation or part of the compensation for the fulfillment of the obligation under the non-competition clause. Its purpose is completely different. It is a one-off financial compensation for the loss of earnings after the employment termination for specified reasons, which has nothing to do with the fulfillment of the non-competition clause. It is a separate claim of the employee which does not substitute the claim under the non-competition clause. As stated by Pichrt and Drápal (2015, p. 355): "Given the difference between these institutes, it is clear that the redundancy payment does not terminate the right to payment of financial compensation based on the non-competition clause." Such employer´s behaviour would be unlawful and in case of a dispute, the injured employee could successfully defend himself by asserting his claims in court.

3.5 Contractual penalty

It cannot be ruled out that the employee will breach his obligation and start a competitive gainful activity. The law gives the employer a instrument for protection in the form of a contractual penalty in a reasonable amount. It can be agreed in the non-competition clause as a sanction.

However, a contractual penalty is not a mandatory part of the non-competition clause, so it depends on the will of the employee and the employer whether they agree on it. Nevertheless, it is clear from the nature of the case that the contractual penalty is a regular part of the non-competition clause. The amount of the contractual penalty must be adequate to the nature and significance of the conditions, which lead to the non-competition clause conclusion. Some aspects have to be taken into consideration such as duration of employee´s obligation as well as a nature of sensitive and protected information.

If the contractual penalty is agreed to be unreasonably high, its agreement must be considered invalid. As a result, the entire non-competition clause is invalid. This opinion was expressed by the Supreme Court of the Czech Republic in its judgment No. 21 Cdo 4393/2015, which shows that the obligations arising from the non-competition clause are binding

for employers and employees. Although a contractual penalty is not a mandatory element of a non-competition clause, based on the purpose of the contractual penalty it must be concluded that it is inseparable from the other content. I.e. if the invalidly agreed contractual penalty is disproportionately high, the entire non-competition clause is invalid. When considering what amount of the contractual penalty is adequate, the amount of reasonable monetary compensation that the employer is obliged to pay to the employee for compliance with the obligation of the non-competition clause could be a guide. A similar opinion is held, for example, by Nesčáková and Jakubka (2012). Contrary to that, Landwehrmann (2016, p. 23) argues critically: „that in practice, there are situations where a competitor buys the employee out from the non-competition clause paying a contractual penalty, which, given the requirement of proportionality of the amount of contractual penalty and the potential profit, may not even represent a significant investment for him.

In order to resolve the issue of a contractual penalty, it is also necessary to state an important opinion of the Constitutional Court of the Czech Republic, which follows from Judgment No. 3101/18. The Constitutional Court ruled that the only violation of the former employee's obligation resulting from the non-competition clause is decisive when the right to payment of a contractual penalty is considered. Duration of the new competitive job or whether the employee actually uses the protected information for the benefit of the new employer or his own business is not to be taken into consideration.

According to the Czech law, by paying a contractual penalty, an employee's obligation under the non-competition clause expires. The author lays the question whether this possibility of "redemption" from the non-competition clause does not reduce the effectiveness of the contractual penalty and whether it is not counterproductive to its purpose. The legislator should consider the current regulation. In particular, the possibility of repeatedly imposing a contractual penalty in case of a repeated breach of the non-competition clause would certainly be more effective in protecting the employer's interests.

3.6 Withdrawal from non-competition clause and termination of non-competition clause

The legal regulation allows the agreement on the non-competition clause to be terminated by employee and withdrawed by the employer. The employer may withdraw from the non-competition clause only within the duration of the employment. The law stipulates only a time condition for the employer to resign from the non-competition clause without any further specifics of the reasons to do so or whether it is possible to resign without stating the reason. This seemingly simple regulation raises legitimate questions about how to proceed withdrawal correctly and whether it is sufficient to observe only the condition limiting the possibility of withdrawal for the duration of employment. These questions are answered by the judicature, which clearly states that withdrawal may only take place for reasons which have been agreed with the employee in advance and which do not represent an abuse of the right to his detriment (Supreme Court: 21 Cdo 4394/2010, Supreme Court: 21 Cdo 4986/2010).

However, the judicature no longer specifies what reasons for withdrawal can be agreed in the non-competition clause. Landwehrmann (2106, p. 22) states: „that the position of the employer is always quite uncertain in case of a unilateral termination of the non-competition clause. For example, it is very unclear whether the reason that the employer's know-how has lost its value in the meantime or that the employee will be dismissed for a gross breach of work discipline can be agreed as a reason for withdrawal". The change in technology or the transfer of employee to a job for which a non-competition clause is not justified could become the logical reason. However, the fact that the employee did not acquire any know-how cannot be considered the reason for withdrawal. It is impossible from both points of view practical (de facto excludes the possibility of withdrawal) and legally theoretically. If the employee does not obtain competitively important information, it should rather be a reason for the lapse of the non-competition clause due to the impossibility of performance, i.e. because the employee cannot fulfill the obligation not to compete, if he has nothing to compete with. More Landwehrmann (2016).

Unlike the regulation of the conditions for withdrawal from the non-competition clause by the employer, the conditions for termination of the non-competition clause by the employee are clearly set out in the law. The only reason is that the employer did not pay the employee monetary compensation no later than 15 days after its due date. If the employee submits the employment termination, the non-competition clause expires on the first day of the calendar month following the delivery of the written notice. Thus, the termination of the non-competition clause by the employee can logically occur only after the termination of employment in the period in which the employee fulfills his obligation.

It should definitely be noted that if the non-competition clause is concluded by mutual agreement between the employee and the employer, it can be terminated by agreement as well, although this possibility is not explicitly mentioned in the law.

4 Conclusion

The aim of this paper was to present the non-competition clause as a legal instrument enabling the employer to limit the right of employee to freely choose the employment in order to protect his economic interests. When using the non-competitive clause in practice, adequacy of employer interests' protection and employee´s rights limitation and its compensation in the form of monetary compensation has to be taken into consideration. In this paper, the author paid attention to the characteristics of the non-competition clause and problems often occurring in connection with their legal regulation.

This topic consideration results in conclusion that employers not always act properly when concluding the non-competition clause. The legal regulation of this institute is quite strict though and does not answer many questions clearly. Solution is to be searched for not only in the Labour Code but also in judicature which extends the legal regulation, makes it more accurate or substitutes it. Not each employer is familiar with judicature and knows how to work with it. A proper usage of the non-competitive clause in practice eliminates problems and disputes though. In this context, the legislator is offered to consider the modification of the non-competition clause in the law, using the conclusions and arguments made by the judicature in the present cases.

References

Bělina, M., & Pichrt, J. (2017). *Pracovní právo.* Praha: C. H. Beck. ISBN 978-80-7400-667-8.

Collins, H., & Ewing, K. D., & McColgan, A. (2019). *Labour Law.* Cambridge: University press. ISBN 978-1-10846221-1.

Constitutional Court of the Czech Republic: 3101/18 [online]. [cit. 2020-09-04]. Available at: http://www.usoud.cz.

Hloušková, P., & al. (2019). *Zákoník práce s komentářem.* Praha: ANAG. ISBN 978-80-7554-190-1.

Kocina, J. (2010). *Zákaz konkurence ve světle soukromého a veřejného práva*. Praha: C.H. Beck. ISBN: 978-80-7400-167-3.

Landwehrmann, T. (2016). Konkurenční doložka vs. Wettbeverbsverbot – srovnání úpravy zákazu konkurence po skončení pracovního poměru v kontexu českého a německého práva. *Praktická personalistika,* 3(5-6), 18-24.

Neščáková, L., & Jakubka, J. (2012). *Zákonik práce v praxi.* Praha: GRADA. ISBN 978-80-247-4037-9.

Pichrt, J., & Drápal, L. (2015). *Případové studie pracovněprávní.* Praha: C. H. Beck. ISBN 978-80-7400- 582- 4.

Smied, Z. (2017). Konkurenční doložka podle zákoníku práce (vzor). *Praktická personalistika,* 4(1-2), 44-47.

Supreme Court of the Czech Republic: 21 Cdo 602/2001 [online]. [cit. 2020-09-04]. Available at: http://www.nsoud.cz/judikatura.

Supreme Court of the Czech Republic: 21 Cdo 249/2005 [online]. [cit. 2020-08-14]. Available at: http://www.nsoud.cz/judikatura.

Supreme Court of the Czech Republic: 21 Cdo 5008/2009 [online]. [cit. 2020-08-14]. Available at: http://www.nsoud.cz/judikatura.

Supreme Court of the Czech Republic: 21 Cdo 4394/2010 [online]. [cit. 2020-08-14]. Available at: http://www.nsoud.cz/judikatura.

Supreme Court of the Czech Republic: 21 Cdo 4986/2010 [online]. [cit. 2020-08-20]. Available at: http://www.nsoud.cz/judikatura.

Supreme Court of the Czech Republic: 21 Cdo 2995/2011 [online]. [cit. 2020-08-20]. Available at: http://www.nsoud.cz/judikatura.

Supreme Court of the Czech Republic: 21 Cdo 3034/2011 [online]. [cit. 2020-09-20]. Available at: http://www.nsoud.cz/judikatura.

Supreme Court of the Czech Republic: 21 Cdo 1403/2013 [online]. [cit. 2020-08-04]. Available at: http://www.nsoud.cz/judikatura.

Supreme Court of the Czech Republic: 21 Cdo 4393/2015 [online]. [cit. 2020-09-04]. Available at: http://www.nsoud.cz/judikatura.

Vrajík, M. (2015). Konkurenční doložka bez vymezení území a konkurenční činnosti. *Praktická personalistika,* 2(7-8), 50-51.

Vrajík, M. (2017). Omezení jiné výdělečné činnosti zaměstnance. *Praktická personalistika,* 4(9-10), 41-49.

Vrajík, M. (2017). Konkurenční doložka v pracovním právu. *Praktická personalistika,* 4(11-12), 22-31.

WikiKnihovna (2014). *Konkurence* [online]. [cit. 2020-09-04]. Available at: http://wiki.knihovna.cz/index.php?title=Konkurence

Effect of Corporate Social Responsibility as a Prerequisite for Employees' Organizational Commitment in the Hospitality Industry

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Abstract: The hospitality industry is characterized as a work environment with high employee turnover, which many scholars reason by e.g. low pay, little room for personal growth or career opportunities. Therefore, being inspired by Carroll's (2015, 2016) four-dimensional concept of corporate social responsibility (CSR), the purpose of this study is to empirically examine the effect of CSR (economical, legal, ethical, and philanthropic dimension) as a prerequisite for employees' organizational commitment (OC), which in due course fosters employees' voluntary retention. The sample (n = 411) was collected from employees of 24 small or medium size lodging enterprises situated in Prague. The results show a significant positive influence of CSR on employees' OC. However, not all four dimensions of CSR play the same role in generating employees' desirable behaviour outcomes. This study also contributes to the literature on CSR as scholarly literature gives little space to CSR in regards to employees.

1 Introduction

Although tourism has become one of the major contributors to many national and local economies, its subsector - the hospitality industry has been continuously struggling with high employee turnover, regardless of the phase of the business cycle, time or geographical region (Kim, Song & Lee, 2016; Yao, Qiu & Wei, 2019; ČSU, 2019; ČSÚ, 2020). This could be reasoned by viewing the offered jobs as low paid, with little or no career opportunities, giving the employees little room for personal growth and self-actualization, and thus disabling them to realize their full potential; yet seasonal, stressful, time demanding, and monotonous (Yang, Wan & Fu, 2012; Robinson & al., 2014; Kim, Song & Lee, 2016). High employee turnover represents not only direct and indirect staff turnover cost (e.g. the recruiting and training of new employees, weakening of the relationship between the organization and the present employees or loss of organizational knowledge), but also the predestined downturn of overall economic organizational performance (Yang, Wan & Fu, 2012). For example, according to John et al., (2019), a higher rate of organizational commitment (OC) and voluntary retention (R) are the key indicators of organizational performance. Thereafter, increasing employees' OC seems like a potential solution for both, improvement of the employees' work performance and maintenance of the desired level of employees' R. Although scholarly literature recognizes many types or layers of "employees' attachment" to an organization - OC (e.g. habitual - based on habit and routine, normative - based on obligation, or continuance commitment - based on employees' assessing "gain and losses" in case of leaving the organization), according to Mercurio (2015), the central and enduring characteristic of OC is the affective bond. Emotionally committed individuals believe in and accept organizational goals and values as theirs, and hence are willing to provide considerable effort on their behalf and remain in their organizations (Mercurio, 2015; John & al., 2019). Therefore, if hospitality managers want to positively influence employees' "emotional bond to the organization" (affective OC), its "prerequisites" must be identified.

Corporate Social Responsibility (CSR) can be understood as all decisions of an organization that go beyond its economic and technical interests (Carroll, 2015). The most commonly used and cited concept of CSR (e.g. Bauman & Skitka, 2012; Farooq, Farooq & Jasimuddin, 2014; Kim, Song & Lee, 2016; Kim & al., 2017; Zhang, Oo & Lim, 2019) is the model defined for the first time in 1979 by Carroll (1991, 2015, 2016). Carroll (1991, 2015, 2016) proposed a four-level CSR model that includes the economic, legal, ethical and discretionary (later referred to as philanthropic) level (dimension) of social responsibility. The fundamental level of CSR is economic responsibility, which is based on the very nature of the organization's existence. In its absence, all the other dimensions of social responsibility become irrelevant. The legal level reflects society's "legalized" ethical rules. By the ethical responsibility, society continually increases demands on the organization's behaviour beyond the limits set by the law and at the same time "pushes" their expansion. The distinguishing feature between the ethical and philanthropic responsibility is that society does not expect ethical or moral

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significance from philanthropic activities. The society wants organizations to contribute their monetary or other resources to humanitarian purposes or projects. However, organizations are not considered unethical if they do not provide the expected amount of their means or finances (Carroll, 1991, 2015).

According to CSR theory, an organization must satisfy the needs and desires of different groups of people (stakeholders) who would otherwise stop supporting or could not support the organization. Organizational stakeholders typically include customers, employees, investors, suppliers, and the community. The list of stakeholders may vary for each organization, but it is widely accepted that employees belong to the organization's key stakeholders. Their interest may be a legal claim, such as a fulfilment of contractual terms (legal dimension of CSR) or at other times, a moral claim, such as the employee's ability to express his or her own opinions (ethical dimension of CSR) (Carroll, 1991, 2015, 2016).

This interpretation of CSR is surely in line with motivational theories (e.g. Maslow, 1943; Deci & Ryan, 2000), Self-Categorization Theory (SCT) or Social Identity Theory (SIT); as many scholars confirm the important role of individual CSR components or activities as motivation drivers or "prerequisites" for meeting employees' needs, improving the quality of their working lives and strengthening the psychological bond between the organization and its employees (e.g. Cycyota, Ferrante & Schroeder, 2016; Kim & al., 2017; Youn, Lee & Lee, 2018; Graves, Sarkis & Gold, 2019; John & al., 2019).

Thereupon, inspirited by Carroll's four-dimensional CSR concept (Carroll, 1991, 2015, 2016), the purpose of this paper is to identify those CSR dimensions (economic, legal, ethical, and philanthropic) which play a significant role in hospitality industry employees' OC (affective OC); as using the right CSR components or activities might be one of the ways how to retain enthusiastic, skilled, and committed employees who strive for excellence and represent a competitive advantage.

Hence this paper proposes the following hypothesis:

Hypothesis: Perceived CSR (economic, legal, ethical, and philanthropic dimension) by hospitality industry employees has a positive direct influence on their organizational commitment.

2 Methods

To analyse the relationship between perceived CSR by hospitality industry employees and their OC, the four-dimension/factor (altogether 31 items) concept of CSR by Carroll (2015, 2016), and the OC concept (altogether 5 items) were used. Both concepts/constructs were adjusted for this research and included altogether 36 items converted into questions/statements like e.g. "The organization, which I work for, has a remuneration system based on performance" (CSR, economic dimension), "Employer-employee contractual obligations are always honoured by the organization which I work for" (CSR, legal dimension), "The organization, which I work for, responds to every employee complaint" (CSR, ethical dimension), and "The organization, which I work for, contributes to the well-being of the local community (society) by cooperating with governmental and/or non-governmental organizations" (CSR, philanthropic dimension). Construct on OC contained questions such as "I accept the organization's future fate as mine" or "I consider the organization, which I work for, as a workplace for my whole working life". Respondents were requested to answer these questions/statements by choosing an adequate level of their agreement on the 7-point Likert scale, ranging from strong disagreement (1 point) to strong agreement (point 7). Besides the questions on CSR and OC, respondents were asked to answer 8 questions on demographics, using the best fitting option from given alternatives.

As the paper aims to analyse the causal relationship between CSR perceived by hospitality industry employees and their OC; small and medium-size hotels (ranked by 4*) situated in Prague, the Czech Republic were considered the most suitable since these accommodation providers need to meet high-quality service standard requirements and challenge the financial disadvantages derived from their size. Thus, the final list of 24 enterprises was retrieved from the official web pages of the Trivago accommodation search engine (Trivago, 2019).

The data collection process was carried out between the month of August 2019 and December 2019 by the author of this paper. The paper-based questionnaire was selected as the best option for collecting the data and was administered in person to volunteering employees during their shift change after gaining the consensus from the management or owners of the particular enterprise. The approximate time for questionnaire completion was 20 minutes. Hence, the final sample consists of 411 respondents (N = 411), which was considered satisfactory (Robinson & al., 2014, Hanaysha & Tahir, 2016, Kim & al., 2017).

For the analysis, the IBM SPSS Statistics program was used. First, descriptive statistics were employed to investigate the demographic characteristic of the respondents. Second, factor analysis was applied for factor/dimension reductions. Third, Cronbach's alpha was used to investigate the factors' internal consistency reliability. Fourth, regression analysis

was used to identify relations between variables and to test the hypothesis. Before conducting the research, the questionnaire and analysis fit was tested on 20 respondents.

3 Research results

3.1 Demographic characteristics of the respondents

The sample consisted of 411 respondents in total, with males representing 47.9 % (N=197) and females representing 52.1% (N=214). Based on the age, the respondents were segmented into the following 5 subgroups: 1. less than 25 years old - 34.8% (N=143), 2. between 25 and 35 years old – 27.3% (N=112), 3. between 35 and 45 years old - 19.5% (N=80), 4. between 45 and 55 years old - 10.5% (N=43) and 5. 55 and above - 8.0% (N=33). Out of the total (N=411), 175 respondents (42.6%) were without a partner or single and 236 respondents were married or with a partner (57.4%). 175 respondents had one or more children (42.6%), while 236 respondents, which is 57.4% out of the total, had no children. 30 respondents (7.3%) received primary education, 35.8% (N=147) received secondary education and 82 respondents (20.0%) completed higher education with ;a DIS degree. 99 respondents, which is 24.1% completed university education obtaining a Bachelor's degree, while 12.9% of respondents (N= 53) completed university education with a Master's degree. The majority of respondents, which is 303 (73.7%), has a full-time working status, while 108 respondents (26.3%) work part-time. A minority of respondents (N=37.9,0%) work on managerial positions (department managers), 61 respondents (14.8%) work as "team leaders" or shift managers, and 313 respondents, which is 76.2%, marked "staff" as their working positions. Lastly, all respondents were sub-grouped into 13 categories based on the working field: 1. Human Resources - 21 respondents (5.1%), 2. Economic/Operating Unit - 14 respondents (3.4%), 3. Marketing - 22 respondents (5.4%), 4. Food and Beverages Production - 64 respondents (15.6%), 5. Restaurant and Bar Operations - 67 respondents (16.3%), 6. Store - 15 respondents (3.6%), 7. Customer Service and Reservations - 118 respondents (28.7%), 8. Housekeeping - 15 respondents (3.6%), 9. Laundry - 16 respondents (3.9%), 10. IT - 25 respondents (6.1%), 11. Maintenance - 15 respondents (3.6%), 12. Security - 10 respondents (2.4%) and 13. Entertainment and Wellness - 9 respondents (2.2%).

3.2 Variability and reliability test

The factor analysis (Principal Components Analysis) investigated the variability of 5 factors (composite variables), i.e. the economic dimension of CSR (independent composite variable), the legal dimension of CSR (independent composite variable), the ethical dimension of CSR (independent composite variable), the philanthropic dimension of CSR (independent composite variable), and OC (dependent composite variable). Tabachnick and Fidell (2007) follow Comrey and Lee (1992) in suggesting using more stringent cut-offs for factor loadings going from 0.32 (**poor**), 0.45 (**fair**), 0.55 (**good**), 0.63 (**very good**) to 0.71 (**excellent**). Thus, the threshold for all factor loadings was set at 0.63. Cronbach's alpha was used to investigate the internal consistency among the items of each factor. Cronbach's alpha for the economic dimension of CSR after excluding 5 items equalled 0.875 (7 items). Cronbach's alpha for the legal dimension of CSR equalled 0.850 (4 items). Cronbach's alpha for the ethical dimension of CSR after excluding 3 items equalled 0.902 (7 items). Cronbach's alpha for the philanthropic dimension of CSR after excluding 2 items equalled 0.891 (2 items), while the Cronbach's alpha for OC after 2 items reduction equalled 0.936 (3items). In social scientific research, Cronbach's alpha coefficient of 0.600 and higher is admitted as satisfactory (Kim & al., 2015), therefore all the Cronbach's alpha coefficients are well above the minimum requirement and are thus satisfactory.

Data suitability assumptions (KMO, Bartlett's test of sphericity, correlation analysis) and linear regression analysis model fit (ANOVA, residuals statistics, correlation analysis, Shapiro-Wilk test of normality) were assessed on the level of significance $p < 0.05$.

3.3 Hypothesis test

The effect of perceived CSR by hospitality industry employees on their organizational commitment:
The effect of the independent variables (economic, legal, ethical and philanthropic dimension of the CSR) upon the dependent variable (OC) has R^2 of .392 with F of 65.476 ($p < .001$) to be significant (Table 1). The perceived economic dimension of CSR by hospitality industry employees has an insignificantly negative influence on their OC with $\beta = -0.025$ ($p < .691$). The perceived legal dimension of CSR by hospitality industry employees has a significantly positive influence on their OC with $\beta = .220$ ($p < .001$). The perceived ethical dimension of CSR by hospitality industry employees has a significantly positive influence on their job satisfaction with $\beta = .356$ ($p < .001$). The perceived philanthropic dimension of CSR by hospitality industry employees has a significantly positive influence on their job satisfaction with $\beta = .238$ ($p < .001$) (Table 1, Table 2).

Thus, the hypothesis "Perceived CSR (economic, legal, ethical, and philanthropic dimension) by hospitality industry employees has a positive direct influence on their organizational commitment" has been partially confirmed ($p < .001$).

Table 1 Regression analysis for CSR and OC

	Regression analysis for dependent variable: OC					
	R= .62620271 R2= .39212983 Adjusted R2= .38614097					
	F (4.406) = 65.476 p< .00000 Standard error of estimate: 2.9852					
N=411	ß	Standard error of ß	b	Standard error of b	t (406)	p-value
Constant			-1.78694	1.077498	-1.65842	0.098005
Economic	-0.025107	0.063068	-0.01711	0.042992	-0.39810	0.690768
Legal	0.220332	0.056754	0.26200	0.067487	3.88222	0.000121
Ethical	0.356546	0.048831	0.17562	0.024052	7.30166	0.000000
Philanthropic	0.238528	0.047615	0.45230	0.090287	5.00955	0.000001

Source: Own processing

Table 2 Partial correlation coefficients: CSR and OC

	Regression analysis for dependent variable: OC					
	Independent variables: Economic, Legal, Ethical, Philanthropic dimension					
N=411	ß	Partial correlation	Semi part.correlation	Tolerance	t (406)	R ˆ2
Economic	-0.025107	-0.019753	-0.015404	0.376420	-0.398097	0.623580
Legal	0.220332	0.189192	0.150218	0.464826	3.882224	0.535174
Ethical	0.356546	0.340696	0.282529	0.627908	7.301656	0.372092
Philanthropic	0.238528	0.241275	0.193839	0.660392	5.009547	0.339608

Source: Own processing

4 Discussion and Conclusions

The above-outlined results indicate a significant positive influence of CSR on employees' OC. However, not all four dimensions of CSR (economic, legal, ethical, and philanthropic) play the same role in stipulating the desired employees' behaviour outcome - OC.

39% (R2 = .3921, Adjusted R2 = .3861, p < .001, Tab. 1) of employees' OC could be explained by ethical (β = .356, partial correlation coefficient = .340, p <.001, Tab. 1, Tab. 2), philanthropic (β = .238, partial correlation coefficient = .241, p < .001, Tab. 1, Tab. 2), and legal (β= .220, partial correlation coefficient = .189, p < .001, Table 1, Table 2) dimension of CSR. The majority of the CSR influence could be explained by the ethical dimension. This result is in line with current research findings on CSR and employees (e.g. Kim & al., 2017; John & al., 2019). In general, employees like to be treated with fairness and dignity (e.g. transparent performance evaluation or application of antidiscrimination policies), having the opportunity to express themselves freely and take part in open discussions (e.g. presenting employees with adequate information or two-way symmetrical communication). Also, the findings of this paper claim that the legal dimension of CSR (practices like e.g. organizations' compliance with employment-related laws and regulations - safety procedures, health, and social insurance contribution) has a significant positive influence on OC, which is as well in line with the results presented by other researchers (e.g. Kim & al., 2017; John & al., 2019). Thus, ethical and legal CSR dimensions play a vital role in stimulating employees' loyalty or commitment. Employees like to relate to those organizations, which are trustworthy, reputable and compatible with their own values. According to Social Identity Theory (SIT) or Self-Categorization Theory (SCT), employees like to associate their own identity with the social status and reputation of the organization they work for (Graves, Sarkis & Gold, 2019; John et al., 2019). Similarly, if the organization treats its employees with dignity and appreciation, they like to reciprocate likewise (Peterson, 2004). Consequently, organizations' engagement in meaningful and substantive CSR activities, such as addressing significant social and environmental issues (philanthropic CSR dimension), could determine the level of employees' organizational engagement and commitment; fulfilling their psychological desires and meaningful existence (Maslow, 1943; Deci & Ryan 1985, 2000).

In contrast, viewing the CSR activities as symbolic, superficial or insincere (e.g. green washing, social washing) by employees leads to no positive or negative individual behaviour outcomes (e.g. low level of organizational commitment, shirking behaviour or employee cynicism) (Donia & Tetrault Sirsly, 2016). Additionally, the results also indicate that the economic dimension of CSR (e.g. tangible benefits, competitive wages or organizations long-term strategy) plays no role in employees' bond or loyalty to the organization. This finding is following the results of the qualitative examination of employee turnover intentions carried out by Yang, Wan and Fu (2012).

Therefore, this paper proposes that an organization's fair and honourable behaviour, law compliance and pursuing meaningful philanthropic activities have the potential to increase employees' adherence and loyalty, and consequently diminish their intentions to leave. In line with Yang (2010), this study confirms that affective commitment is a powerful contributor to turnover intentions.

References

Bauman, Ch. W. & Skitka, L. J. (2012). Corporate social responsibility as a source of employee satisfaction. *Research in organizational Behavior*, 32, 63-86. doi:10.1016/j.riob.2012.11.002

Carroll, A. B. (1991). The Pyramid of Corporate Social Responsibility: Toward the Moral Management of Organizational Stakeholders. *Business Horizons*, 34(4), 39-48. doi:10.1016/0007-6813(91)90005-G

Carroll, A. B. (2015). Corporate social responsibility: The centrepiece of competing and complementary frameworks. *Organizational Dynamics*, 44, 87-96. doi: 10.1016/j.orgdyn.2015.02.002

Carroll, A. B. (2016). Carroll's pyramid of CSR: taking another look. *International Journal of Corporate Social Responsibility,* 1(3). doi: 10.1186/s40991-016-0004-6

Comrey, A. L. & Lee, H. B. (1992). *A first course in factor analysis* (2nd edition). Hillsdale, NJ: Lawrence Erlaum Associates.

Cycyota, C. S., Ferrante, C. J. & Schroeder, J. M. (2016). Corporate social responsibility and employee volunteerism: What do the best companies do? *Business Horizons*, 59, 321-329. doi:10.1016/j.bushor.2016.01.004

ČSÚ (2019). Český statistický úřad (Czech Statistical Office). Retrieved from https://www.czso.cz/csu/czso/cestovni_ruch [30th Nov. 2019]

ČSÚ (2020). Český statistický úřad (Czech Statistical Office). Retrieved from https://www.czso.cz/csu/czso/cestovni_ruch [31st March, 2020]

Deci, E. L. & Ryan, R. M. (1985). *Intrinsic Motivation and Self-determination in Human Behavior*. Plenum: New York.

Deci, E. L. & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: human needs and the self-determination of behavior. *Psychological. Inquiry*, 11, 227-268. doi: 10.1207/S15327965PLI1104_01

Donia, M. B. L. & Tetrault Sirsly, C.A. (2016). Determinants and consequences of employee attributions of corporate social responsibility as substantive or symbolic. European Management Journal, 34, pp. 232 - 242.

Farooq, M., Farooq, O. & Jasimuddin, S. M. (2014). Employee's response to corporate social responsibility: exploring the role of employees collectivist orientation. *European Management Journal*, 32, 916-927. doi: 10.1016/j.emj.2014.03.002

Graves, L. M., Sarkis, J. & Gold, N. (2019). Employee pro-environmental behaviour in Russia: The roles of top management commitment, managerial leadership, and employee motives. *Resource, Conservation and Recycling*, 140, 54-64. doi:10.1108/IJM-07-2019-0347

Hanaysha, J. & Tahir, P. R. (2016). Examining the Effects of Employee Empowerment, Teamwork, and Employee Training on Job Satisfaction. *Procedia - Social and Behavioral Sciences*, 219, 272-282.

John, A., Qadeer, F., Shahzadi, G. & Jia, F. (2019). Getting paid to be good: How and when employees respond to corporate social responsibility? *Journal of Cleaner Production*, 215, 784-795. doi:10.1016/j.jclepro.2019.01.074

Kim, J. J., Eom, T. K., Kim, S.W. & Youn, M. K. (2015). Effects of ethical management on job satisfaction and turnover in the South Korean service industry. *International Journal of Industrial Distribution and Business*, 6(1), 17-26. doi: 10.13106/ijidb.2015.vol6.no1.17

Kim, J., Song, H. J. & Lee, Ch. K. (2016). Effects of corporate social responsibility and internal marketing on organizational commitment and turnover intentions. *International Journal of Hospitality Management*, 55, 25-32. doi: 10.1016/j.ijhm.2016.02.007

Kim, H. L., Rhou, Y., Uysal, M. & Kwon, N. (2017). An examination of the links between corporate social responsibility (CSR) and its internal consequences. *International Journal of Hospitality Management*, 61, 26-34. doi: 10.1016/j.ijhm.2016.10.011

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, 50, 370-396. doi: 10.1037/h0054346

Mercurio, Z. A. (2015). Affective Commitment as a Core Essence of Organizational Commitment. An Integrative Literature Review. *Human Resource Development Review,* 14 (4), 389-414. doi:

10.1177/1534484315603612

Peterson, D. K. (2004). The relationship between perceptions of corporate citizenship and organizational commitment. *Business Society,* 43(3), 296-319. doi: 0.1177/0007650304268065

Robinson, R. N. S., Kralj, A., Solnet, D. J., Goh, E. & Callan, V. (2014). Thinking job embeddedness not turnover: Towards a better understanding of frontline hotel worker retention. *International Journal of Hospitality Management*, 36, 101-109.

Tabachnick, B. G. & Fidell, L. S. (2007). *Using multivariate statistics* (5th edition). Pearson Education Inc.

Trivago (2019). *Trivago. cz* [Online]. https://www.trivago.cz/ [30th Nov., 2019]

Yang, J. T. (2010). Antecedents and consequencesofjobsatisfaction in the hotel industry. *International JournalofHospitality Management,* 29, 609-619.

Yang, J. T., Wan, C. S. & Fu, Y. J. (2012). Qualitative examination of employee turnover and retention strategies in international tourist hotels in Taiwan. *International Journal of Hospitality Management*, 31, 837-848.

Yao, T., Qiu, Q. & Wei, Y. (2019). Retaining hotel employees as internal customers: Effect of organizational commitment on attitudinal and behavioral loyalty of employees. *International Journal of Hospitality Management*, 76, 1-8. doi: 10.1016/j.ijhm.2018.03.018

Youn, H., Lee, K. & Lee, S. (2018). Effects of corporate social responsibility on employees in the casino industry. *Tourism Management*, 68, 328-335. doi: 10.1016/j.tourman.2018.03.018

Zhang, Q., Oo, B. L. & Lim, B. T. H. (2019). Drivers, motivations, and barriers to the implementation of corporate social responsibility practices by construction enterprises: A review. *Journal of Cleaner Production*, 210, 563-584. doi: 10.1016/j.jclepro.2018.11.050

The Role of Strategic Planning in SMEs in Times of Turbulent Changes: Perspective of Czech Retail Enterprises

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Abstract: Organizations everywhere, of all types and sizes, are under constant pressure to improve their business performance. Strategic planning consists of integrated decisions, actions or plans that will help to achieve target goals. In this research study, strategic planning was investigated as factor influencing the business success of retail enterprises. The objective of the paper is to investigate the effect of strategic planning of Czech retail enterprises on their business success. The strategic planning in Czech retail enterprises has been researched with the method of oral questioning, and the main instrument was a questionnaire. The sample consisted of 362 Czech retail enterprises which are located in the Czech Republic.

Keywords: strategic planning, strategy, business success, retail enterprises, strategic decisions.

JEL Classification: L20, L81, M10

1 Introduction

The success of a business doesn't happen by accident, it requires careful thought and planning. Business performance, innovativeness, proactiveness, risk-taking, competitive aggressiveness, and competitive scope and autonomy are the crucial factors to ensure the success of the business (Arshad et al., 2014). A key component of business planning involves the development and implementation of specific business strategies. In this research study, strategic planning was investigated as factor influencing the business success of retail enterprises. This paper offers several contributions to strategic planning research and attempts to answer calls for studies that span across the disciplines. In particular, the paper pays attention to the key role of the strategic planning for achieving business success. Although we use a single small country, the Czech Republic, as a laboratory to test our theoretical propositions, our study is situated within the domain of business studies, since its focus is on the effects of the strategie planning on the success of entrepreneurial activities. We offer a new angle on a business theory by focusing on the effects of the strategic planning on the success of business activities in markets. Our study helps to advance the theoretical development of the role of the strategic planning in entrepreneurial activities of retail enterprises.

Various empirical studies have been done to investigate the relationship between strategic planning and enterprise success with varied conclusions. The objective of this paper is to investigate the effect of strategic planning in Czech retail enterprises on business success. The ambition is to answer the central research question: "How affect strategic planning achieve business success"? In this research study, strategic planning is investigated as factors influencing the success of entrepreneurial activities of retail enterprises. The study is based on primary data collected from a recent survey of Czech retail enterprises. The relationships are analyzed using relevant regression techniques. The paper is organized into three parts. The first part of the paper outlines selected theories dealing with the strategic planning, and business strategy. The second part of the paper aims to present and then interpret the results of the survey carried out among Czech retail enterprises. Finally, the last section provides the conclusion of the research and offers a discussion of the most important implications. The results of the analysis are discussed, and further recommendations are provided for managers in the last section.

2 Theoretical Background

We can say, that the success of the business of many companies depends above all on their performance. One of the fundamental questions in the field of business performance is how companies achieve and sustain competitive advantages and pursue the success of the business. A fundamental premise in management literature is that the application of a strategic planning leads to improved company performance and competitiveness. According to Aaltonen and Ikåvalko (2002), the outcome of all of the company´s operations and strategies is company performance. Strategic planning is a set of managerial decisions and actions, and these decisions determine the long-term performance of business entities

(Peleckis 2015; Tseng & Hung, 2014; Şentürk, 2012) and company strategy. The effectiveness of the strategic development plans is important to achieve a competitive advantage for the enterprises (Sertyesilisik 2006). The organization sets effective strategies by considering where the organization has come from, what it has learned, and where it is going. The includes consideration of the context in which it operates, knowledge of customer groups and market segments, past performance, discharge of legal responsibilities and minimization of harm. Companies practically apply the strategy seriously as a tool that can be utilized to fast track their performances. The strategy is a process that can allow an organization to concentrate its resources on optimal opportunities with the objectives of increasing sales and achieving a sustainable competitive advantage (Kotler, 2012). Strategic decisions are long-term decisions in in accordance with company strategy, company mission, and vision. Thus, the following hypothesis is formulated:

Hypothesis 1: Strategy (a) and strategic objectives (b) are positively related to business success.

With the increase in competition, the competitive advantage becomes even more important for the sustainability of the companies. The essence of optimal strategic planning making is to build a market position strong enough and an organization capable enough to produce successful performance despite potent competition and internal difficulties. A success company continually reinvents strategies to gain better performance and competitive advantages in today´s dynamic competition. Strategic decisions involve a change of major kind since an organization operates in the global business environment. In the globally competitive environment, strategic planning is essential for enterprises to develop competitiveness and market potential. Strategic decisions deal with harmonizing organizational resource capabilities with the threats and opportunities. Crowley and Bourke (2018) have analyzed the external and internal factors of enterprises that enhance the strategic planning outcomes and develop entrepeneurial activities. According to Antlová (2015) very needed is co-creation not only in a trend of jointly creating products but also in cooperative work with regional and international companies. Antlová (2015) suggests a cooperative work model in order to accumulate and use knowledge primarily using knowledge creation and transfer processes, to create value in long-range plans. It describes a movement away from the internal environment of a company to an external one. Thus, the following hypothesis is formulated:

Hypothesis 2: External environment (a) and internal environment (b) are positively related to business success.

When a company has the permanent competitive advantage, its resources and capabilities are durable, hard to identify and hard to copy. A business strategy is a set of fundamental choices and decisions, which define its long-term objectives, its value proposition on the market, how it intends to build and sustain a competitive business system and how it organizes itself. The achievement of strategic objectives can be affected by many change factors. Greenley (1986) noted that strategic planning has potential advantages and intrinsic values that eventually, translate into improved company performance. Ritala et al. (2018) examine the diversity of sustainable business models adopted by the companies. To be competitive in the twenty-first century, companies need to continuously improve and perform to an excellent standard to improve quality and performance. Thus, the following hypothesis is formulated:

Hypothesis 3: Change of strategy (a), communication of strategy (b), and improvements of strategy (c) are positively related to business success.

3 Methods

The analysis is based on the data from a standardized empirical study, which comprises of research questions on the management of Czech enterprises. To analyse the management of Czech retail enterprises, some questions of the impact of strategic planning on business success of Czech retail enterprises we asked in the survey. The objective of the paper is to investigate the effect of strategic planning in Czech retail enterprises on their business success. The research was carried out in the Czech Republic between October 2018 and January 2020. The strategic planning in Czech retail enterprises has been researched with the method of oral questioning, and the main instrument was a questionnaire. The research design is based on the collection of primary data from top managers of selected Czech retail enterprises. The sample consisted of 362 Czech retail enterprises which are located in the Czech Republic. The enterprises under research were selected with the method of non-probability purposive sampling, or more precisely by assumption and occasional selection. The enterprises included in the study are incorporated in the Czech Republic, and all of them are private enterprises.

The structured questionnaire contained two fields of varying degrees of complexity relating to the area of strategic management. The questionnaire consists of closed, semi-closed and open questions. The questions are based on information offered via personal communication with selected business and university experts, any by former researchers. In some questions, simple and complex scales were used, mostly the Likert-type scale (5 = strongly agree to 1 = strongly disagree). The questionnaire was pre-tested for instrument validity with 20 participants-managers who were asked to

respond to the items measuring the theoretical construct. These participants were also asked to identify any ambiguities that may reveal in the questionnaire draft. Based on their feedback, some minor changes in wording were made.

Due to a relatively low response rate in email surveys in the Czech Republic, and because most Czech managers fear that revealing the corporate data is putting their organizations at security risks, it was necessary to make use of a high level of personal involvement consisting of telephone calls, personal distribution of and collecting questionnaires. First, telephone calls were placed to general managers or CEOs of the Czech retail enterprises to explain the purpose of the study and to request their participation, after those questionnaires were hand-distributed to the general managers and CEOs. Trained research assistants helped the managers and CEOs complete the questionnaire, and explained any items that the respondents wished to have clarified. This procedure resulted in 400 matched questionnaires, of which 38 were eliminated because some responses were incomplete. Thus 362 (a response rate of 90.5%) questionnaires were used in the subsequent data analysis and statistical processing. The representativeness of the research sample was verified by using the criterion of territorial representation of businesses in the present research. The representativeness of the research sample was also verified by a chi-square test. Based on the level of significance $\alpha = 0.05$, the p-value accounted for 0.128, which means that the research sample was representative concerning the location of the business unit.

The dependent variable **business success** was measured by subjective ratings. We asked the respondents to evaluate the present enterprise performance and its performance 3 years ago, relative to other retail enterprises in the same industry, using a five-item, five-point Likert type measure adopted for this study. The question was "The present enterprise strategy can be characterized as successful and fulfilling enterprise objectives, and enabling the achievement of long-term sustainable competitive advantage and had a positive impact on turnaround over the last 3 years: (1=totally disagree; 5=totally agree)". The Cronbach´s α of this measure was 0.84. The mean rating by top managers was 4.02, with a standard deviation of 0.819. The independents variables (strategy, objectives, enternal environment, internal environment, change of strategy, communication of strategy, improvements of strategy) were measured by subjective indicators included using a five-item, five-point Likert type measure adopted for this study (1=totally disagree; 5=totally agree). Guided by current research and empirical evidence, we have included several control variables. Among the enterprise-level determinants of performance, the enterprise´s size and enterprise age are the two widely used demographic characteristics of enterprises. Therefore, we include enterprise size (which is measured as the natural logarithm of the number of employees) and enterprise age (in years). Statistical organizations classify enterprises by a wide range of variables such as sales revenues and the number of employees. This research study follows the conventional European idea that the size of enterprises is defined according to EU norms. An enterprise, which has 1 to 9 employees and 2 million euro of turnover per year, is referred to as a microenterprise. An enterprise, which has 10 to 49 employees and at most 10 million euros of turnover per year, is called a small enterprise. An enterprise, which has 50 to 249 employees and at most 50 million euros of turnover per year, is called a medium enterprise. An enterprise, which has more than 250 employees and more than 50 million euros of turnover per year, is called a large enterprise. In line with this, we classify our research sample by the number of employees so that 35.9 % of the sample consists of microenterprises and 37.4 % small enterprises, and 26.7 % of medium ones. The average enterprise age of the respondents is 17 years.

4 Research results

The data obtained from the empirical research on a selected sample of 480 enterprises were processed by SPSS. The analysis began by examining the correlation between variables. All variables were screened to reveal their distribution through Pearson correlation coefficients deviations for the variables (Tab 1). Table 1 presents the summary statistics of all variables, and correlations for the variables. Correlations were obtained from the Pearson Correlations Matrix are shown in Table 1, the values indicating intercorrelations among the predictor's variables were low, ranging from 0.181 to 0.613 (p < 0.05), thus indicating the independence of the variables used for measuring the predictors. Since the descriptive data revealed a promising variation as well as the correlation among the variables included in the model, the results seem to support the hypotheses. The second phase of research includes the analytical method: Hierarchical Regression Analysis.

Table 1 Descriptive Statistic and Correlation Analysis

Variable	mean	SD	1	2	3	4	5	6	7	8	9	10
Success	4.03	0.792	1									
Size	42.29	55.701	-0.057	1								
Age	17.29	20.874	0.022	0.245**	1							
Strategy	4.24	0.700	0.504**	-0.063	0.085	1						
Objectives	4.28	0.734	0.419*	-0.020	0.058	0.613**	1					
External env.	3.98	0.848	0.335**	0.005	-0.256**	0.296**	0.305**	1				
Internal env.	3.89	0.821	0.323	0.007	-0.054	0.411**	0.364**	0.430**	1			
Changes	3.77	0.957	0.316*	-0.068	-0.172*	0.321**	0.160*	0.389**	0.181**	1		
Communication	3.44	0.995	0.227	-0.069	0.015	0.313**	0.199**	0.237**	0.245**	0.393**	1	
Improvements	3.81	0.941	0.367*	-0.012	0.140*	0.370**	0.399**	0.318**	0.350**	0.372**	0.323**	1

$*p < 0.05; **p < 0.01$
Source: Developed by authors

Hierarchical regression has been used to test the hypotheses with business success as the dependent variable. We tested the impact of strategy, objectives, enternal environment, internal environment, change of strategy, communication of strategy, and improvements of strategy on business success of retail enterprises, controlling for enterprise size, and enterprise age. The results of the analyses are presented in Table 2.

We entered the control variables as the first block, Model 1. The regression equation in Model 1 is not statistically significant (F = 1.844, p > 0.05). Model 1 in Table 2 shows that none of the selected control variables is not significantly associated with the business success of Czech retail enterprises. The independent variables (strategy, objectives) were entered into the regression as the second block, Model 2. The incremental explanatory prediction on business success was significant in the regression, ΔR2 was 0.287. The regression equation in Model 2 is statistically significant (F = 33.989, p < 0.01). The independent variables explain 30.1 % of the variance in Model 2. The multicollinearity test showed that the VIF of independent variables in the final model ranged from 1.089 to 2.154 and the factor of tolerance range from 0.764 to 0.918. These values indicate no serious problems with multicollinearity. Hypothesis 1 claiming that the strategy (a) and objectives (b) are positively related to business success was supported.

Table 2 Regression Results for International Performance

	Model 1	Model 2	Model 3	Model 4
Size	0.002(0.001)	0.001(0.001)	0.001(0.001)	0.001(0.001)
Age	-0.002(0.002)	-0.003(0.002)	-0.002(0.002)	-0.002(0.002)
Strategy H1a		0.472(0.068)**	0.407(0.070)**	0.355(0.072)**
Objectives H1b		0.196(0.063)*	0.146(0.063)*	0.133(0.064)*
External environment H2a			0.166(0.050)*	0.111(0.052)*
Internal environment H2b			0.060(0.052)	0.050(0.052)
Changes H3a				0.092(0.045)*
Communication H3b				0.010(0.039)
Improvements H3c				0.104(0.048)*
Model R^2	0.014	0.301	0.336	0.348
ΔR^2	0.014	0.287	0.035	0.012
F	1.844	33.989**	26.346**	19.438**

[a] Unstandardized coefficients are reported, with standard errors in brackets. The changes in R^2 in Models 2-3 are in comparison with the value of R^2 in the model to their left.
Value of Durbin-Watson is 1.936
$*p < 0.05; **p < 0.01.$
Source: Developed by authors

The independent variables (external environment, internal environment) were entered into the regression as the third block, Model 3. The incremental explanatory prediction on business success was significant in the regression, ΔR2 was 0.035. The regression equation in Model 3 is statistically significant (F = 26.346, p < 0.01). The independent variables explain 33.6 % of the variance in Model 3. The multicollinearity test showed that the VIF of independent variables in the final model ranged from 1.180 to 2.355 and the factor of tolerance range from 0.864 to 0.950. These values indicate no serious problems with multicollinearity. Hypothesis 2 claiming that the external environment (a) and internal environment (b) are positively related to business success was partially confirmed.

The independent variables (changes of strategy, communication of strategy, improvements of strategy) were entered into the regression as the fourth block, Model 4. The incremental explanatory prediction on business success was significant in the regression, ΔR2 was 0.012. The regression equation in Model 4 is statistically significant (F = 19.438, p < 0.01). The independent variables explain 34.8 % of the variance in Model 4. The multicollinearity test showed that the

VIF of independent variables in the final model ranged from 1.280 to 2.365 and the factor of tolerance range from 0.764 to 0.958. These values indicate no serious problems with multicollinearity. Hypothesis 3 claiming that the changes of strategy (a), communication of strategy (b), and improvements of strategy (c) are positively related to business success was partially confirmed.

5 Conclusions

We can say, that there is a significant relationship between a strategic planning and business performance of small and medium-sized enterprises. According to Chaffee (1985), the strategic planning is the determination of the primary long-term goals of the enterprises, and the adoption of courses of action and allocation of resources necessary for carrying out these goals.

The study contributes to our understanding of the relationships between strategic planning and business success. Our study informs enterprise performance research by examining the effects of selected factors on the relationship between strategic planning and business success. We hypothesized that there are positive relations between strategy and objectives, and business success. The first hypothesis was confirmed. The second hypothesis that enternal environment and internal environment to have positive relationships with business success was confirmed partially. The third hypothesis concerning the relationship between change of strategy, communication of strategy, and improvement of strategy and business success was partially confirmed.

It is important to note some of the limitations of the research. First, the findings may apply mostly to medium-sized companies and large enterprises. The authors do not claim that the results would apply to microenterprises and small enterprises. Moreover, the research model can be redesigned by adding some other variables which are taught to antecedents of business strategy and company performance.

Several other implications also emerge from the research study findings. For business researchers, the results suggest that investigation of the decision-making process in a single activity provides the best and multifaceted picture of multinational managerial decisions. The paper contains information on the entrepreneurial activities of Czech companies. There appear to be some potential areas for further research work such as performance in Czech market. The research could be focused on activity located in one region of the world with a good deal of variation regarding market size, growth rates, levels of development, openness, tax rates, and other features.

References

Aaltonen, P., & Ikåvalko, H. (2002). Implementing Strategies Successfully. *Integrated Manufacturing Systems*, 13(6), 415-18.

Antlová, K. (2015). Agility Approach in Innovation Projects. *Proceedings of the 12th International Conference Liberec Economic Forum 2015*. Liberec, Technical University of Liberec, 236-243.

Arshad, A.Z., Rasli, A., Arshad, A.A., & Zain, Z.M. (2014) The impact of Entrepreneurial Orientation on Business Performance: A Study of Technology-based SMEs in Malaysia. *Procedia – Social and Behavioral Sciences*, 130, 46-53.

Chaffee, E. E. (1985). Three Models of Strategy. *The Academy of Management Review*, 10(1), 89-98.

Crowley F., & Bourke, J. (2018). The Influence of the Manager on Firm Innovation in Emerging Economies. *International Journal of Innovation Management*, 22(3).

Greenley, G. (1986). Does Strategic Planning Improve Company Performance? *Long Range Planning*, 19(2), April, 101-109.

Kotler, P. (2012), *Kotler on Marketing*. Simon & Schuster.

Peleckis, K. (2015). Strategic Management Schools and Business Negotiation Strategy of Company Operations. *Economics and Management. Ekonomia I Zarzadzanie*, 7(2), 26-34.

Ritala, P. et al. (2018). Sustainable business model adoption among S&P 500 firms: A longitudinal content analysis study. *Journal of Cleaner Production*, 170, 216-226.

Şentürk, F.K. (2012). A Study to Determine the Usage of Strategic Management Tools in the Hotel Industry. *Procedia-Social and Behavioral Sciences*, 58, 11-18.

Sertyesilisik, B. (2006). The effectiveness of the five-year development plans of the development of the construction sector. *22nd Annual ARCOM Conference*, United Kingdom, 583-590.

Tseng, S.C., & Hung, S.W. (2014). A strategic decision-making model considering the social costs of carbon dioxide emissions for sustainably supply chain management. *Journal of Environmental Management*, 133, 315-32

Location of a firm as a determinant of its capital structure

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Abstract: Unambiguous conclusions of geography of finance admit, that there is geographical variation in access to finance. Firms from periphery may suffer from shortage of external capital, especially of bank loans. This paper gives empirical support for this statement using panel dataset of 956 firms in the period between 2016-2018. Pursuing an econometric approach we test a hypothesis that external financing and bank loans is positively related to the level of urbanization of the region, where a firm is located. Our empirical results lend support to the followers of geography of finance, who argue that location and place still remain of a crucial importance in the world of finance.

1 Introduction

Economic level of the regions is strongly influenced by a structure and a number of firms that are located in the particular areas. Economic vitality of the firms is then depending on their possibilities to gain capital. According to Lee and Luca (2019) there is mounting evidence to suggest that there is geographical variation in access to finance. Zhao and Jones-Evans (2017) find an evidence, that economic development of small and medium firms is influenced by their geographic proximity to the banks, that are usually located in the agglomerative centres. One can then assume, that firms from remote areas suffer from capital shortage in the comparison to their counterparts in big cities. Bečicová and Blažek (2015) confirmed that there is a credit gap in the Czech periphery, however, other studies (e.g. O'Brien ,1992) claim the opposite findings. The aim of this paper is therefore to contribute to this research gap using data on capital structures of Czech firms. We draw on the Theory of regional segmentation of financial markets (Dow, 1992) and Pecking order theory (Myers and Majluf, 1984) and look for the evidence, that firms from rural areas have lower share of external capital, mainly from banks, than firms from bigger centres.

The paper proceeds as follows. While the second part reviews theoretical and empirical studies that focus on the geography of money and capital structure theories and develops our hypothesis, the third part describes our data and methods. The empirical study presented in the fourth part focuses on the relationship between the location of the firm and its capital structure. The concluding part discusses our main results.

2 Theoretical background and formulation of the hypothesis

Since the 50s years of the 20th century, the capital structure of companies is the significant topic for economic research. The theories seeking the optimal capital structure pass through many variations and requirements. The default theory of capital structure has become the theory with three assertion from Modigliani and Miller transpired in 1958. Modigliani and Miller came to the conclusion, that capital structure is irrelevant when it comes to the value of the firm. These results with combination of unreal model conditions have evoked conduction of further research on the capital structure theory. As a result there were introduced Trade-off model (Jensen and Meckling, 1976), Neumaierová-Neumaier theory (Neumaierová, Neumaier, 1995) or Pecking-order theory (Myers and Majluf, 1984). The last one argues that, due to asymmetric information, firms adopt a hierarchical order of financing preferences so that internal financing is preferred over external financing. This theory became an object of many empirical studies of which results are ambiguous. Shyam-Sunder and Myers (1999) or De Jong (2011) find that the Pecking order model is an excellent first-order descriptor of financing behaviour. However, Frank and Goyal (2003) discover the opposite. So did Leary and Roberts (2010), who conclude that the Pecking order theory is a poor descriptor.

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Theory of regional segmentation of financial markets (Dow, 1992) argues that financial sources are allocated close to the financial centres and thus borrowers from remote regions might be excluded from financial services. Theory of regional segmentation of financial markets distinguishes two banking segments - national and regional. The national banking segment is represented by great banks and top-ranking customers with high-quality repute whereas the regional banking segment charge of small and medium enterprise with doubtful history. The difference between mentioned systems generate distinction in regional segmentation. The distinction is caused mainly by different providing loans, which have influence in dynamic regional development, and by bank's investing in capital markets, their liquidity preferences, and their investment willingness of large company's stock. The consequences of segmentation depend on the type of banking system – centralized or decentralized. In case of centralized system, there can come about restriction of number loans for small and less known enterprises. On the contrary, the decentralized system enables to provide loans even fewer known companies with disadvantageous conditions (Blažek, 2011). Blažek and Bečicová (2015) claim that Czech banking system is strongly centralized. The banking system can be characterized by spatial and function concentration. It should be noted that the spatial distance between centre and periphery is measured in kilometres or miles, however the functional distance is presented by economic development of region and its centre (Alessandrini, 2005).

According to Blažek and Uhlíř (2011), there is an obvious direct impact on the development of regions, mainly through the investment bank on the capital markets and their preferential liquidities. Dow (1992) states that it is necessary to distinguish between a centralized and a decentralized banking market system, because in a centralized system there may be a reduction in lending for smaller and lesser-known companies. According to Joeeer (2006), who compares the indebtedness sources of small and large companies, small ones are more financially limited and face non-corporate barriers to choosing their capital structures, while affecting the strong relationship between indebtedness and size of listed companies. The capital structure of companies is affected by many variables influencing the decisions of owners / managers, and the influence of the location of the company can certainly be included in these variables.

The theoretical model of Dow (1992), which provide reasoning for spatial disparities in the access to the capital, forms the basis for the formulation of our hypothesis. This theoretical model approach stresses the role of geographic proximity between borrowers and lenders in their financial relationships. Dow foresees the credit rationing and describes the exclusion of clients from rural areas from financial services. Based on the Theory of regional segmentation of financial markets and on the Theory of pecking order one may assume that the more peripheral is the location of the firm the lower is the share of external capital in its capital structure, because it is becoming more and more rare for companies. Companies are thus forced to use internal sources of financing, when it comes to external ones, the bank loans are the last in a row. To verify this conjecture, the following hypothesis may be formulated:

H1: The use of external financing and bank loans is positively related to the level of urbanization of the region, where a firm is located.

In order to test and then possibly support the hypotheses, the following wording has been used for its preliminary version:

H0: The use of external financing and bank loans is negatively related to the level of urbanization of the region, where a firm is located.

Hypothesis H1 reflects the findings of Bečicová and Blažek (2015), who found a credit gap in the Czech periphery.

3 Data and methods and model specification

From the socio-economic and environmental point of view, it is possible to distinguish the degree of urbanization of a given locality, according to which the degree of development of the territory can be categorized. With higher development of the territory, more suitable external conditions for the company can be expected. Within the study, the branch NACE 56100 Catering in restaurants, stalls and mobile facilities is selected, where it is possible to assume an even distribution of the location of companies in the Czech Republic. The study is carried out at the level of LAU 2 and the division of the degree of urbanization into five clusters according to Zelená (2018) is used. To identify the relationship between indebtedness and the location of companies, a combination of data on the degree of urbanization of individual municipalities and financial data of individual companies is needed. The division of areas according to the degree of urbanization is used based on Zelená (2018), where the degree of urbanization and rurality was determined for the purpose of identifying problem areas and making recommendations for improving the situation using Ward's cluster method. Data from the Czech Statistical Office and Eurostat at the level of municipalities (LAU 2) were used to create clusters. Key indicators include:
- Percentage expression of the area of the municipality to the total area of the studied area (i.e. the state),
- population density of municipalities (number of inhabitants living per km²),

- percentage share of built-up area of the total area of the municipality,
- percentage share of the population of the municipality employed in the third economic sector.

The study states five clusters: 1 – urbanized areas, 2 – small urbanized villages, 3 – satellite towns, 4 – rural villages within driving distance, 5 – rural areas. Figure 1 shows the distribution of the number of companies according to location.

Figure 4 Number of enterprises by location
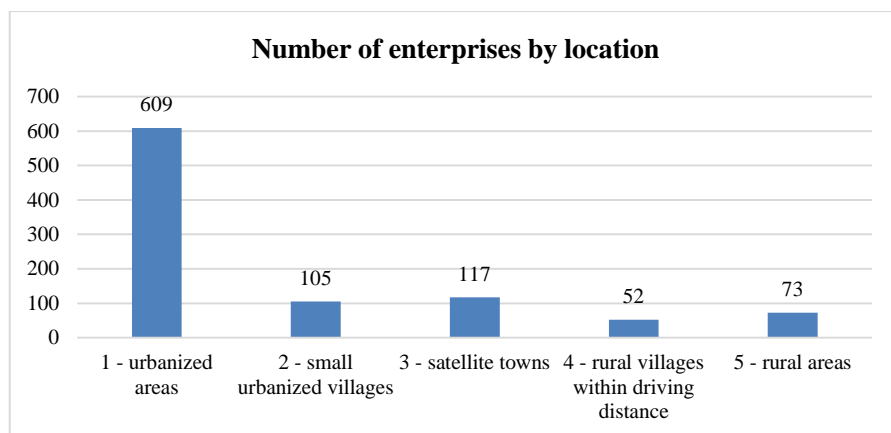
Source: *authors' elaboration*

The financial data of individual enterprises are obtained from the Albertina database specializing in enterprises operating in NACE 56100. Our data consist of a panel of 956 firms in the period between 2016 and 2018, therefore we deploy the panel regression analysis. All estimates are made in the software Gretl. We estimated the model with random effects (based on the results of the Hausman test) with robust standard errors, which are consistent against the consequences of autocorrelation and heteroscedasticity. Stationarity of variables was proved with the use of the unit root test Levin, Lin & Chu for the panel data (Levin et al., 2002). A suitable method for processing a large sample is the selected method of panel analysis that allows the inclusion of these amounts of data depending on multiple variables. The analysis of panel data represents the possibility of a cross-section of the monitored units in the monitored periods. The monitored units can be, for example, households, companies, states, etc. Panel analysis enables the data to enlarge the data file, reducing the collinearity between the explanatory variables and test even more complex econometric models (Hušek, 2003).

To test the influence of localization of a firm on its capital structure two regression models with the following variables:

Dependent variables:

- Total indebtedness (*DTA*) - share of claims on total capital,
- Bank loans on total debt (*BLD*) - share of bank loans on total debt.

Independent variables:

- Localization of a firm (*LOC*) - degree of urbanization of the place, where the firm is located,
- Age of a firm (*AGE*) - number of years since the born of the firm,
- Size of a firm (*SIZE*) - total sales,
- Return on Assets (*ROA*) - return on assets (Earnings before interest and tax / Total capital),
- Return on Equity (*ROE*) - return on equity (Net income / Equity),
- *Z-SCORE* - Altman´s bankruptcy index,
- Liquidity (*L*) - current assets / current liabilities.

All variables, including a description of the measures used and their descriptive statistics, are summarized in Table 1.

Table 1 Description of variables and summary statistics

Variable	Abb.	Mean	Median	Max.	Min.	Std. Dev.	Obs.
Total Indebtedness	DTA	3.1779	0.9297	656.0000	656.00	19.067	1,290
Bank loans on total debt	BLD	0.0643	0.0000	1.0953	-0.2929	0.1449	1,286
Localization	LOC	1.8152	1.0000	5.0000	1.0000	1.2741	1,290
Age	AGE	11.407	9.0000	27.0000	3.0000	6.4033	1,290
Size	SIZE	5.3619	6.5846	8.1857	0.0000	2.6489	1,290
ROA	ROA	-0.7893	0.0000	25.0000	-23.2000	1.3079	1,290
ROE	ROE	0.0558	0.0189	207.0000	-168.1900	6.5879	1,282
Z-SCORE	ZSCORE	0.0298	1.0154	29.0500	-475.8900	16.4360	1,290
Liquidity	L	2.9419	0.3829	782.0000	-458.8500	25.3390	1,290
Variable	**Abb.**	**Variation coefficient**	**Oblique**	**Sharp-ness**	**5 %**	**95 %**	**IQ range**
Total Indebtedness	DTA	5.9999	22.7070	689.5100	0.0603	7.5379	1.2429
Bank loans on total debt	BLD	2.2534	2.7130	8.5928	0.0000	0.3779	0.0222
Localization	LOC	0.7019	1.3747	0.5892	1.0000	5.0000	2.0000
Age	AGE	0.5613	0.9450	-0.4302	4.0000	24.0000	8.0000
Size	SIZE	0.4940	-1.4436	0.02832	0.0000	7.3860	1.1949
ROA	ROA	16.5710	-4.4728	187.3600	-0.9749	0.5639	0.1446
ROE	ROE	118.0300	5.5599	691.0700	-1.1137	1.3218	0.2544
Z-SCORE	ZSCORE	550.4100	-21.1020	539.4500	-4.0483	6.0384	2.0339
Liquidity	L	8.6133	12.3710	509.7300	0.0000	9.7400	1.6254

Source: Gretl; authors' elaboration

To test our hypothesis, we use our cross-sectional data with the dependent variable *DAT* and *BLD*, which represent the level of indebtedness respectively the share of bank loans on total debt. Our main independent variable - localization (*LOC*) is represented by coefficient of urbanization, remaining independent variables represent capital structure determinants, usually deployed in empirical testing of capital structures. First of the variables is location (LOC_i) which presents degree of urbanization of the place, where located firm is, Age of a firm (*AGEi)* states the stability of the company according to the year under review, the size (*SIZEi)* of the company is defined as the logarithm of total sales, return on assets (*ROAi)* corresponds to the EBIT's participation in total activity. Return on equity (*ROEi)* is the share of net profit in equity. The last two variables include *Z-SCOREi* corresponds to the basic calculation of Altman's analysis:

$$\mathbf{Z} = 3.3 \times EBIT / Assets + 1 \times Sales / Assets + 0.6 \times Market\ value\ of\ equity / Book\ value\ of\ debt + 1.4 \times Retained\ earnings / Assets + 1.2 \times Net\ working\ capital / Assets.$$

Current liquidity (*Li)* is the share of current assets in current liabilities. To test the influence of localization on the indebtedness, the following regression models are estimated:

$$DTA_i = \alpha + \beta_1 LOC_i + \beta_2 AGE_i + \beta_2 SIZE_i + \beta_3 ROA_i + \beta_4 ROE_i + \beta_5 ZSCORE_i + \beta_6 L_i + \varepsilon_i,$$

where DTA_i is a total indebtedness of firm *i*. LOC_i is degree of urbanization of the place, where is located firm.

$$BLD_i = \alpha + \beta_1 LOC_i + \beta_2 AGE_i + \beta_2 SIZE_i + \beta_3 ROA_i + \beta_4 ROE_i + \beta_5 ZSCORE_i + \beta_6 L_i + \varepsilon_i,$$

where BLD_i is a share of bank loans on total debt of firm *i*. and εi, is the residual (random) part of the model.

4 Research results

Cross-sectional data including 2,075 (2,071) observations were used to estimate the multiple regression model to investigate the effects of selected explanatory variables on the dependent variable. The results are estimated with robust standard errors in order to overcome potential heteroscedasticity in cross-sectional data. Collinearity in the final model was inspected using the Variance Inflation Factor (VIF). After econometric verification of the estimated model, we interpret the results in Table 2.

Table 2 Model Table

Independent Variables	Dependent Variable	Dependent Variable
	DTA	BLD
LOC	−0,207428 (0.2058)	**−0.0192635 ***** **(0.0000)**
AGE	-0.0302 (0,3563)	-0.0001 (0.8541)
SIZE	**0.1676 *** (0.0344)**	-0.0019 (0.1315)
ROA	**2.7345 *** (4.76e-50)**	0.0003 (0.8758)
ROE	-0.0016 (0.9658)	3.8222 e-5 0.8904
ZSCORE	**-1.1019 *** (0.0000)**	6.7895e-5 (0.6064)
L	-0.0022 (0.7877)	-3.8522e-5 (0.6406)
CONSTANT	**3.24871 *** (0.0000)**	**0,109676 *** (0.0000)**
R^2	0.754984	0.0264891
Observations	2,075	2,071
Note: *** statistical significance at 0,05% level. Standard Errors are in parenthesis.		

Source: Gretl; authors elaboration

Table 2 shows the results of estimating the impact of the different level of urbanization of a firm's location on the usage of external capital. In a nutshell, the results show that the location of a firm matters in designing the capital structures, especially it influences the usage of bank loans. Negative sign of the variable (*LOC*) in the first model with dependent variable of total indebtedness (*DTA*) indicates that we find positive relationship between the usage of external capital and the degree of urbanization, however, this coefficient is not statistically significant. This is not the case of the coefficient of (*LOC*) variable in the second model, which turned out to be negative and statistical significant. Our presented results therefore falsify Hypothesis H0 and hence support Hypothesis H1, that external financing and bank loans is positively related to the level of urbanization of the region, where a firm is located. Our empirical results lend further support to the Theory of regional segmentation of financial markets and to the followers of geography of finance, who argue that that location and place still remain of a crucial importance in the world of finance.

We deployed remaining set of dependent variables that are believed to matter for capital structures of firms. Among usual determinants of capital structure we find a significant association of indebtedness and size of the firms (*SIZE*), their profitability (*ROA*) and probability of bankruptcy (*ZSCORE)*. These findings lay the foundations for further research.

5 Conclusions

As part of the analysis, we came to the result that the total indebtedness depends on SIZE, ROA and Z-score. Localization has a negative effect, so it can be said that the farther the company is from the centre, the less it uses external capital financing.

In the second model, it turned out statistically significantly that the share of bank loans in foreign capital decreases with increasing peripherality. This result supports Dow (1992) and the Theory of regional segmentation of financial markets. Although the study did not significantly differentiate the knowledge of the impact of a centralized / decentralized banking system, as did Bečicová and Blažek (2015), who came to the conclusion that the banking financial market is strongly centralized in the Czech Republic, it can be stated that from the centre, the number of bank capital provided to small and medium-sized enterprises is declining.

Acknowledgement

References

Alessandrini, P., Croci, M. Zazzaro, A. (2005): The Geography of Banking Power: the Role of Functional Distance. Banca Nazionale del Lavoro Quarterly Review, LVIII, s. 129-167.

Bečicová, I.; Blažek, J.(2015): Is there a credit-gap in a periphery? The perception of this problem by small entrepreneurs. *Journal of Rural Studies.* 42, pp. 11-20

Blažek, Jiří a David Uhlíř. Teorie regionálního rozvoje: nástin, kritika, implikace. Vyd. 2., přeprac. a rozš. Praha: Karolinum, 2011. ISBN 978-80-246-1974-3.

De Jong, A., Verbeek, M., & Verwijmeren, P. (2011). Firms' debt–equity decisions when the static trade off theory and the pecking order theory disagree. *Journal of Banking & Finance*, 35(5), 1303-1314.

Dow, S. C. (1992), European monetary integration and the distribution of credit availability. In S. Corbridge. R. Martin and N. Thrift (eds) *Money, Power and Space,* Oxford: Blackwell.

Frank, M.Z., Goyal, V.K., (2003). Testing the pecking order theory of capital structure. Journal of Financial Economics 67, 217–248.

Hušek, R., (2003): Aplikovaná ekonometrie: teorie a praxe. Praha: Professional Publishing, 2003.

Jensen, M., & Meckling, W. (1976). Theory of the firm: managerial behaviour, agency costs and ownership structure. Journal of Financial Economics, 3(4), 305e360.

Jõeveer, Karin. *Sources of capital structure: evidence from transition countries*. Prague: CERGE-EI, 2006. Working paper series. ISBN 80-7343-102-5.

Leary, M., Roberts, M., (2010). The pecking order, debt capacity, and information asymmetry. Journal of Financial Economics 95, 332–355.

Lee, N., & Luca, D. (2019). The big-city bias in access to finance: evidence from firm perceptions in almost 100 countries. Journal of Economic Geography, 19(1), 199-224.

Levin, A., Lin, C. F., & Chu, C. S. J. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. Journal of econometrics, 108(1), 1-24.

Myers, S.C., Majluf, N.S., (1984). Corporate financing and investment decisions when firms have information that investors do not have. Journal of Financial Economics 13, 187–221.

Neumaierová, I., Neumaier, I.: Úvaha o optimální zadluženosti. *Finance a úvěr 46*, s. 51-61, 1996.

O'Brien, R. (1992) Global Financial Integration: The End of Geography. London: Royal Institute of International Affairs, Pinter Publishers.

Shyam-Sunder, L., Myers, S.C., 1999. Testing static tradeoff against pecking order models of capital structure. Journal of Financial Economics 51, 219–244.

Sigmundová, Dagmar a Erik Sigmund. Trendy v pohybovém chování českých dětí a adolescentů. Olomouc: Palacký University Olomouc, 2015. DOI: 10.5507/ftk.15.24448399

Zelená, M., (2018). Rozvojová specifika rurálních a urbánních oblastí České republiky. Brno, 2018. Diplomová práce, Mendelova univerzita, Fakulta regionálního rozvoje a mezinárodních studií. Vedoucí práce Ing. Radka Redlichová, Ph.D.

Zhao, T., & Jones-Evans, D. (2017). SMEs, banks and the spatial differentiation of access to finance. Journal of Economic Geography, 17(4), 791-824

Current state of implementation of the Smart City development concept in municipalities with extended competencies in the Czech Republic on the example of the Moravian-Silesian Region and Zlín Region

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Abstract: At present, the Smart City development concept is increasingly used worldwide in the field of urban development management, neither the territory of the Czech Republic does not avoid this trend. The professional literature describing this concept is rich but also characterized by its inconsistency and fragmentation into all areas of territorial development. The implementation of the Smart City development concept is mostly understood as an individual matter of individual municipalities and is strongly influenced by political will. This paper aims to identify and compare the current level of application of the Smart City development concept within the strategic management of selected cities in the Czech Republic based on a selected group of relevant indicators. Smart approaches at the level of municipalities with extended competencies, ie municipalities that have a specific position in the Czech system of public administration, were analyzed. The analysis included municipalities of this type, which are located in the territory of two regions, whose governments apply different approaches to supporting the Smart concepts at the regional and local levels. These are the Moravian-Silesian Region and the Zlín Region. The research was conducted on the basis of an analysis of freely available sources (strategic documents, analytical documents, memorandums, presentation of the issue on the websites, official statements of the city management, etc.). The results of the research indicate an overall low level of implementation of the Smart City development concept within the evaluated group of municipalities and large differences in the level of implementation of the concept between individual municipalities. The example of the two regions being compared also suggests that a higher level of support for the implementation of "smart" concepts by the regional government may not be reflected in a higher level of implementation of these concepts in municipalities. The conclusions of the work will serve as a basis for future research purposes with a focus on evaluating the involvement of municipalities in innovation processes in the field of Smart technologies.

Keywords: Smart City, smart technologies, local development, innovations.
JEL Classification: R11, R58, O18, O20, O30

1 Introduction

The Smart City represents a relatively new concept in the theory of regional development, which currently receives considerable attention both in the scientific community and on the practical level. The concept is not anchored, there is a number of its definitions. For example, Dameri (2013) defines Smart City as a geographically well-defined territory in which modern digital technologies (ICT, transport, energy production) serve to increase the quality of life of citizens. Important aspects of broad participation, environmental quality, inclusion and smart development are emphasized. Such a city is managed by authorities with clearly defined tasks and competencies towards the fulfillment of urban development concepts. Another definition (Musa, 2016) states that Smart Cities are cities that electronically connect technical infrastructure in the interest of the citizens. Smart Cities aim to increase the quality of citizen life's through efficient modern technologies and to meet their needs. Giffinger et al. (2007) prepared one of the oldest comprehensive definitions of the Smart City concept. They divided the Smart City development concept into six dimensions. This conceptualization offers a view of the city as a set of two basic components such as smart governance and smart people and the set of goals it wants to achieve in the dimensions of the smart economy, smart mobility, smart environment and smart living.

At present, the Smart City development concept is increasingly used worldwide in the field of urban development management, neither the territory of the Czech Republic does not avoid this trend. It is possible to find areas in the Czech Republic that have already successfully implemented many projects in the spirit of the Smart City and are further developing and improving this idea.

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The position of the main supporter of the Smart City / Region concepts in the Czech Republic is performed by the Ministry of Regional Development. A fundamental example of support in this regard is the document entitled Methodology for the preparation and implementation of the Smart Cities concept at the level of cities, municipalities and regions. The original name of this methodology in the Czech language is "Metodika pro přípravu a realizaci konceptu Smart Cities na úrovni měst, obcí a regionů." (Ministerstvo pro místní rozvoj ČR, 2018) This is an updated methodology, the first version of which dates from 2015 and is freely available to all actors.

In connection with the activities of the Ministry of Regional Development of the Czech Republic or with its support, other analytical and methodological documents were processed. The authors of the survey would like to mention two publications in particular. The first one is the Analysis of the Current Level of the Czech Republic's Involvement in the Concept of Smart City and Smart Region in Connection with New Trends, including Proposals for Measures. The original name of this publication in the Czech language is "Analýza aktuální úrovně zapojení ČR do konceptu smart city a smart region v souvislosti s novými trendy, včetně návrhů opatření". (Grega et al., 2018) The second one is the Methodology for the application of the smart governance approach to the organizational and management structures of municipalities in the Czech Republic. The original name of this publication in the Czech language is "Metodika aplikace přístupů smart governance do organizačních a řídících struktur municipalit v České republice." (Horák et al., 2019)

The research presented in this paper focuses on approaches to the implementation of the Smart City development concept in two selected regions of the Czech Republic, namely in the Moravian-Silesian Region and the Zlín Region. Governments of these regions have completely different approaches to promoting "smart" concepts.

The Moravian-Silesian Region has 1,200,539 inhabitants (as of 31 December 2019), its territory is divided into 22 administrative districts of municipalities with extended competencies. The average size of municipalities with extended competencies is 32,883 inhabitants, excluding the regional capital Ostrava it is 20,220 inhabitants. Since 2015, the regional government has been intensively supporting the Smart City / Region concepts. That year, a Memorandum of Cooperation for the preparation of the Smart City and Smart Region concept for improving the quality of life and the environment in Ostrava and the Moravian-Silesian Region was signed by the Moravian-Silesian Region, the Statutory City of Ostrava, the Ministry of Industry and Trade of the Czech Republic and the Ministry of the Environment of the Czech Republic. The regional government prepared and approved a Development Strategy of the Smart Region of the Moravian-Silesian Region 2017-2023 "Smarter Region". The strategy analyses the initial state of implementation of "smart" concepts, sets development priorities for them and defines the implementation structure and processes, always with strong links to municipalities in the region. The six largest cities in the region are included in the implementation part of the strategy as a set of "key actors in the smart region". The Department of Transport and Smart Region of the Regional Office of the Moravian-Silesian Region is responsible for the implementation of the Smarter Region strategy.

The Zlín Region has 582,555 inhabitants (as of 31 December 2019), its territory is divided into thirteen administrative districts of municipalities with extended competencies. The average size of municipalities with extended competencies in the region is 20,183 inhabitants, excluding the regional capital Zlín, it is 15,621 inhabitants. The regional government started to deal with the Smart City / Region concept only in 2020, now it is in the initial phase when it has started preparing a Smart Region strategy.

2 Methods

The research aims to compare approaches to the implementation of the Smart City development concept in municipalities with extended competencies in the Czech Republic, on the example of the Moravian-Silesian Region and the Zlín Region. Municipalities with extended competencies are municipalities that have a higher position in the Czech system of public administration than other municipalities. It is usually a group of several largest cities within a given region, so it can be concluded that these municipalities have more robust capacities to perform self-governing activities than smaller cities. This numerically limited administrative category of municipalities represents a suitable sample for conducting research.

For research purposes, the following research questions were defined:

Q1: What share of cities from the research sample deals with the Smart City development concept at present? How has their share increased since 2017?

Q2: Do the cities publicly commit to the philosophy of the Smart City development concept? (political declaration, PR)

Q3: Is the philosophy of the Smart City development concept reflected in the strategic documents of the cities?

Q4: Do cities designate specialized bodies in charge of implementing the Smart City development concept?

Q5: How can be characterized the approaches to the implementation of the Smart City development concept in individual cities?

Q6: Is there a correlation between the intensity of support for "smart" concepts by the regional governments and the level of implementation of these concepts in cities with extended competencies in these regions?

The research is based on the method of text documents analysis. Secondary sources published by municipalities from the research sample on websites, in strategic documents and press releases were analysed. Data for the research were collected during September 2020.

The answers to the research questions were assessed as follows:

Q1: The denominator of the share contains the total number of municipalities with extended competencies in the region. The share numerator contains the number of municipalities with extended competencies in the region that deal with the Smart City concept, it was determined based on a sufficient condition, wherein the case of an individual municipality with extended competencies, some of the criteria must be met:

   a)   the existence of several implemented or intensively prepared projects, focused on "smart" solutions, which are interconnected (functionally or thematically),

   b)   the existence of a political declaration on the Smart City development concept implementation (see research question no. 2),

   c)   the inclusion of the Smart City development concept in the basic development strategy of the city (see research question no. 3),

   d)   the existence of a specialized Smart City strategy (see research question no. 3),

   e)   a specialized body dealing with the implementation of the Smart City development concept has been established (see research question no. 4).

The values are determined based on current data and based on historical data collected by the authors from December 2017 to January 2018 within the framework of previous research activities. It is thus possible to compare the development of the share over time.

Q2: The assessment of whether the municipality publicly commits a certain political declaration to implement the Smart City development concept was made based on a sufficient condition, where some of the criteria must be met:

   a)   there is an approved resolution of the city council on the implementation of the Smart City development concept,

   b)   the program statement of the city council includes information on the implementation of the Smart City development concept (initiation or continuation),

   c)   there is a press release from the municipality stating that the city is implementing the Smart City development concept or is about to start its implementation.

In addition, PR activities related to the Smart City development concept were examined, for which three categories were defined:

   a)   actively: systematic information, ie there is a website or at least a subpage of the website with information on the implementation of the Smart City development concept and at the same time the city has issued at least two press releases on the topic in the last 12 months (in period from September 2019 to August 2020),

   b)   to a limited extent: only partial information, very rarely published or out of date,

   c)   not performed: PR is not performed.

Q3: In the first step, it was determined whether the municipality has approved the basic development strategy. Subsequently, it was assessed whether such a strategy in the proposal part contains a solution in the spirit of the Smart City development concept (implementation of the concept, sub-areas of the concept, specific "smart" projects). The complexity was not assessed, but only the minimum condition of whether this topic is included in the strategy. In addition, it was examined whether the municipality has a specialized Smart City strategy, either comprehensively or within a sub-area (eg Smart Governance, Smart Transport, etc.).

Q4: Mention was sought of the existence of a body responsible for the implementation of the Smart City concept within the city hall, regardless of its form (for example, a commission, a working group, a project team).

Q5: The characteristics of municipalities' approaches to the Smart City development concept implementation were assessed according to the degree of complexity at the level of strategies and projects, for which three categories were defined:

a) comprehensive: the municipality fulfills the basic theoretical theses of the Smart City development concept (solves the topic conceptually with the projection into strategic documents, prepares and implements "smart" solutions in more relevant thematic areas, which create synergies),

b) partial: the fulfillment of the basic theoretical theses of the Smart City development concept by the municipality is incomplete (there is a projection of the Smart City topic into strategic documents or into the project portfolio, but only in selected areas),

c) general: the municipality subscribes to the Smart City concept, but does not have a clear strategy in this regard, nor is the profile of implemented or planned "smart" solutions and projects known.

Q6: The intensity of support for "smart" concepts by regional governments in the direction of municipalities is assessed only using verbal evaluation with the determination of the order of regions. To compare the level of implementation of the Smart City development concept in municipalities between the evaluated regions, a simple scoring model was developed, which works with a set of six indicators. Their overview and scoring model are given in Table 1 below. For each indicator, the arithmetic mean for all municipalities is calculated from the research sample from each region. Subsequently, the values of all indicators are summed. The order of regions according to the calculated score is compared with the order of regions according to the intensity of support for "smart" concepts. A working hypothesis is established on this research question, that the Moravian-Silesian Region, whose government more strongly supports the implementation of "smart" concepts towards municipalities than the Zlín Region Government, also shows a higher level of the Smart City development concept implementation in municipalities with extended competencies.

Table 1 Scoring model

Indicator	Spectrum of values	Rating
Political declaration	Yes No, Not identified	1 0
Inclusion of the Smart City concept to the main development strategy	Yes No	1 0
Specialized Smart City strategy	Yes In preparation No	1 0,5 0
Designated specialized bodies responsible for the implementation of the concept	Yes Not identified	1 0
PR activities	Carried out actively Carried out to a limited extent Not performed	1 0,5 0
Approach	Comprehensive Partial General Can't be assessed	2 1 0,5 0
Sum of the maximum values	-	**7**

Source: Own processing

3 Research results

The research results presented in this chapter are divided into subchapters related to individual research questions.

3.1 Share of municipalities with extended competencies dealing with the Smart City development concept

In the Moravian-Silesian Region, three municipalities from the research sample (14%) dealt with the Smart City development concept according to the criteria set out in the research methodology in 2017; currently, their number increased to eight (36%), which represents a 22% increase in share. One other municipality is now in the initial phase. In the Zlín Region, one municipality was identified in 2017 from a research sample meeting the set criteria (8%) and currently, there are six municipalities (46%). which represents an increase in the share of 38%. The Zlín Region thus shows a larger share of municipalities with extended competencies, which are currently dealing with the implementation of the Smart City concept, as well as a larger growth of this share, as shown in Table 2.

Table 2 Share of municipalities with extended competencies dealing with the Smart City development concept

Do municipalities with extended competencies deal with the Smart City concept?	Moravian-Silesian Region			Zlín region		
	2017	**2020**	**Difference**	**2017**	**2020**	**Difference**
YES	14 %	36 %	**22 %**	8 %	46 %	**38 %**
Initiation in progress	0 %	9 %	**9 %**	0 %	0 %	**0 %**
NO	86 %	55 %	**-31 %**	92 %	54 %	**-38 %**

Source: Own research

3.2 Public commitment to the philosophy of the Smart City concept.

In the Moravian-Silesian Region, three municipalities (14%) from the research sample openly sign up for the implementation of the Smart City concept in a certain form of the political declaration; in the Zlín Region, these are two municipalities (15%). In cases of both regions, the authors evaluate these shares as very low. The performance of PR activities concerning the implementation of the Smart City concept is rated slightly better, the identified shares are shown in Table 3. In this indicator, the Zlín Region shows slightly better values than the Moravian-Silesian Region.

Table 3 PR activities of municipalities with extended competencies concerning the implementation of the Smart City development concept

PR activities concerning the Smart City development concept	Moravian-Silesian Region	Zlín region
Carried out actively	5 %	15 %
Carried out to a limited extent	36 %	31 %
Not performed	59 %	54 %

Source: Own research

3.3 Reflections on the philosophy of the Smart City development concept in strategic documents of municipalities

All but one of the municipalities from the research samples have approved and valid basic development strategies in both evaluated regions. The town of Vítkov in the Moravian-Silesian Region and the town of Vizovice in the Zlín Region lack a basic development strategy. The inclusion of the Smart City development concept in the proposal parts of basic development strategies shows an equal share of 23% of municipalities from research samples in both regions. In terms of a specialized Smart City strategy, in the case of the Moravian-Silesian Region, its existence was identified in only one municipality from the research sample (5%), namely in the statutory city of Třinec, in four cases (18%) ongoing preparation of strategic document of this kind was identified. In contrast, in the Zlín Region, 3 evaluated cities (23%) have specialized Smart City strategies and one city (8%) is preparing such a strategy. In terms of working with specialized Smart City strategies, municipalities from the research sample of the Zlín Region show slightly better values than municipalities from the Moravian-Silesian Region.

3.4 Designation of a specialized body for the implementation of the Smart City development concept

In the Moravian-Silesian Region, three cases were identified (14%), where the municipality designated a specialized body for the implementation of the Smart City development concept, in the Zlín Region this is only one case (8%). These bodies are usually working groups and commissions; in one case this role is performed by a designated department of the town hall.

3.5 Municipal approaches to the implementation of the Smart City development concept according to the degree of complexity

In terms of the complexity of approaches to the implementation of the Smart City development concept at the level of strategies and projects, the municipalities from the research sample from Zlín Region show better overall values than the municipalities from the Moravian-Silesian Region. The highest, ie comprehensive approach was identified in the Moravian-Silesian Region in three cases (14%) and in the Zlín Region in two cases (15%). These are approximately the same shares. However, in the second and third categories, the Zlín Region shows better values. The last category is "cannot be evaluated", which includes municipalities from research samples that do not reflect the basic theses of the Smart City development concept within their strategies. There is a larger representation in the case of the Moravian-Silesian Region (15 cases, 68%) compared to the Zlín Region (7 cases, 54%). The results are shown in Table 4 below.

Table 4 Shares of municipalities from the research samples in the evaluated regions according to the characteristics of the approach to the implementation of the Smart City development concept

Approach	Moravian-Silesian Region	Zlín region
Comprehensive	14 %	15 %
Partial	0 %	8 %
General	18 %	23 %
Can't be assessed	68 %	54 %

Source: Own research

3.6 Correlation between the intensity of support for "smart" concepts by the regional governments and the level of implementation of these concepts in cities

The level of implementation of the Smart City development concept in municipalities from research samples, evaluated using the scoring model presented in the methodological chapter, shows a value of 1.23 points (18% of the possible maximum) in the case of the Moravian-Silesian Region and 1.54 (22% of the possible maximum) in the case of the Zlín Region. The maximum possible value is 7 points. The average values for individual indicators in both regions are given in the following Table 5. In this evaluation, the Zlín Region shows a slightly higher value than the Moravian-Silesian Region. Looking at the individual indicators, the Zlín Region shows better values than the Moravian-Silesian Region in four cases, in one case the values are identical, and only in one case, the Moravian-Silesian Region shows better values than the Zlín Region.

On the research question evaluated in this chapter, a working hypothesis was established, that the Moravian-Silesian Region, whose government more strongly supports the implementation of "smart" concepts towards municipalities than the Zlín Region Government, also shows a higher level of Smart City development concept implementation in municipalities from the research sample than municipalities in the Zlín Region. Concerning the fact that, on the contrary, the Zlín Region shows a better assessment of the level of implementation of the Smart City concept in municipalities from the research sample than municipalities from the Moravian-Silesian region, this hypothesis has not been proven.

Table 5 Average values of evaluated indicators

Indicator	Moravian-Silesian Region	Zlín region
Political declaration	0,14	0,15
Inclusion of the SC concept to the main development strategy	0,23	0,23
Specialized Smart City strategy	0,14	0,27
Designated specialized bodies responsible for the implementation of the concept	0,14	0,08
PR activities	0,23	0,31
Approach	0,36	0,50
Sum	**1,23**	**1,54**

Source: Own research

4 Conclusions

The research brought new knowledge about the level of implementation of the Smart City development concept in the Czech Republic. The pilot research was focused on a selected sample of cities, namely cities belonging to the category of municipalities with extended competencies in the Moravian-Silesian and Zlín regions. Six research questions were defined and answered.

The Smart City development concept is currently dealt with by 36% of municipalities with extended competencies in the Moravian-Silesian Region, in the Zlín Region, this share is 46%, while between 2017 and 2020 these shares increased significantly. Overall, the authors of the research evaluate the level of implementation of the Smart City development concept in a sample of selected cities in both regions as low. On the prepared scoring model, based on six partial indicators, the Moravian-Silesian Region reached the value of only 18% and the Zlín Region 22%. Furthermore, large differences in the level of implementation of the Smart City development concept were identified between the individual evaluated municipalities from the research sample.

The research established a working hypothesis that the Moravian-Silesian Region, whose government more strongly supports the implementation of "smart" concepts towards municipalities than the Zlín Regin government, will also show

a higher level the Smart City development concept implementation in municipalities from the research sample than municipalities in the Zlín Region. Concerning the fact that, on the contrary, the Zlín Region shows a better assessment of the level of implementation of the Smart City development concept in municipalities from the research sample than municipalities from the Moravian-Silesian region, this hypothesis has not been proven. However, the achieved score of both regions is very close. Because the evaluation model used was constructed simply with a relatively rough scales of the included indicators and its testing was not performed on the cases of more regions, it is not possible to simply decide to reject the hypothesis. In any case, the authors evaluate as a surprising fact that in the case of the Moravian-Silesian Region, the values were not significantly higher than in the Zlín Region. This fact suggests that in addition to the intensity of support of the regional government for the implementation of "smart" concepts in municipalities, there are other important factors.

Conducted research confirmed the growing interest of municipalities in the Czech Republic in the Smart City development concept and at the same time considerable reserves in approaches to its implementation. However, research has not shown that concentrated support from the regional government towards municipalities leads to a strengthening of the implementation of the Smart City concept in these municipalities. The authors of the research will continue to address this topic.

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References

Dameri, R. P. (2013). Searching for smart city definition: A comprehensive proposal. *International Journal of Computers & Technology.* 11(5), pp 2544–2551. ISSN 2277-3061.

Giffinger, R., et al. (2007*). Smart cities: Ranking of European medium-sized cities.* Centre of Regional Science (SRF), Vienna University of Technology.

Grega, L. et al. (2018). Analýza aktuální úrovně zapojení ČR do konceptu smart city a smart region v souvislosti s novými trendy, včetně návrhů opatření. [pdf] Brno: Mendelova univerzita v Brně. Available at: < https://www.vlada.cz/assets/evropske-zalezitosti/aktualne/Zaverecna-zprava_Smart_City_a_Smart_Region.pdf > [Accessed 10 September 2020].

Horák, M. et al. (2019). Metodika aplikace přístupů smart governance do organizačních a řídících struktur municipalit v České republice. [pdf] Zlín: Univerzita Tomáše Bati ve Zlíně, Fakulta managementu a ekonomiky. Available at: < https://mmr.cz/getmedia/0afc98f8-b136-4042-8b2d-46ef7bb4dea8/Metodika-smart-governance_finalni-verze_srpen-2020.pdf.aspx?ext=.pdf> [Accessed 10 September 2020].

Ministerstvo pro místní rozvoj ČR (2018). Metodika pro přípravu a realizaci konceptu Smart Cities na úrovni měst, obcí a regionů. [pdf] Praha: Ministerstvo pro místní rozvoj ČR. Available at: < https://mmr.cz/getmedia/f76636e0-88ad-40f9-8e27-cbb774ea7caf/Metodika_Smart_Cities.pdf.aspx?ext=.pdf> [Accessed 10 September 2020].

Musa, S. (2016). Smart Cities - A Roadmap for Development. *Journal of Telecommunications System & Management.* 5(3). ISSN 21670919.

A systematic quantitative literature review of GHRM under AMO theoretical perspective

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Abstract: The field of GHRM is important but under theorized and subsequently under-researched. This review addresses the scarcity of research on GHRM-AMO theoretical perspective. This study aims to systematic quantitative literature review of the green human resource management (GHRM) under the lens of ability-motivation-theory (AMO). This study analyzed 89 studies on GHRM and selected only 26 studies relevant to GHRM and AMO theory by search on Web of Science and Scopus databases. This review analyzed by using manual Microsoft excel software. This review found through trend analysis that most of GHRM studies conducted in developing countries context. This review revealed that green recruitment and selection, green training and development, green performance management and green pay and rewards are mostly explored practice in the existing literature. While, this review also demonstrates that less explored practices are employee green creativity, green lifestyle, employee green passion, green competence building, green motivation enhancing, environmental knowledge and environmental responsibility. More importantly, such a systematic review would allow scholars to reach a more explicit and comprehensive understanding of GHRM and AMO theoretical relationship. This study enhances to the body of knowledge by exploring GHRM practices which leads to environmental sustainability by improving green employee behaviour.

1 Introduction

Sustainable HRM has a fresh Green HRM solution that has been evolving and rising currently over the last decade. It applies primarily to environmental sustainability at work. It has been built to affect and enhance the ecological responsiveness and actions of workers, and eventually to both reduce the carbon footprint of a company and add to its green credentials (Renwick et al., 2013). A rising majority of research attention has recently acquired by Green HRM (Renwick et al., 2016). A main objective of the resulting literature is to raise consciousness among HR managers and scholars of the value of taking environmental aspects into context in HRM. Current assumptions arising from this goal addressed how environmental protection can be incorporated and introduced in everyday HR functions (e.g.., Jackson, Renwick, Jabbour, & Muller-Camen, 2011; Renwick et al., 2013). GHRM practices such as green hiring (e.g. employing workers for positions requiring green behaviours and including green tasks), green training (e.g. delivering workshops imparting environmental knowledge), and green incentives (e.g. connecting benefits to meeting ecological goals) have been found to have a major effect on sustainability (See Renwick et al., 2016).

Green management practices for human capital are essential to the sustainability. As a vast number of studies, GHRM literature focuses on creating a connection between layers of the workers. Thus, researchers were neglecting the extent of the organization in the workplace. In the field of higher educational institutions, green HRM practices are critical by building on the principle of ability-motivation-opportunity (AMO), a research-based on this conducted by Anwar et al. (2020), they noticed that green skill, motivation, commitment has a significant effect on the actions of organization citizenship towards the environment (OCBE). The key contribution of their research was to focus attention on Green HRM practices in the domain of higher education institutions more dominantly engagement to illustrate the crucial role of the environmentally sustainable actions of academic workers in enhancing a universities environmental efficiency.

The survey conducted by Yu et al. (2020) explored the importance of green human resource management (GHRM) in fostering sustainable collaboration with customers and suppliers, as well as moderating positions in internal green

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supply chain management (GSCM). They collected data from 126 manufacturers in China using a new conceptual model based on the principle and flexibility principle (CT) of ability-motivation-opportunity (AMO). They observed that GHRM is substantially and positively linked to customer and supplier environmental collaboration and that internal GSCM substantially moderates the relationships. It is recommended that HRM practitioners develop GHRM practices that include (ability), reward (motivation), and conductive atmosphere (opportunity) to better enforce environmental cooperation.

Besides, the hotel industry is now moving towards implementing green HRM practices to promote environmental protection, research conducted by Pham et al. (2019) investigating the indirect and interactive impact on employee environmental involvement of GHRM practices (training, reward, and corporate culture). They expand the AMO theory in the green sense by researching a new philosophical structure. In their research, they show that three GHRM practices are effective instruments in explicitly stimulating workers to participate in environmental initiatives. Intriguingly, green training and green organizational culture have also discovered a two-way relationship that can activate employee dedication to the environment, particularly at the high and moderate levels of green organizational culture.

Moraes (2019) explored the interaction between (GHRM), especially environmental training, empowerment, and teams for the implementation of eco-efficiency values in the service industry sector. They discovered that environmental training is having a positive effect on eco-efficiency. They often found that training would struggle with hurdles to promote empowerment and teamwork genuinely. Green HRM seems to be the integration of environmental responsibility into the overall HRM phase of potential recruitment, people training, employee rewarding, and developing a green workforce that recognizes and supports environmentally sustainable supports, policies, and programs. Also, contemporary researchers are found to be encouraging the role of human resources in environmental success have focused on the actions of environ-mentally responsible workers as a key element in the efficient adoption of occupational, environmental policies (Kim et al., 2017). GHRM could concentrate mostly on the realms of work and home at the same time as workers build expertise through the daily implementation of habits such as energy saving, recycling, composting, and avoidance in inefficient or polluting practices (McDonald 2011).

By offering a comprehensive and oriented analysis of GHRM research under the lens of AMO theory, this reviews aims to advance the methodological and analytical advancement of the GHRM field. A future research plan for GHRM was described, addressing consequences for clinicians, concerning the reviews given by Renwick et al. (2008). They characterized how current GHRM literature could benefit from in-corporating national culture; a better understanding of green recruiting, as well as training and engagement strategies for employees; and a stronger emphasis on relating GHRM to environmental and economic performance results. To properly resolve the theoretical links between particular, HRM practices and EM, Renwick, Redman, and Maguire (2013) moved beyond the function-based viewpoint. More specifically, Tariq, Jan, and Ahmad (2016) argued that more inspired workers are to conduct environmental activities that compensate for being green. Human capital is the cornerstone of any effective enterprise, so engaged green workers have a tremendous influence on the viability and effectiveness of social organizations. This analysis adds to the information body by discussing GHRM practices and presents it as the prism of the philosophy of ability- motivation- opportunity (AMO). To fix a void in research in this way.

The paradigm of ability-motivation-opportunities has become the most popular theoretical viewpoint for GHRM activities (e.g., Guerci et al., 2016a, 2016b; Pinzone et al., 2016). Even so, under the theoretical viewpoint of the AMO theory (Amruth & Geetha; Benevene & Buonomo 2020), only a few systematic analyses have been done on green HRM. The issue would be whether research on green HRM with the AMO theory is required or not. In terms of their integration with the AMO theory, there is an emerging necessity for induction in GHRM literature. The main purpose of this research is to analyze and synthesize current literature concerning the view of AMO as it applies to the tendency of workers to practice GHRM. Although the studies absence in comparison to the analytical-view of the GHRM and AMO. This comprehensive review looked at the body of information as a small addition. Although researchers seldom addressed the psychological viewpoint of ability-motivation -opportunity to improve green actions for workers

The purpose of this review follows the research question:

RQ1: What is the impact of GHRM practices under the AMO theoretical perspective?

The theoretical perspective of AMO

Taking into account, the rule of Ability-Motivation-Opportunity (AMO), which is the most common worldview in perceiving the impact of HRM rehearses on organizational achievement in an observational examination, the greening of HRM and ensuing environmental impacts can be best perceived (Appelbaum, 2000; Boselie et al., 2005). the hypothesis of AMO portrays that High-Performance Work Practices (HPWS) is a lot of various. Yet, steady HR rehearses bunched dependent on three principal viewpoints: capacity, inspiration, and opportunity (Appelbaum, 2000) In like manner, motivation depends on exercises, for example, monetary and non-monetary benefits which are intended to improve worker endeavors to meet success objectives. At long last, the open door is a bundle of works on comprising of cooperation, data sharing, and self-rule advancing practices that advance worker support and contribution (Marin-Garcia and Tomas, 2016). The AMO worldview recommended by Appelbaum (2000) portrays that HRM procedures that expansion the aptitudes of employees, their readiness to accomplish work and enthusiasm for accessible opportunities lead to representatives ' hierarchical citizenship activities, which further prompts authoritative achievement. Consequently, employees act of corporate citizenship fill in as a hidden instrument among HPWS and corporate achievement (Appelbaum, 2000; Marin-Garcia and Tomas, 2016).

Academics have examined Green HRM in different sectors using the focal point of AMO theory (i.e., Cheema and Javed, 2017; Pinzone et al., 2016; Ragas et al., 2017, 2013; Singh et al., 2020; Pham et al., 2019; Yu et al., 2020). For example, the role of GHRM, environmental awareness, and green behaviour of academics in public research universities was studied by Fawehinmi et al. The outcomes of corporate social responsibility (CSR), Green HRM(GHRM), and the sustainable environment in the textile sector were investigated by Cheema and Javed (2017). According to Pinzone et al. (2016), Green HRM practices, combined affective contribution to progress in environmental management, and citizenship behaviour of collective organizations in the health care field towards the environment. Pham et al. (2019) examined the association in the hospitality industry between green training of employees, green employee engagement, green performance management, and OCBE. Yu et al. (2020) led an examination on GHRM in the vehicle business, internal green supply chain management, customer, and supplier environmental cooperation. Ragas et al. (2017) analyzed the factors that influence the adoption of indifferent private sectors of GHRM activities, green lifestyle, and work efficiency. Singh et al. (2020) investigated how Green HRM associates with the ties between green leadership styles in the development, green innovation, and environmental performance in small and medium enterprises in the manufacturing sector.

AMO theory implies that because they can do so, workers can do better (i.e. they have the expertise and experience required); employees are motivated to do so (they desire to and are praised for their behaviour), and their community gives the opportunity in terms of services and resources. The primary emphasis of AMO is commonly used at the personal level as a theoretical framework for analyzing the relationship between HRM and performance (e.g. Bos-Nehles, Van Riemsdijk, and Kees Looise 2013). A GHRM and environmental management systematic analysis (1998-2011) organized within the AMO context established existing awareness gaps about how GHRM can strengthen the human resources of an enterprise. It was concluded that it would be more beneficial to use observational analysis that defines the key design variables of successful Green EI [employee involvement] programs (Renwick, Redman, and Maguire 2013).

AMO is a high-level generalization and philosophical model of human-behaviour (Michie, van Stralen and West 2011), while each AMO aspect contributes to green attitudes and behaviours technically. For example, self-efficacy arising from the recruiting and placement of workers with abilities that can be applied in technological ways to boost environmental results (e.g. design or deployment of pollution mitigation systems) can be demonstrated by green skills; this ability can also be attributed to preparation and growth (Daily, Bishop and Massoud 2012). Green behaviour encouragement can contribute to environmentally friendly activities and thereby protect the environment. Resources can be characterized by the existence (or absence of) facilities and communication networks that facilitate the recycling of goods and green behaviours defined as pro-environ-mental. Help for management (Ramus, 2002), and employee-attitude (Harvey et al., 2013).

2 Methods

The purpose of this study is to conduct a systematic quantitative literature review (Tranfield et al., 2003). This study analyzed 89 studies on GHRM and selected only 26 studies found relevant to GHRM and AMO theory by search on Web of Science and Scopus databases. This review employed Microsoft Excel software by content analysis. Specifically, "green HRM" and "ability motivation opportunity theory" were used as search terms in the Web of Science and Scopus databases.

3 Research results

Table 1 GHRM-AMO Theoretical Relationship

AMO Construct	Objective	GHRM Practices	Practices mentioned in Studies
Ability	Identify and applying green competencies	Green competence building, Green recruitment and selection, Green training and development Employee green creativity Environmental Knowledge	2 26 26 1 2
Motivation	Creating an appraisal and reward system that reinforces green behaviours	Green motivation enhancing, Green performance management Green pay and rewards Green lifestyle Employee green passion Green organization culture Green health and safety	2 26 26 1 1 4 5
Opportunity	Offering the opportunity to be proactive in the crafting of activities aimed at increasing green behaviours	Green employee involvement Green employee empowerment	4 3

Source: Own Processing

The table.1 shows GHRM-AMO relationship. The 26 papers which accounted for GHRM dimension under the lens of AMO theory mostly consist of quantitative studies. Among all above mentioned GHRM paractices, Green recruitment and selection, Green training and development are the factors which frequncy are high and found in all papers under the construct of ability. Green performance management and green pay and rewards is also important dimension found in the selected papers under the motivation factors. All 26 papers reported that green performance management stimulating green employee behaviors and reinforcing long-term organizational outcomes. Also few studies also reported that Green organization culture and Green health and safety dimensions have been linked to employee-related outcome and that reinforces green behaviours.

Table 2 A review of GHRM studies under the lens of AMO theory

Author (s)	Study Type	Predictors	Outcomes	Mediators	Moderators
Anwar et al. (2020)	Quantitative (Sample Size n=122)	Green Competence, Motivation Enhancing, Employee Involvement	Environmental Performance	Organization Citizenship Behavior towards the environment	
Yu et al. (2020)	Quantitative (Sample Size n=126)	GHRM	Environmental Cooperation with Customers, Suppliers		Internal GSM
Yong et al. (2020)	Quantitative (Sample Size n=122)	Green Analysis & Description of Job Position, Green Recruitment, Green Selection, Green Training, Green Performance, Green Rewards	Sustainability		
Singh et al. (2020)	Quantitative (Sample Size n=309)	Green Transformational Leadership	Environmental Performance	GHRM Practices Green Ability, Motivation, Opportunity, Green Innovation	
Moraes et al. (2019)	Quantitative (Sample Size n=178)	Environmental Training, Environmental Empowerment, Team Work	Eco-Efficiency Performance		

Pham et al. (2019)	Quantitative (Sample Size n=209)	Green Training	Organization Citizenship Behavior towards the environment		Green Employee Involvement, Green Performance Management
Cheem and Javed (2017)	Quantitative (Sample Size n=273)	Selection & Recruitment, Rewards & Pay system, Performance & Appraisal	Corporate Social Responsibility	Sustainable Environment	

Source: Own Processing

The table.2 demonstrates review of recent studies on phenomenon of GHRM under the theretical perspective of AMO. Anwar et al. (2020) , green competence, motivation enhancing, employee involvement reported factors as predictor and related to consequence of environmental performance . Also,Yong et al. (2020) ,and Pham et al. (2019) addressed green traing as antecendant to GHRM showed the effect, respectively, of sustainability and organization citizenship behavior towards the environment. Eco-effciency is new outcome in the existing literature which studied by Moraes et al.,(2019), they found that environmental trainint boost the eco-friendly behavior of employees at the workplace. The most of studies explored the environmental performance in the recent years due to global concerns on climate change. This systematic quantitative literature review aims to put shed light on how GHRM can make impact the implementation of employee and organization related aspects at the workplace. This work is not without limitations. First, our eligibility requirements were omitted. It is possible that research work published in different languages may have provided non english articles. A noteworthy contribution to this study.Secondly, we omitted the proceedings of of the meeting thus theoretically losing susbstantial data regarding current GHRM trials and initiatives. Ultimately, to the best from our understanding given our selction criteria, this study considered all the qualifying articles.

4 Conclusions

This review found GHRM practices boost environmental sustainability by ability motivation opportunity (AMO) framework at the workplace. This review found through trend analysis that most of GHRM studies conducted in developing countries context. This review revealed that green recruitment and selection, green training and development, green performance management and green pay and rewards are mostly explored Among the selected papers creativity, green lifestyle, employee green passion, Green competence building, green motivation enhancing, environmental knowledge and environmental responsibility.

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References:

Amrutha, V. N., & Geetha, S. N. (2020). A systematic review of green human resource management: Implications for social sustainability. Journal of Cleaner Production, 247, 119131.

Anwar, N., Mahmood, N. H. N., Yusliza, M. Y., Ramayah, T., Faezah, J. N., & Khalid, W. (2020). Green Human Resource Management for organizational Citizenship behaviour towards the environment and environmental performance on a university campus. Journal of Cleaner Production, 256, 120401.

Appelbaum, E., (2000). Manufacturing Advantage: Why High-Performance Work Systems Pay off. Cornell University Press, Ithaca, NY.

Boselie, P., Dietz, G., Boon, C., (2005). Commonalities and contradictions in HRM and performance research. Human. Resource. Management. Journal. 15 (3), 67e94.

Benevene, P., & Buonomo, I. (2020). Green Human Resource Management: An Evidence-Based Systematic Literature Review. Sustainability, 12(15), 5974.

Bos-Nehles AC, MJ Van Riemsdijk and J Kees Looise (2013) Employee perceptions of line management performance: applying the AMO theory to explain the effectiveness of line managers' HRM implementation. Human Resource Management 52(6), 861–877

Cheema, S., & Javed, F. (2017). The effects of corporate social responsibility toward green human resource management: The mediating role of sustainable environment. Cogent Business & Management, 4(1), 1310012.

Daily BF, JW Bishop and JA Massoud (2012) The role of training and empowerment in environmental performance: a study of the Mexican maquiladora industry. International Journal of Operations and Production Management 32(5), 631–647.

Guerci, M., & Carollo, L. (2016). A paradox view on green human resource management: Insights from the Italian context. International Journal of Human Resource Management, 27(2): 212–23.

Harvey, G., Williams, K., Probert, J., 2013. Greening the airline pilot: HRM and the green performance of airlines in the UK. Int. J. Human Resource Management. 24 (1), 152e166.

Jackson, S. E., Renwick, D. W., Jabbour, C. J., & Muller-Camen, M. (2011). State-of-the-art and future directions for green human resource management: Introduction to the special issue. German Journal of Human Resource Management, 25(2), 99-116.

Kim, A., Kim, Y., Han, K., Jackson, S.E., Ployhart, R.E., (2017). Multilevel influences on voluntary workplace green behaviour: individual differences, leader behaviour, and coworker advocacy. J. Manag. 43 (5), 1335e1358.

Marin-Garcia, J. A., & Tomas, J. M. (2016). Deconstructing AMO framework: A systematic review. Intangible Capital, 12(4), 1040-1087.

de Souza Moraes, S., Jabbour, C. J. C., Battistelle, R. A., Rodrigues, J. M., Renwick, D. S., Foropon, C., & Roubaud, D. (2019). When knowledge management matters: interplay between green human resources and eco-efficiency in the financial service industry. Journal of Knowledge Management. Vol. 23 No. 9, pp. 1691-1707.

McDonald S (2011) Green behaviour: differences in recycling behaviour between the home and the workplace. In D Bartlett (ed) Going green: the psychology of sustainability in the workplace, 59– 64. British Psychological Society, Leicester, UK.

Pham, N. T., Tučková, Z., & Jabbour, C. J. C. (2019). Greening the hospitality industry: How do green human resource management practices influence organizational citizenship behavior in hotels? A mixed-methods study. Tourism Management, 72, 386-399.

Pinzone, M., Guerci, M., Lettieri, E., & Redman, T. (2016). Progressing in the change journey towards sustainability in healthcare: the role of 'Green'HRM. Journal of Cleaner Production, 122, 201-211.

Ren, S., Tang, G., & Jackson, S. E. (2018). Green human resource management research in emergence: A review and future directions. Asia Pacific Journal of Management, 35(3), 769-803.

Ramus, C.A., 2002. Encouraging innovative environmental actions: what companies and managers must do. J. World Bus. 37 (2), 151e164.

Renwick, D. W., Jabbour, C. J., Muller-Camen, M., Redman, T., & Wilkinson, A. (2016). Contemporary developments in Green (environmental) HRM scholarship. International Journal of Human Resource Management

Renwick, D. W., Redman, T., & Maguire, S. (2013). Green human resource management: A review and research agenda. International Journal of Management Reviews, 15(1), 1-14.

Singh, S. K., Del Giudice, M., Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. Technological Forecasting and Social Change, 150, 119762.

Tranfield, D., Denyer, D. and Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. British Journal of Management, 14, pp. 207-222.

Yong, J. Y., Yusliza, M. Y., Ramayah, T., Chiappetta Jabbour, C. J., Sehnem, S., & Mani, V. (2020). Pathways towards sustainability in manufacturing organizations: Empirical evidence on the role of green human resource management. Business Strategy and the Environment, 29(1), 212-228.

Yu, W., Chavez, R., Feng, M., Wong, C. Y., & Fynes, B. (2020). Green human resource management and environmental cooperation: An ability-motivation-opportunity and contingency perspective. International Journal of Production Economics, 219, 224-235.

Mathematical-statistical Modelling and Optimization in Practice

Electricity supplier selection in the Czech Republic in 2020 for retail customers – optimization model

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Abstract: The electricity market in the Czech Republic from the retail customers' (households', entrepreneurs') point of view is changing every year and although the information about the prices for the electricity consumption for households is available on the web, it is not easy to follow all the rules, prices and finally to compare the annual costs. The final decision of an entrepreneur is also influenced by the fact if he/she can have the tariff for households or it is necessary or suitable and cheaper to have a tariff for small entrepreneurs. In this article the analysis of the Czech electricity market and the distribution rates D25d (households) and C25d (entrepreneurs) is made for the year 2020 to find out the differences in annual costs and the ranges for the electricity consumption where the given product is the cheapest one. Non-dominance testing and linear optimization models are used to obtain the solution.
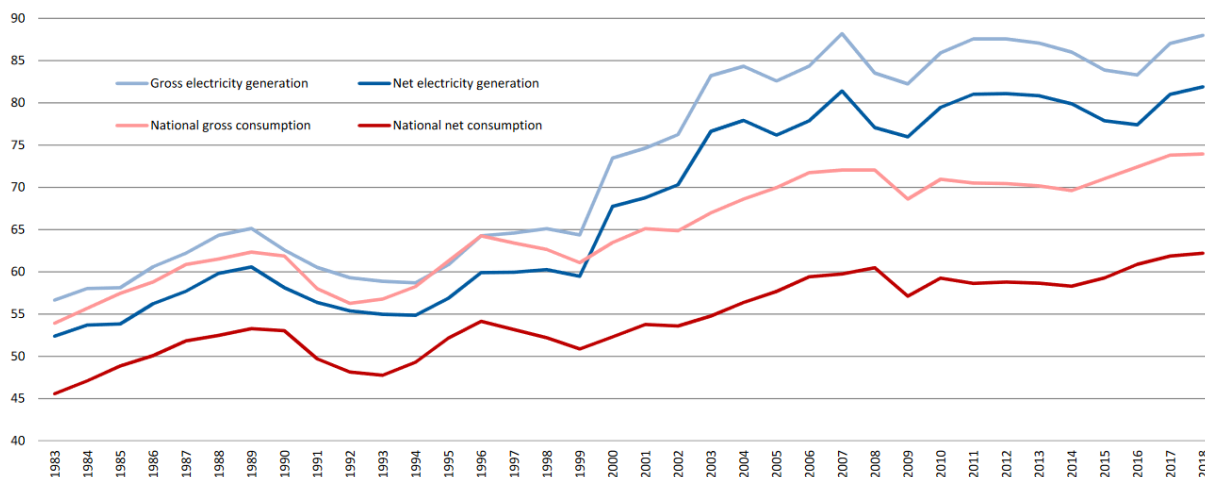
Keywords: electricity consumption, electricity suppliers, entrepreneurs, households, optimization model

JEL Classification: C44, D14, O13, L26

1 Introduction

Electricity is one of the commodities without which the ordinary life can no longer be imagined. Only when the electricity supply is interrupted we will realize how big our dependence on electricity is, and how difficult or even impossible it would be without it. Electricity makes our work and study easier, in some situations it saves our time (when washing, cooking, storing food) and allows us to use various devices for sports or cultural activities. Each of us uses it daily - devices such as lighting, televisions, computers, mobile phones and electrical appliances such as refrigerators, freezers, stoves and other household appliances could not work without electricity. Although the number of energy-saving electrical appliances is increasing, new and new devices are constantly appearing – and probably it is the reason why electricity consumption has become more or less increasing in recent years (Figure 1).

Figure 1 Long-term development in electricity generation and consumption in the Czech Republic (TWh)

Source: ERU (2019)

According to the study of Karanfil and Li (2015) the electricity-growth nexus is highly sensitive to regional differences, countries' income levels, urbanization rates and supply risks. The increase of the consumption of households might be caused by the development of ICT and the growing number of various machines and other electrical devices, the decrease by the lower demand of new appliances for the electricity consumption. Fischer (2008) has stated that sustainable electricity consumption is a Herculean task because households seem to be a particularly difficult target group. If the data

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presentation is not clear for the households to easy understand the consumption, they might have problems with understanding the system of electricity consumption costs calculation – this is also the case of the Czech Republic.

In the year 2006, the Czech electricity market underwent a significant transformation and individual households as well as companies could choose their electricity supplier (Boltz, 2013). Quite logically, customers prefer suppliers who provide cheaper electricity. But the electricity consumption costs are affected not only by suppliers, but also by the distributor for the given area, the Energy Regulatory Office (ERU) and the electricity market operator (OTE) (OTE, 2020). There are three distributors operating on the Czech market, each of which manages a different area. Pražská energetika, (PRE) covers the area of the capital city of Prague, E.ON Distribuce (E.ON) manages the entire South Bohemian and South Moravian regions, as well as the Vysočina Region (except Havlíčkův Brod District), Zlín Region (except Vsetín District) and Prostějov district in the Olomouc region. The remaining areas of the Czech Republic fall under ČEZ Distribuce (ČEZ) - see Figure 2.

Figure 2 Map of electricity distributors

Source: Cenyenergie.cz (2020)

The number of electricity suppliers on the Czech market changes every year and most of them offer several products. The complete list of products can be obtained using various web calculators, from the websites of individual suppliers, or on the basis of the ERU price calculator (ERU-calculator, 2020). The individual products then differ both according to the supplier's prices and the distribution rate, as well as according to the distribution area, i.e. the consumer's place of residence, and other conditions. The main criterion for choosing a supplier is usually the price, resp. costs of electricity consumption, so these criteria are important for this article, other conditions for products (e.g. length of contract, etc.) are not covered. It is sometimes difficult for consumers to choose the most suitable supplier and the relevant product, despite the possibility of comparison with the use of a calculator (ERU-calculator, 2020), because not every customer has an overview of the exact annual electricity consumption or possible fluctuations during years. As a result, it is hard to estimate whether another product or another supplier is not more advantageous with slightly higher or lower consumption.

The aim of this article is to describe the situation on the electricity market in 2020 from the perspective of households and small businesses (entrepreneurs). Data for electricity consumption in the tariff rate D25d for households, resp. C25d for entrepreneurs are used - both rates are associated with the use of electricity for hot water heating. The reason for choosing this rate are previous analyzes devoted to the distribution rate D25d (e.g. Kuncová & Sekničková, 2019; Kuncová, 2015). Based on our previous analyses of the D25d distribution rate best product selection (for the given household), the optimization model is created to find for what ratio of the high and low tariff rates the given product is the cheapest one both for households in D25d and for entrepreneurs in C25d.

According to Decree No. 408/2015 Coll., the distribution rate D can be used by "a natural person whose consumption point is connected to the distribution system with voltage between phases up to and including 1 kV and who consumes electricity to satisfy his personal needs related to housing or personal needs of members of his household. A category D customer is also considered to be a natural or legal person within the scope of electricity consumption only for the needs of administration and operation of common parts of the house serving only for joint use by owners or users of flats". Therefore, if the nature of the business is such that its performance is not tied to the place of residence (eg. painter, electrician), the entrepreneur may use the distribution rate D25d. All entrepreneurs whose establishment is inextricably linked to their place of residence and who cannot carry on a trade elsewhere must use the C25d product. In this paper the differences in the annual costs of D25d and C25d usage are described.

2 Methods

There are several ways how to analyze the offered products from the point of view of total annual costs or from the point of view of prices of electricity consumption (Ventosa et al., 2005, Kuncová, 2015). One of the possibilities is the use of a non-dominance test and possibly also multi-criteria evaluation of products (Diakoulaki & Karangelis, 2007), another possibility is the use of Monte Carlo simulation (Hegazy et al., 2003; Kuncová & Sekničková, 2014) and finally the creation of an optimization model is also suitable (Kuncová & Sekničková, 2019). This approach will also be used in this article and will be supplemented by a non-dominance test, thanks to which the products offered can be divided into "good" and "bad" in terms of comparable price criteria. The test of non-dominance (Figueira et al, 2005) consists in finding dominated alternatives that can never be in the first place, because in the list of alternatives there is an alternative that is better than the dominated alternative according to at least one criterion, and at the same time is not worse in any other criterion. Alternatives that do not fall into the dominated are referred to as non-dominated, and each of them may be placed first under certain conditions. Products offered by electricity suppliers are understood as alternatives, the criteria include the prices of suppliers and distributors for electricity consumption in the high and low tariffs and the fixed rates for the circuit breaker. The comparison is always made for a given distribution region separately.

The tariff rate D25d is given to household (C25d for entrepreneurs) when the electricity is also used for the accumulative heating and hot water heating for lower and middle yearly offtake with operative management of the validity period of the low tariff for 8 hours. It is the so-called dual tariff rate as it has 2 periods (high tariff, low tariff) during the day. The remaining 16 hours fall into a high tariff. The situation for a household with a circuit breaker from 3x20A to 3x25A and with the fixed power consumption of 10 MWh was previously analyzed (e.g. Kuncová & Sekničková, 2019; Kuncová, 2015, Kuncová & Sekničková, 2014), that is why this paper continues with the same conditions. The analysis assumed that 45% of the energy is collected at a high rate and 55% at a low rate. In this article, the optimization models are used to find the cheapest products for household and for entrepreneur and to compare the results. Also the non-dominance test are applied to see what products could be "winners" with regard to price criteria.

The choice of a suitable product in terms of single-criterion optimization should be made by the customer based on the total cost of distribution and supply of electricity. The final annual cost is determined for each product $i = 1, \dots, m$ and distributor $j = 1, 2, 3$ according to the following relationship:

$$COST_{ij} = (1 + VAT)\left[12\left(mf_{ij} + mf_j + mo\right) + c\left(r^{HT}\left(p_{ij}^{HT} + p_j^{HT}\right) + r^{LT}\left(p_{ij}^{LT} + p_j^{LT}\right) + os + t\right)\right] \tag{1}$$

where
VAT … value added tax,
mf_{ij} … fix monthly fee of the product i and distributor j,
mf_j … fix monthly fee (for the circuit breaker) of the distributor j,
mo … monthly payment for other services,
c … annual consumption in MWh,
p_{ij}^{HT} … price in high tariff per 1 MWh of the product i and distributor j,
p_j^{HT} … price in high tariff per 1 MWh of the distributor j,
p_{ij}^{LT} … price in low tariff per 1 MWh of the product i and distributor j,
p_j^{LT} … price in low tariff per 1 MWh of the distributor j,
r^{HT} … percentage of the consumption in high tariff,
r^{LT} … percentage of the consumption in low tariff,
os … price for other services per 1 MWh (system services, support for electricity from supported energy sources)
t … electricity tax per 1 MWh (t = 28.3 CZK).

The final customer in the distribution area j should therefore choose the appropriate product i to minimize these annual costs:

For 2020 and the analyzed D25d rate for households, 70 products from 28 suppliers are offered in all three distribution regions - compared to previous years (Kuncová & Sekničková, 2019) this is an increase in the number of products offered and a steady state of the number of suppliers, which does not mean the same suppliers. E.g. compared to 2017, there are 4 new supplier companies on the market, while 5 companies no longer offer any product at this distribution rate, some have already left the electricity market. The C25d rate is identical in definition to the D25d rate, but is intended for small businesses consumption (entrepreneurs). For 2020, 52 products are offered from 24 suppliers, which, with one exception, match the suppliers at the D25d rate. Table 1 summarizes the average prices and fees of suppliers in each distribution area. It is evident that the prices and fees for entrepreneurs (C25d) are higher than for households (D25d). Table 2 describes the distributors' prices and fees – and also here there are big differences between D25d and C25d tariffs.

Table 1 Suppliers' average prices and fees in 2020

rate	distrib. region	Suppliers' monthly fee avg.	high tariff avg.price per 1 MWh	low tariff avg.price per 1 MWh
D25d	**PRE**	58.07	1 701.28	1 394.80
	E.ON	57.46	1 736.66	1 401.16
	ČEZ	57.81	1 698.72	1 419.99
C25d	**PRE**	68.37	1 783.88	1 424.90
	E.ON	65.70	1 825.48	1 445.95
	ČEZ	66.18	1 793.83	1 442.40

Source: Own calculations based on ERU-calculator (2020)

Table 2 Distributors' prices and fees in 2020

rate	distrib. region	circuit-breaker monthly fee	distributor's high tariff price per 1 MWh	distributor's low tariff price per 1 MWh	distributor's other services price per 1 MWh
D25d	**E.ON**	125.00	1 572.95	164.93	572.12
	PRE	129.00	1 826.14	140.85	
	CEZ	136.00	1 848.51	134.56	
C25d	**E.ON**	314.00	2 084.94	164.93	572.12
	PRE	332.00	2 148.82	140.85	
	CEZ	281.00	1 897.90	134.56	

Source: ERU-calculator (2020)

3 Research results

According to the data from ERU-calculator (2020) the optimization models based on the formula (1) were solved for all non-dominated products. For the distribution rate D25d there are 7 (E.ON, ČEZ) or 9 (PRE) non-dominated products out of the 70 (10-13%), so it was necessary to solve 23 optimization problems. The results were the same in terms of the amount of consumption in all distribution regions, the differences are in the cost of annual electricity consumption (Table 3). The tables also show the product of Pražská plynárenská, a.s., that is the cheapest one only at zero consumption, which is rather a hypothetical situation. Fonergy s.r.o. offered the cheapest product for lower electricity consumption, ELIMON offered the medium-sized product and Gazela Energy a.s. had the cheapest product for high consumption. The cheapest distribution region is PRE followed by E.ON, the most expensive region is ČEZ. The difference between the annual electricity consumption cost among regions is about 3-8%.

Table 3 Optimization results for the D25d distribution rate and year 2020

D25d		consumption MWh/year		costs/year CZK	
PRE		from	to	from	to
61	Pražská plynárenská, a.s., PRODUKT Komplet	0	0	1888.76	1888.76
47	Fonergy, s.r.o.,PREMIUM	0	1.551	1888.76	7291.80
26	ELIMON, Svěží CENÍK	1.551	18	7291.80	61666.71
52	Gazela Energy, a.s., Domácnost	18	infinity	61666.71	infinity
E.ON					
61	Pražská plynárenská, a.s., PRODUKT Komplet	0	0	1946.84	1946.84
47	Fonergy, s.r.o.,PREMIUM	0	1.551	1946.84	7538.86
26	ELIMON, Svěží CENÍK	1.551	18	7538.86	63917.85
52	Gazela Energy, a.s., Domácnost	18	infinity	63917.85	infinity
ČEZ					
61	Pražská plynárenská, a.s., PRODUKT Komplet	0	0	2048.48	2048.48
47	Fonergy, s.r.o.,PREMIUM	0	1.551	2048.48	7653.89
26	ELIMON, Svěží CENÍK	1.551	18	7653.89	64163.39
52	Gazela Energy, a.s., Domácnost	18	infinity	64163.39	infinity

Source: ERU-calculator (2020), own calculations

The same analysis was done with the data for the distribution rate C25d. Out of the 50 products only 5 are non-dominated (10%), so only 15 optimization models were necessary to solve. The results are similar to the situation for households (D25d) in the sense that the best products are the same for each distribution region and also the cheapest

suppliers are nearly the same, only costs are different (Table 4). For the small entrepreneurs with C25d distribution rate with small consumption, the product offered by Pražská plynárenská, a.s. is the cheapest one, or the average consumption the product from ELIMON should be selected and for the high consumption (more than 21.415 MWh per year) the best product is offered by Eneka s.r.o. Contrary to households, ČEZ is the cheapest distribution area followed by PRE and E.ON, the differences are around 4-10%.

Based on the results it is clear that the annual consumption costs are higher in the C25d distribution rate – when the consumption for the small entrepreneur are about 1.551 MWh, the annual costs are about 45% (PRE, E.ON) or 30% (ČEZ) higher than for D25d distribution rate. For the consumption 18 MWh per year the difference in annual costs is smaller – about 6-15%.

Table 4 Optimization results for the C25d tariff rate and year 2020

	C25d	consumption MWh/year		costs/year CZK	
		from	to	from	to
PRE					
33	Fonergy, s.r.o.,PREMIUM	0	0	4633.04	4633.04
44	Pražská plynárenská, a.s., PRODUKT Komplet	0	2.441	4633.04	13978.93
19	ELIMON, Svěží CENÍK	2.441	21.415	13978.93	83345.32
28	Eneka s.r.o., Jednička	21.415	infinity	83345.32	infinity
E.ON					
33	Fonergy, s.r.o.,PREMIUM	0	0	4894.40	4894.40
44	Pražská plynárenská, a.s., PRODUKT Komplet	0	2.441	4894.40	14286.09
19	ELIMON, Svěží CENÍK	2.441	21.415	14286.09	84008.38
28	Eneka s.r.o., Jednička	21.415	infinity	84008.38	infinity
ČEZ					
33	Fonergy, s.r.o.,PREMIUM	0	0	4153.88	4153.88
44	Pražská plynárenská, a.s., PRODUKT Komplet	0	2.441	4153.88	13201.81
19	ELIMON, Svěží CENÍK	2.441	21.415	13201.81	80252.31
28	Eneka s.r.o., Jednička	21.415	infinity	80252.31	infinity

Source: ERU-calculator (2020), own calculations

4 Conclusions

The number of products offered by electricity suppliers to households (D25d distribution rate) and small entrepreneurs (at the C25d distribution rate) for the year 2020 is very high (70 products for D25d and 52 products for C25d). Based on the non-dominance testing, most of the products are not suitable for any household nor entrepreneur, as they are dominated by another product with smaller prices. Only about 10-13% of the products are non-dominated, i.e. theoretically they can be among the cheapest. According to the optimization models the intervals for household and entrepreneur electricity consumption were found. Regardless of whether it is a household or a small entrepreneur, only 3 products are among the cheapest in terms of annual electricity consumption.

As it is stated in the Decree No. 408/2015 Coll., the distribution rate D can be used by a household that consumes electricity to satisfy the personal needs related to housing or personal needs of members of the household, and sometimes also it can be used by a legal person especially when the nature of the business is such that its performance is not tied to the place of residence. All other entrepreneurs who are not inextricably linked to their place of residence and who cannot carry on a trade elsewhere must use the C products. Based on the optimization models' results it is not appropriate for small entrepreneurs to switch to the distribution rate C25d unless they are subject to the rules given by the above-mentioned decree. If it is necessary, their annual electricity consumption costs will be about 6-45% higher compared to the D25d distribution rate. If the entrepreneur has to use the C25d distribution rate and he can choose the place of his business, then the cheapest region is ČEZ. For households, on the contrary, it is PRE. As the differences in the annual costs of the electricity consumption can be negligible, it is appropriate to monitor the market situation and price developments and to select electricity suppliers accordingly.

References

Boltz, W. (2013). The Challenges of Electricity Market Regulation in the European Union. *Evolution of Global Electricity Markets*. Elsevier Inc. 2013, 199-224.

Cenyenergie.cz (2020). Platba za jistič: Kolik nás stojí rezervovaný příkon? Retrieved August 15, 2020, from https://www.cenyenergie.cz/poplatek-platba-za-jistic-rezervovany-prikon/#/promo-ele-mini

Decree No. 408/2015 Coll. (2020). Decree on Electricity Market Rules. Retrieved August 30, 2020, from https://www.za-konyprolidi.cz/cs/2015-408

Diakoulaki, D., & Karangelis, F. (2007). Multi-criteria decision analysis and cost–benefit analysis of alternative scenarios for the power generation sector in Greece. *Renewable and Sustainable Energy Reviews.* 11/4, 716–727.

ERU (2019). Yearly Report on the Operation of the Czech Electrical Grid 2018. Retrieved August 30, 2020, from http://www.eru.cz/documents/10540/4580207/Yearly_report_electricity_2018.pdf/f25a55d8-6730-4521-8e40-96d8e5f00c70

ERU-calculator. (2020). Price calculator. Retrieved August 10, 2020, from http://kalkulator.eru.cz/

Figueira, J., Greco, S., & Ehrgott M. (2005). Multiple Criteria Decision Analysis – State of the Art Surveys. New York: Springer Science + Business Media Inc.

Fischer, C. (2008). Feedback on household electricity consumption: a tool for saving energy? *Energy Efficiency*, 1, 79-104.

Hegazy, Y.G., Salama, M.M.A., & Chickhani, A.Y. (2003). Adequacy assessment of distributed generation systems using Monte Carlo Simulation. *Power Systems - IEEE Transactions.* 18/1, 48-52.

Karanfil, F. & Li, Y. (2015). Electricity consumption and economic growth: Exploring panel-specific differences. *Energy Policy.* 82, 264-277.

Kuncová, M., & Sekničková, J. (2019). Electricity Consumption Cost for Households in the Czech Republic Based on the High and Low Tariff Rates Ratio – Optimization Model. *Proceedings of the 37th Mathematical Methods in Economics*. České Budějovice: JČU. 547-553.

Kuncová, M., & Sekničková, J. (2014). Analysis of the efficiency of the electricity supplier selection depending upon the price changes. *Proceedings of the 32nd Mathematical Methods in Economics*. Olomouc: Univerzita Palackého v Olomouci. 542–547.

Kuncová, M. (2015). Methods for the Electricity Supplier Selection - Case Study of the Czech Republic. *International Journal of Mathematical Models and Methods in Applied Sciences*, 9, 714-720.

OTE (2020). Basic information. Retrieved August 10, 2020, from https://www.ote-cr.cz/cs/o-spolecnosti/zakladni-udaje

Ventosa, M., Baíllo, Á., Ramos, A. & Rivier, M. (2005): Electricity Markets modelling trends, *Energy Policy*. 33, 897–913.

Default in Selected Sectors in the Czech Republic

Radmila Krkošková[1]

Abstract: The paper investigates the relationship between the macroeconomic indicators and default rate in the sector of construction and the sector of financial and insurance activities in the Czech Republic. Both long-term and short-term relationships are analysed. This approach requires the construction of vector error correction model which determines both long-term and short-term causal relationship. This investigation is based on the time series of the share of outstanding loans and the total amount of loans, and on selected macroeconomic variables. The results confirm the existence of statistically significant relationships between macroeconomic indicators and the probability of defaults within both sectors. We have used the data from 2005Q1 to 2019Q4. Calculations have been performed by using the Eviews software.

Keywords: ADF test, co-integration test, construction, default rate, financial and insurance activities, macroeconomic factors, VECM
JEL Classification: G21, G28

1 Introduction

Banks need to have criteria to help them in their decisions. The risk of failure is considered as the most important criterion for banks. A key tool for increasing an institution's profitability is good risk identification and management. From the point of view of the bank or other financial institutions, the most important risk is the credit risk, which is the possibility of a loss due to the debtor's inability to fulfil its obligations, as Foglia (2009) states. The key parameter of the credit risk is the probability of default (PD). Other parameters include the default loss and the default exposure, as reported by Ferrari at al., (2011). The probability of default is also a very important component in banks 'stress testing, where the financial system is tested under various macroeconomic scenarios (Virolainen, 2004). The default rate for different entities rises during the recession. Estimating the default rate is a topic of both the professional and academic public, as Stoklasová (2018) shows.

The issue of default also concerns, for example, China. As its economy has experienced a marked slowdown since 2018, China has been hit with an all-time high rate of business defaults despite the government's effort to prevent this by brutal fiscal stimulus packages, or the support from the central bank which guaranteed a significant part of loans to Chinese businesses. Fitch Ratings warned of the collapse of Chinese businesses as by the end of the third quarter 25 Chinese corporate issuers have failed to settle payments for 52 mainland bonds, valued at 60.6 billion yuan (12.1 billion dollars). The business bond delinquency continued in 2020 due to refinancing expenses, although one would expect these to concern primarily the privatised private sector. The COVID-19 crisis further compounded this and the increasingly harsh attitude of the USA regarding their trade deficit with China has begun to strongly impact the Chinese private sector.

This paper deals with finding the influence of macroeconomic variables on the default rate within the sector of construction, and the sector of financial and insurance activities in the Czech Republic.

The Construction section includes general construction and specialised construction activities for buildings and civil engineering works. It includes new works, repairs, additions and alterations, the erection of prefabricated buildings or structures on the site and also construction of a temporary nature. General construction is the construction of entire dwellings, office buildings, stores and other public and utility buildings, farm buildings etc., or the construction of civil engineering works such as motorways, streets, bridges, tunnels, railways, airfields, harbours and other water projects, irrigation systems, sewerage systems, industrial facilities, pipelines and electric lines, sports facilities etc. It also includes the repair of buildings and engineering works (NACE, 2020a).

The Financial and insurance activities section includes financial service activities, including insurance, reinsurance and pension funding activities and activities to support financial services. This section also includes the activities of holding assets, such as activities of holding companies and the activities of trusts, funds and similar financial entities (NACE, 2020b).

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The core of this paper is the analysis of four hypotheses concerning the relationship between the macroeconomic indicators and the default rate in the sector of construction and the sector of financial services and activities in the Czech Republic: H1: There is a long-term relationship between the macroeconomic indicators and the default rate in the sector of construction in the Czech Republic, H2: There is a short-term relationship between the macroeconomic indicators and the default rate in the sector of construction in the Czech Republic, H3: There is a long-term relationship between the macroeconomic indicators and the default rate in the sector of financial and insurance activities in the Czech Republic, H4: There is a short-term relationship between the macroeconomic indicators and the default rate in the sector of financial and insurance activities in the Czech Republic.

This article has the following structure. The second part of this paper presents data and methods. The third part contains econometric models and their results describing the default rate in both sectors. The results are summarized in the conclusion.

2 Data and methods

Three approaches are used to the model macroeconomic credit risk. The first approach is based on the search for an empirical relationship between some of the default probability indicators as a dependent variable and key macroeconomic indicators as independent variables, (Chan-Lau, 2006). The second approach is based on a model which, as the debtor's default, raises the situation where the value of the return on his assets falls below a certain threshold as shows Jakubík (2007). The third approach is based on models that treat default as a random factor, as reported by Jarrow &Turnbull (1995). This paper deals with the first approach.

Quarterly data for the period from 2005/Q1 to 2019/Q4 were used for the calculations. The ARAD database of the Czech National Bank (2020) was the primary data source. The description of individual variables is shown in Table 1. The selection of variables was done according to Allen & Saunders (2003).

Table 1 Description of variables

Variable designation	Description of variable
YC	The default rate is defined as the proportion of newly created 'bad' loans to the total volume of loans in the sector of construction.
YF	The default rate is defined as the proportion of newly created 'bad' loans to the total volume of loans in the sector of financial and insurance activities.
GDP	Gross domestic product at current prices in millions of CZK. The lower GDP growth means the lower sales growth and it is more difficult for businesses to generate profits. For this reason, the default rate is expected to be higher with the lower GDP.
CPI	Consumer Price Index (2005=100). It is assumed that the rise in price indices the (inflation growth) will cause an increase in the default rate.
M2	Monetary aggregate M2 in millions of CZK. In the short term, the money supply decreases the interest rate and a reduction in the default rate can be expected. In the long run, a positive relationship between money supply and the default rate is expected due to increases in price.
ER	CZK/EUR. The exchange the rate depreciation does not have a clear effect on the default of firms. For import firms, the growth of the exchange rate has the effect of increasing their costs (the growth of the exchange rate leads to an increase in the probability of default). The opposite is true for export companies.
BRENT	Oil price index (2005=100). The growth in oil prices is reflected in the growth of fuel, the price of which is entering most of the production. We can expect an increase in default with the increase in oil prices.
UN	The unemployment rate. A positive long-term and short-term relationship is assumed.

Source: Own processing

All these variables were seasonally adjusted, in addition by the logarithmic transformation. Individual time series were tested for the presence of unit roots. One of the most popular stationary tests is called the augmented Dickey-Fuller (ADF) test. Most time series in macroeconomics are non-stationary or integrated with order I(1), as stated in Engle & Granger (1987), Enders (2014). ADF test has the zero hypothesis: H_0: time series contains a unit root, i.e. that a time series is not stationary. An alternative hypothesis is placed against the zero hypothesis: H_1: a time series is stationary. The test results for all variables are provided in Table 2.

Table 2 Testing the unit root of variables in levels and their first differences

Variable	T-stat	Signif.	Result	Variable	T-stat	Signif.	Result
YC	− 0.002	0.975	N	D(YC)	− 6.112	0.000	S
YF	− 0.003	0.935	N	D(YF)	− 6.316	0.000	S
GDP	− 2.317	0.418	N	D(GDP)	− 3.435	0.014	S
CPI	− 2.019	0.577	N	D(CPI)	− 3.184	0.026	S
M2	− 3.156	0.104	N	D(M2)	− 1.272	0.185	N
ER	− 2.605	0.279	N	D(ER)	− 7.707	0.000	S
BRENT	− 2.517	0.116	N	D(BRENT)	− 7.329	0.000	S
UN	− 0.928	0.945	N	D(UN)	− 1.505	0.132	N

Source: Own processing

Except for the *M2* and *UN* variables, all variables are stationary in the first differences, meaning they are of the first order of integration; I(1). The further analysis will utilise only those variables which can be "co-integrated", i.e. variables with an identical nonzero order of integration. See e.g. Brooks (2008). The monetary aggregate *M2* and the unemployment rate *UN* were excluded from the further analysis.

In this paper a model suggested by Wilson (1997) is used and the credit risk is modelled through a probability of default (PD) and macroeconomic variables (it is assumed that the PD is affected by the business cycle).

The PD is defined as follows:
$$p_t = \frac{1}{1 + e^{-y_t}}, \tag{1}$$

where p_t is the probability of the default at time *t* expressed by the default rate y_t. This transformation captures non-linear relationships between the default rate and macroeconomic variables. By solving equation (1) we obtain:
$$y_t = ln\left(\frac{p_t}{1 - p_t}\right). \tag{2}$$

Index y_t is defined as follows:
$$y_t = \beta_0 + \beta_1 x_{1t} + \beta_2 x_{2t} + \cdots + \beta_k x_{kt} + \varepsilon_t, \tag{3}$$

where $x_t = (x_{1t}, x_{2t}, \ldots, x_{kt})$ is a vector of exogenous macroeconomic variables in time *t*, $\varepsilon_t \sim N(0, \ \sigma_\varepsilon)$.

3 Research results

It was discovered that all variables, except for *M2* (monetary aggregate) and *UN* (unemployment rate), contain a unit root and thus there is a possibility of co-integration relationships. Therefore, the Johansen co-integration test with the null hypothesis was performed, assuming there was no co-integration relationship between the variables being tested. The Johansen method uses two test statistics. The first one is based on the co-integration matrix trace, the other on the value of the co-integration matrix figures. Before determining the number of co-integration relationships, causal relationships were successively tested both for the *YC* and *YF* macroeconomic indexes with all utilised macroeconomic variables of varying lag-length. Variables with statistically non-significant coefficients were not included in the final model. Results confirm the presence of a single co-integration relationship for both sectors. The methods, presented below, can be found in the articles by Hendry & Juselius (2000, 2001). A VEC model with an unrestricted constant and no trend was used both for the construction sector, and for the finance and insurance sector.

3.1 Model for construction section

Our analysis of the construction-related model used the lag-length of 2. A statistically significant relationship to *YC* was discovered in case of the *GDP*, *ER*, *BRENT*, and *CPI* variables. The Johansen test established one co-integration vector.

A long-term relationship to the likelihood of default was established in case of the *GDP, ER* and *CPI* variables. The growth of the former two lowers the likelihood of default while a growing *CPI* increases it. No long-term effect of chang-ing oil prices on the likelihood of default was established. Based on the resulting shape of the adjustment vector, it can be argued that a complete elimination of short-term imbalances will take about 2 quarters.

Regarding short-term relationships to *YC*, a positive effect of changing oil prices was confirmed. Growing oil prices increase the likelihood of default after one quarter. Considering the sector's nature, this is to be expected. The exchange

rate depreciation works in the same direction. It follows, then, that a depreciation of the Czech currency has a negative effect on the solvency of construction businesses. A growing GDP causes outstanding loans to grow after the first quarter. This effect stops being statistically significant in the second quarter, confirming that banks are willing to give loans to less solvent businesses in times of the economic growth. Such businesses are subsequently unable to service their loans. In case of the *CPI* variable, the likelihood of default decreases one quarter after the *CPI* grows.

The following formula applies to the complex shape of the VEC model:

$$D(YC) = -0.48 \cdot [YC(-1) + 8.65 \cdot GDP(-1) + 12.56 \cdot ER(-1) - 5.48 \cdot CPI(-1)] +$$

$$+58.24 + 0.49 \cdot D(BRENT(-1)) + 7.36 \cdot D(ER(-1)) + 3.31 \cdot D(ER(-2)) - 10.59 \cdot D(CPI(-1)) + \varepsilon_t \quad (4)$$

This model meets the assumptions: the residual component is not correlated; residual component heteroscedasticity and residual component non-normality were not demonstrated. These results are described in Table 3.

Table 3 The assumptions of the model

	Autocorrelatioin	**Heteroscedasticity**	**Normality**
Null hypothesis	H₀: absence of autocorrelation	H₀: absence of heteroscedasticity	H₀: normality of residues
Test	Ljung – Box	ARCH – LM	Doornik – Hansen
Significance	0.623	0.527	0.392

Source: Own processing

Based on the value of the coefficient of determination, it can be argued that changes to a dependent variable are 54.2% explained by the chosen macroeconomic variables.

3.2 Model for financial and insurance activities section

Lag-length of 1 was chosen for the analysis of the finance and insurance model. A statistically significant relationship to *YF* was ascertained with the *GDP, BRENT* variables. The Johansen test established one co-integration vector.

Regarding long-term relationships, a one-point *GDP* growth causes *YF* to drop by 20 points while a one-point *BRENT* growth increases *YF* by 2 points. Based on the resulting shape of the adjustment vector, it can be argued that a complete elimination of short-term imbalances will take about 4.5 quarters.

Considering short-term effects, the GDP growth and oil prices both reduce the likelihood of default. This effect becomes apparent for both variables after one quarter.

The following formula applies to the complex shape of the VEC model:

$$D(YF) = -0.22 \cdot [YF(-1) + 19.86 \cdot GDP(-1) - 1.96 \cdot BRENT(-1)] +$$

$$+42.19 - 5.23 \cdot D(GDP(-1)) - 0.98 \cdot D(BRENT(-1)) + \varepsilon_t \quad (5)$$

The value of the coefficient of determination is 62%, a testament to the model's good information value. Except for the normality test, diagnostic tests have confirmed the model's stability.

Table 4 The assumptions of the model

	Autocorrelatioin	**Heteroscedasticity**	**Normality**
Null hypothesis	H₀: absence of autocorrelation	H₀: absence of heteroscedasticity	H₀: normality of residues
Test	Ljung – Box	ARCH – LM	Doornik – Hansen
Significance	0.471	0.356	0.032

Source: Own processing

4 Conclusions

The aim of this article was to discover the effect of macroeconomic valuables on the default rate in two sectors—the construction sector, and the finance and insurance sector. First, models were designed for both industries where the default rate served as the dependent variable, defined as a share of outstanding and total loans in each monitored industry respectively, at a quarterly rate from 2005 to 2019. By means of logit transformation, these default rates were transformed into macroeconomic indexes which assumed more extensive ranges of functions compared to the default rate. With macroeconomic indexes, the presence of a unit root was established for both sectors. This non-stationarity was removed upon the first difference. For the purposes of modelling the relationship between the variables mentioned above, the Vector Error Correction model was used as it captures both short-term, and long-term relationships.

Regarding the construction sector, the assumption of a *GDP* growth's negative effect on the increase of the default rate was confirmed for long-term relationships. For short-term relationships, the effect of the exchange rate depreciation

on the growth of the likelihood of default was confirmed, as well as the effect of inflation. In regard to inflation, it was confirmed that higher inflation leads to an improvement in the financial situation of debtors and stimulates construction businesses to undergo higher levels of investment risks which may have a negative impact on their solvency. In the construction sector, more businesses without a sufficient capital base are founded in periods of extended economic growth and banks are willing to grant loans to such businesses in times of prosperity.

In case of the finance and insurance sector, banks are more careful with granting loans in times of the economic boom. Increasing amounts of outstanding loans are accompanied by a growing indebtedness. The statistically significant effect on the likelihood of default in this sector is influenced by growing oil prices. In the short-term, this growth of oil prices causes outstanding loans to drop.

Acknowledgement

References

Allen, L. & Saunders, A. (2003). A Survey of Cyclical Effects in Credit Risk Measurement Models. *BIS Working Papers,* 126.

Brooks, C. (2008). *Introductorz Econometrics for Finance.* Cambridge: Cambridge University Press. ISBN 9780521694681.

Chan-Lau, J.A. (2006). Fundamentals-Based Estimation of Default Probabilities: A Survey. *IMF Working Paper*, 6(149).

CNB. (2020). ARAD – system časových řad. Retrieved March 1, 2020, from http://www.cnb.cz/docs/ARADY/HTML/index.htm.

Enders, W. (2014). *Applied econometric time series*. 4th Edition. John Wiley, New York.

Engle, R. F., & Granger, C. W. J. (1987). Co-Integration and Error Correction: Representation, Estimation, and Testing. *Econometrica*, 55 (2), 251-276.

Ferrari, S. & Roy, P.V. (2011). Stress Testing Credit Risk: Modelling Issues. In C. Vespro (Eds.), *Financial Stability Review*, 9(1), 105–120.

Foglia, A. (2009). Stress Testing Credit Risk: A Survey of Authorities Approaches. *International Journal of Central Banking*, 1(5), 9–45.

Hendry, D. & Juselius, K. (2000).Explaining Cointegration Analysis:PartI.*The Energy Journal,* 21(1), 1-42.

Hendry,D. & Juselius,K.(2001).Explaining Cointegration Analysis:PartII.*The Energy Journal,*22(1),75-120.

Jakubík, P. (2007). Macroeconomic Environment Credit Risk. *Czech Journal of Economics and Finance*, 57(1), 60-78.

Jarrow, R. & Turnbull, S. (1995). Pricing Options on Financial Securities Subject to Default Risk. *Journal of Finance*, 50(1), 53–86.

NACE. (2020a). Retrieved August 1, 2020, from http://www.nace.cz/F-stavebnictvi

NACE. (2020b). Retrieved August 1, 2020, from http://www.nace.cz/K-peneznictvi-pojistovnictvi

Stoklasová, R. (2018). Default rate in the Czech Republic depending on selected macroeconomic indicators. *E&M Economics and Management*, 21(2), 69–82.

Virolainen, K. (2004). Macro Stress Testing with a Macroeconomic Credit Risk Model for Finland. *Bank of Finland Discussion Paper,* 18/2004, 1-48.

Wilson, T. C. (1997). Portfolio Credit Risk (II). *Risk Magazine*, 10(10), 56–61.

Network revenue capacity control with overbooking

Petr Fiala[1], Renata Majovská[2]

Abstract: Revenue management is the art and science of enhancing firm revenue while selling the same quantity of product. Network revenue management models attempt to maximize revenue when customers buy bundles of multiple resources. Capacity control and overbooking are two fundamental pieces of revenue management. Revenue management practices often include overbooking capacity to account for customers who make reservations but later make cancellations or do not show up. Capacity control deals with the question of which requests should be accepted over time. Capacity control and overbooking decisions interact. The joint problem can be formulated as a dynamic program. This dynamic program cannot be solved by using traditional dynamic programming tools for problems of practical size. The paper analyzes linear approximations of the joint problem of capacity control in network revenue management and overbooking.

Keywords: network revenue management, capacity control, overbooking, approximations
JEL Classification: G32, G33, C35

1 Introduction

Revenue Management (RM) is the art and science of predicting real-time customer demand and optimizing the price and availability of products according to the demand (see Talluri & van Ryzin, 2004, Philips, 2005, Fiala, 2015). The challenge is to sell the right resources to the right customer at the right time for the right price through the right channel. In order to truly maximize revenue in a coherent and effective way over the long term, revenue managers must move beyond short-term tactics to embrace long-term strategic planning. The RM addresses three basic categories of demand-management decisions: structural, price, and quantity decisions The RM area encompasses all work related to operational pricing and demand management. This includes traditional problems in the field, such as capacity allocation, overbooking and dynamic pricing, as well as newer areas, such as oligopoly models, negotiated pricing and auctions.

The objective of demand generation is to produce the most possible revenue under any supply/demand conditions. In order to achieve this, strategic revenue management goes beyond the management of existing demand to manipulate and increase demand. Using demand generation strategies, revenue managers can take a proactive rather than reactive approach to maximizing revenue. There are other specific features that can be cover in strategic considerations.

Recent years have seen great successes of revenue management, notably in the airline, hotel, and car rental business. Currently, an increasing number of industries is exploring to adopt similar concepts. What is new about RM is not the demand-management decisions themselves but rather how these decisions are made. The true innovation of RM lies in the method of decision making.

Network revenue management models attempt to maximize revenue when customers buy bundles of multiple resources. The dependence among the resources in such cases is created by customer demand. The basic model of the network revenue management problem is formulated as a stochastic dynamic programming problem whose exact solution is computationally intractable. There are several approximation methods for the problem. The Deterministic Linear Programming (DLP) method is a popular in practice. The DLP method is based on an assumption that demand is deterministic and static.

Overbooking was the first RM tool that appeared in the operations research literature (Taylor, 1962) and the first to be implemented in practice. Overbooking is a response to the fact that customers who order product for future delivery often fail to show up to collect at the time when the product becomes available. Often the "no-show" is the customer's decision, but "no-shows" may also be the result of operational factors. The paper analyses linear approximations of the joint problem of overbooking and capacity control in network revenue management. The model combines the DLP model with a single period overbooking model.

2 Network revenue management

The quantity-based revenue management of multiple resources is referred as network revenue management. This class of problems arises for example in airline, hotel, and railway management. In the airline case, the problem is managing

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capacities of a set of connecting flights across a network, so called a hub-and-spoke network. In the hotel case, the problem is managing room capacity on consecutive days when customers stay multiple nights.

Network revenue management models attempt to maximize revenue function when customers buy bundles of multiple resources. The interdependence of resources, commonly referred to as network effects, creates difficulty in solving the problem.

The basic model of the network revenue management problem can be formulated as follows (see Talluri & van Ryzin, 2004):

The network has m resources which can be used to provide n products. We define the incidence matrix $\mathbf{A} = [a_{ij}]$, $i = 1, 2, \ldots, m, j = 1, 2, \ldots, n$, where

$a_{ij} = 1$, if resource i is used by product j, and

$a_{ij} = 0$, otherwise.

The j-th column of $\mathbf{A}$, denoted $\mathbf{a}_j$, is the incidence vector for product j. The notation $i \in \mathbf{a}_j$ indicates that resource i is used by product j. The state of the network is described by a vector $\mathbf{x} = (x_1, x_2, \ldots, x_m)$ of resource capacities. If product j is sold, the state of the network changes to $\mathbf{x} - \mathbf{a}_j$.

Time is discrete, there are T periods and the index t represents the current time, $t = 1, 2, \ldots, T$. Assuming within each time period t at most one request for a product can arrive. Demand in time period t is modelled as the realization of a single random vector $\mathbf{r}(t) = (r_1(t), r_2(t), \ldots, r_n(t))$.

If $r_j(t) = r_j > 0$, this indicates a request for product j occurred and that its associated revenue is r_j. If $r_j(t) = 0$, this indicates no request for product j occurred. A realization $\mathbf{r}(t) = \mathbf{0}$ (all components equal to zero) indicates that no request from any product occurred at time t. The assumption that at most one arrival occurs in each time period means that at most one component of $\mathbf{r}(t)$ can be positive. The sequence $\mathbf{r}(t)$, $t = 1, 2, \ldots, T$, is assumed to be independent with known joint distributions in each time period t. When revenues associated with product j are fixed, we will denote these by r_j and the revenue vector $\mathbf{r} = (r_1, r_2, \ldots, r_n)$.

Given the current time t, the current remaining capacity x and the current request $\mathbf{r}(t)$, the decision is to accept or not to accept the current request. We define the decision vector $\mathbf{u}(t) = (u_1(t), u_2(t), \ldots, u_n(t))$ where

$u_j(t) = 1$, if a request for product j in time period t is accepted, and

$u_j(t) = 0$, otherwise.

The components of the decision vector $\mathbf{u}(t)$ are functions of the remaining capacity components of vector $\mathbf{x}$ and the components of the revenue vector $\mathbf{r}$, $\mathbf{u}(t) = u(t, \mathbf{x}, \mathbf{r})$. The decision vector $\mathbf{u}(t)$ is restricted to the set

$$U(x) = \{ u \in \{0, 1\}^n, \ \mathbf{A}u \leq x \}. \tag{1}$$

The maximum expected revenue, given remaining capacity x in time period t, is denoted by $V_t(x)$. Then $V_t(x)$ must satisfy the Bellman equation

$$V_t(\mathbf{x}) = E\left[\max_{u \in U(x)} \{ \mathbf{r}(t)^T u(t, \mathbf{x}, \mathbf{r}) + V_{t+1}(\mathbf{x} - \mathbf{A}u) \} \right] \tag{2}$$

with the boundary condition $V_{T+1}(\mathbf{x}) = 0, \forall \mathbf{x}$.

A decision $\mathbf{u}^*$ is optimal if and only if it satisfies:

$u_j(t, \mathbf{x}, r_j) = 1$, if $r_j \geq V_{t+1}(\mathbf{x}) - V_{t+1}(\mathbf{x} - \mathbf{a}_j)$, $\mathbf{a}_j \leq \mathbf{x}$,

$u_j(t, \mathbf{x}, r_j) = 0$, otherwise.

This reflects the intuitive notion that revenue r_j for product j is accepted only when it exceeds the opportunity cost of the reduction in resource capacities required to satisfy the request.

3 Network capacity control

The classical technique of approaching the problem (2) has been to use a deterministic LP solution to derive policies for the network capacity problem. Initial success with this method has triggered considerable research in possible reformulations and extensions, and this method has become widely used in many industrial applications.

The Deterministic Linear Programming (DLP) method uses the approximation

$$V_t^{LP}(\mathbf{x}) = \max \mathbf{r}^T \mathbf{y} \tag{3}$$

subject to

$$\mathbf{Ay} \leq \mathbf{x} \tag{4}$$

$$0 \leq \mathbf{y} \leq E[\mathbf{D}] \tag{5}$$

where $\mathbf{D} = (D_1, D_2, \ldots, D_n)$ is the vector of demand over the periods t, $t+1$, …,T, for product j, $j = 1, 2, \ldots, n$, and $\mathbf{r} = (r_1, r_2, \ldots, r_n)$ is the vector of revenues associated with the n products. The decision vector $\mathbf{y} = (y_1, y_2, \ldots, y_n)$ represent partitioned allocation of capacity for each of the n products. The approximation effectively treats demand as if it were deterministic and equal to its mean $E[\mathbf{D}]$. The optimal dual variables, $\boldsymbol{\pi}^{\text{LP}}$, associated with the constraints $\mathbf{Ay} \leq \mathbf{x}$, are used as bid prices.

The DLP was among the first models analyzed for network RM. The main advantage of the DLP model is that it is computationally very efficient to solve. Due to its simplicity and speed, it is a popular in practice. The weakness of the DLP approximation is that it considers only the mean demand and ignores all other distributional information. The performance of the DLP method depends on the type of network, the order in which fare products arrive and the frequency of re-optimization.

4 Overbooking

Overbooking is concerned with increasing capacity utilization in a reservation-based system when there are significant cancelations or no-shows (see Phillips, 2005). A reservation is a forward contract between a customer and the firm. Firms are adopting business practices designed to reduce no-show rates.

Overbooking is applicable in industries with the following characteristics:

- Bookings are accepted for future use.

- Capacity is constrained.

- Customers are allowed to cancel or not show.

- The cost of denying service is relatively low.

The standard practice to respond to no-shows is simply to overbook or to accept more orders for future delivery of a product that there is product available. The potential revenue gain is especially significant if the product is perishable and cannot be held in inventory. The basic overbooking problem is then to decide how many orders to accept for future delivery of a product based on the number of units that will be available. An intelligent decision requires historical data and estimates of no-show rates.

There are some overbooking policies based on different objective functions. A simple deterministic heuristic that calculates an overbooking limit based on capacity and expected no-show rate. A service-level policy involves managing to specific target, for example maximal rate of admissible denied services. A cost-based policy involves explicitly estimating costs of denied service and comparing those costs with potential revenue to determine the overbooking levels that maximize expected total revenue minus expected overbooking costs.

A hybrid policy is one in which cot-based limits are calculated but constrained by service-level restrictions. A cost-based policy is proposed for the combined model.

The cost-based approach requires an estimate of the revenue loss not accepting additional reservations and an estimate of the cost of denied service. Suppose z customers show up on the day of service, and let $d(z)$ denote the denied-service cost function, assuming that there is an increasing convex function of z. A common assumption in practice is that each denied-service costs a constant marginal amount h. Let c denote the physical capacity, then

$$d(z) = h(z - c)^+. \tag{6}$$

Let r denote the marginal revenue generated by accepting an additional reservation. A common simplification in practice is to consider it fixed. Let y denote the number of reservations on hand, and the random variable $z(y)$ denotes the number of customers who show up on the day of service out of y reservations. The total expected net revenue is given by

$$V(y) = ry - E[d(z(y))]. \tag{7}$$

The simplest model is based on a binomial model of cancellations in which no-shows are lumped together with cancelations. Let denote q the probability that a reservation currently on hand show up at the time of service. Under some assumptions (see Talluri & van Ryzin, 2004), the show demand is binomially distributed with the **probability mass function**

$$p(z(y) = z) = \binom{y}{z} q^z (1-q)^{y-z}, \ z = 0, 1, \ldots, y, \tag{8}$$

and the distribution function

$$F_y(z) = p(z(y) \le z) = \sum_{k=0}^{z} \binom{y}{k} q^k (1-q)^{y-k}, \tag{9}$$

with mean $E[z(y)] = qy$ and variance $\text{var}(z(y)) = yq(1-q)$.

The optimal booking limit x^* is the largest value of x satisfying the condition

$$\Delta V(y) = E[d(z(x))] - E[d(z(x-1))] \le r. \tag{10}$$

For the binomial model, this condition reduces to $hqp(z(x-1) \ge c) \le r$,

and it can be rewritten to the condition

$$1 - F_{x-1}(c-1) \le \frac{r}{qh}. \tag{11}$$

5 Combined models

Models for coordinating network-capacity controls and overbooking decisions are analyzed. The main question is how to set overbooking levels on a network. The capacities of network resources are key inputs to capacity-control problems. Using overbooking, these capacities may be inflated defining virtual capacities for each resource that exceed the physical capacity. This increase in capacity affects the acceptance or rejection decisions of the capacity-control method. On the other hand, capacity-control decisions clearly influence the opportunity cost of capacity, which is a key input to economic overbooking models. Hence, the total revenue for a network is affected both by capacity-control and overbooking practices. Despite the strong interdependence of these decisions, the two problems are typically separated in practice.

The time horizon will be divided into two periods: a reservation period, and a service period. The reservation period spans $(0, T]$ and the reservations can be made for any of the n products. The reservation period is followed by the service period, during which the customers with reservations show up or become no-shows. During the service period, the firm may deny service to customers who show up in case of insufficient capacity, in which case it pays a penalty.

One way to formulate this overbooking problem is as a two-stage, static model that combines the DLP model and the cost-based overbooking models. The demand of reservation requests to arrive according to a stochastic process during $(O, T]$. The problem parameters are $E[\mathbf{D}]$, the vector of expected demand to come for the n classes. Let $\mathbf{c} = (c_1, \ldots, c_m)$ denote the vector of resource capacities, and the vector $\mathbf{r} = (r_1, \ldots, r_n)$ denote the vector of revenues associated with the n products. There is a denied-service cost on each resource given by the vector $\mathbf{h} = (h_1, \ldots, h_m)$. The denied-service cost may differ from one resource to another, but it does not vary with time of product type. Decision variables are $\mathbf{x}$, the vector of overbooking levels (virtual capacities) and $\mathbf{y}$, the vector of primal capacity allocations. The show demand for resource i in this formulation is approximated by the random variable $z_i(x_i)$, vector $\mathbf{z}(\mathbf{x})$ is the vector of show demand.

The formulation is as follows:

$$V(\mathbf{x}, \mathbf{y}) = \max(\mathbf{r}^T \mathbf{y} - E\left[\mathbf{h}^T (\mathbf{z}(\mathbf{x}) - \mathbf{c})^+\right]) \tag{12}$$

subject to
$$\mathbf{A}\mathbf{y} \le \mathbf{x} \tag{13}$$

$$\mathbf{0} \le \mathbf{y} \le E[\mathbf{D}] \tag{14}$$

$$\mathbf{x} \ge \mathbf{c} \tag{15}$$

The objective function is the total net revenue, revenue minus denied-service costs. Let $R(\mathbf{y}) = \mathbf{p}^T \mathbf{y}$ denote the revenue function and $C(\mathbf{x}) = E[\mathbf{h}^T (\mathbf{z}(\mathbf{x}) - \mathbf{c})^+]$ denote the overbooking-cost function. The overbooking-cost function $C(\mathbf{x})$ is a non-decreasing and convex function of the overbooking limit $\mathbf{x}$ if the random variable associated with the of survivors for resource i, $z_i(x_i)$ is assumed to follow the binomial model with survival probability q_i. Thus, the objective function of the problem (12)-(15) is jointly concave in $\mathbf{y}$ and $\mathbf{x}$.

A general nonlinear programming method can be used to solve the problem. An alternating-direction method (see Bertsekas & Tsitsiklis, 1997) algorithm specialized to this problem's structure.

6 Conclusions

The paper analyzes linear approximations of the joint problem of overbooking and capacity control in network revenue management. The model combines the deterministic linear programming (DLP) model with a single period overbooking model. The DLP method was used for simplicity. The used approximation greatly simplifies the model and is a good approximation in the important case where demand is high. The approach can be adapted to other network approximations as well (such as RLP and PNLP) (see Fiala, 2010). The same formulation applies to a variety of network bid-price methods. A cost-based policy of overbooking with binomial model of cancellation was proposed for the combined model. Poisson model of cancellation or other policies of overbooking are possible to use. The network revenue model can be combined with other important views on the problem. The very popular are pricing models (Majovská & Fiala, 2017) and modeling of customer choice behavior (Fiala, 2012). These problems can be analyzed by multiple criteria (Majovská & Fiala, 2017, Kalčevová & Fiala, 2006). Further research will focus on the generalization of network revenue management models

Acknowledgement

References

Bertsekas, D. P., & Tsitsiklis, J. N. (1997). *Parallel and Distributed Computing*. Belmont: Athena Scientific.

Fiala, P. (2010). Approximations for solving network revenue management problems. In: *Mathematical Methods in Economics* 2010 (pp. 132–137). České Budějovice: University of South Bohemia.

Fiala, P. (2012) A framework for solving network revenue management problems with customer choice behavior. *Central European Journal of Operations Research*, 20(3), 383–392.

Fiala, P. (2015). *Revenue management – modely a analýzy*. Praha: Professional Publishing.

Kalčevová, J., & Fiala, P. (2006). IZAR – Multicriteria Decision Support System. In: *Mathematical Methods in Economics 2006*. (pp. 277–282). Pilsen: University of West Bohemia in Pilsen

Majovská, R., & Fiala, P. (2017). Cenové modely revenue managementu. In: *Nové trendy v ekonometrii a operačním výzkumu* 2017(pp. 93–98). Bratislava: Vydavateľstvo Ekonóm.

Majovská, R., & Fiala, P. (2015). Dynamic analysis of multi-criteria network systems. In: *Mathematical Methods in Economics* 2015 (pp. 484–490). Plzeň: University of West Bohemia.

Phillips, R. L. (2005). *Pricing and Revenue Optimization*. Stanford: Stanford University Press.

Talluri, K. T., & van Ryzin, G. J. (2004). *The Theory and Practice of Revenue Management*. Boston: Kluwer Academic Publishers.

Taylor, C. J. (1962). The determination of passenger booking levels. In: *Proceedings of the Second AGIFORS Symposium* (pp. 93–116).

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Inflation in China: The Role of Trade Openness and Exchange Rate

Luo Yang[1], Aleš Melecký[2]

Abstract: One of the critical issues that central banks usually face when formulating monetary policy is the problem of time-inconsistency. Falling into the time inconsistency trap has extremely negative effects. For instance, central banks are more likely to pursue sub-optimal monetary policies, the economy may experience higher inflation, and financial stability may be endangered. This study examines how two external linkages — trade openness and exchange rate volatility affected inflation in China in the period from 2000 to 2018. China carried out exchange rate reform in 2005 and implemented a floating exchange rate regime. Since the outbreak of the financial crisis in 2008, China's large-scale money and credit supply in 2009 has played a very important role in taking the Chinese economy out of the financial crisis first, but this has triggered a hidden danger of future inflation. Through building a model based on the ARDL model framework, we found a significantly positive relationship between trade openness and inflation in the long run. However, there is no clear evidence of a significant effect of exchange rate change on inflation.

Keywords : Trade openness, Exchange rate, Inflation, Monetary policy, ARDL model
JEL Classifications: C22, E31, F31

1 Introduction

The problem of time inconsistency has always been an important issue in international macroeconomics. Kydland & Prescott (1977) in their pioneering study on the problem of time inconsistency refers to the action plan set for the period $t + i$ in the period t which is not fulfilled in the period $t + i$ because the implementation of the action plan is no longer priority. Barro and Gordon (1983) extended the original approach by introducing supply shocks and stabilization policies, adding the theory of expectation formation. Their model assumes that the central bank's output target is above its natural level. Under this assumption, the central bank will increase output by imposing unexpected inflation.

Time inconsistency issue can lead to sub-optimal high inflation rates due to the expansionary momentary policy. While proponents of trade openness (spillover hypothesis) claim that trade openness may cause the declining price level, protectionism is inflationary due to the increasing domestic costs (Mussa, 1974). Romer (1993) believes that after the discretionary action of protectionism, the real exchange rate depreciation increases with the rising openness of the economy and ultimately leads to higher costs for households and businesses. Therefore, the greater is openness, the authorities will expand less as an implicit commitment mechanism provides policy makers with an incentive to curb the sudden expansion of currency and lead to a reduction in inflation. Lane (1997) believes that the inverse relationship between openness and inflation rate stems from the existence of imperfect competition and rigid nominal prices in non-trade sectors. According to the new growth theory, openness can reduce inflation mainly through increasing output efficiency, for instance, raising capacity utilization, making a better allocation of resources, and increasing foreign investment (Jin, 2000).

The proponents of the compensation hypothesis have a diametrically opposed view. They believe that the more open the economy is, the higher the inflation in the country. They assume that social and economic inequality increases with the rising openness of the economy. Social inequality leads to strong public protests for the increasing social expenditures because of the cost of international integration. The government responds by providing more spending to avoid economic and political crises. The social compensation generated by the increase in government spending stimulates consumer spending, which in turn leads to higher inflation (Kaufman & Segura-Ubiergo, 2001). From another perspective, the more open trade, the higher is the demand for imported goods, which may increase inflation. (Daniels and VanHoose, 2006). Some scholars hold the opinion that if foreign consumers have a certain degree of inflexibility and inelasticity in the demand for domestically produced goods, the monetary authority enjoys a certain degree of monopoly in the international market. Then, the monetary authority's decision is to strike a balance between the increased monetary growth in the open economic environment and the consumption tax cost of inflation. In addition, an open economy may also lead to inflation

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in the country through imports of manufactured goods or raw materials imported from other parts of the world. Moreover, as the economy opens, the ability to control inflation through fiscal and monetary policies decreases. Therefore, opening up the economy may increase the positive effect on inflation (Richard, 2007). The relationship between inflation and trade openness which stems from different theories and empirical results seems puzzling (Temple, 2002).

Similarly, there is a rich literature about how changes in exchange rate influence the inflation of a country, from a theoretical and empirical point of view, from macro and micro perspectives, and based on a single equation up to complex economic models. The impact of exchange rate changes on a country's inflation is analyzed from different dimensions. The exchange rate development affects the adjustment of international payments, the implementation of monetary policy and the adjustment of inflation. For the implementation of monetary policy and exchange rate policy, it is important to identify the impact of exchange rate changes on the price level. The impact of the exchange rate on the price level helps countries to drive exchange rate adjustments. Therefore, it is of great importance to study the impact of RMB exchange rate changes on inflation in China.

The paper is organized as follows. Section 2 discuses exchange rate regime, transmission mechanism in China, and measurement of trade openness. Section 3 describes employed data and methodology. Section 4 discusses our results. Section 5 concludes.

2 Exchange Rate Transmission Mechanism and Measurement of Trade Openness

Overall, the exchange rate fluctuations are transmitted to the domestic price level via three channels which we depict in Figure 1. First, exchange rate changes force domestic retailers to adjust their final prices of imported consumer goods, thus affecting the overall domestic price level. Second, exchange rate changes affect the price of imported intermediate inputs, which will affect the production costs of domestic companies using these inputs in the production process. The changes in production costs are transmitted to the price of final goods, which increase the domestic price level. Third, exchange rate fluctuations change the relative price of the domestic export goods abroad. Therefore, the importing country's demand for domestic exports changes. This influence the supply of goods on the domestic market, which affect the domestic price level.

Figure 1 Transmission of exchange rate fluctuations to price level
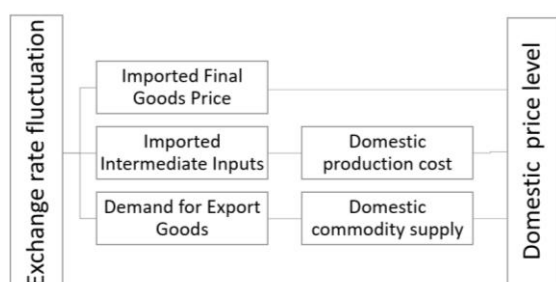
Source: self-elaborated

Various approaches have been used in the literature to measure trade openness. Table 1 summarizes the most common approaches to measure trade openness.

Table 1 Measurement of Trade Openness

Measure	Definition
$Mi/GDPi$	Import trade share, measured as imports (Mi) divided by GDP of country i
$Xi/GDPi$	Export trade share, measured as exports (Xi) divided by GDP of country i
$(X + M)i/GDPi$	Trade share measured as exports and imports divided by GDP of country i

Source: (Squalli & Wilson, 2011)

In this paper, we prefer to use the ratio of total volume of foreign trade to GDP to express the degree of trade openness. This so-called trade-to-GDP ratio is frequently used to measure the importance of international transactions relative to domestic transactions (OECD, 2011).

3 Data and Methodology

In the following analysis, we use consumer price index to measure inflation (INFL), money supply (M2), real GDP growth (REG), average wages (WAG), nominal effective exchange rate (NEER), West Texas Intermediate (WTI), and trade openness (OPEN) calculated as volume of imports and exports to GDP. We calculate the annual percentage change of each variable except REG. The data are obtained from China National Bureau of Statistics and CEIC Data.

Table 2 Data Description

Variables	Mnemonics	Description
Inflation	INFL	Consumer price index inflation (in %)
Money Supply	M2	Money Supply M2 in local currency, The People's Bank of China. Federal Reserve Board´s average market exchange rate is used for currency conversions. (mil. of USD)
Real GDP Growth	REG	Real GDP index, at 1992 prices (in %), The National Bureau of Statistics
Average Wage	WAG	Average wage in local currency. Federal Reserve Board´s average market exchange rate is used for currency conversions. Monthly earnings cover urban population only. (USD)
Nominal Effective Exchange Rate	NEER	The National Bureau of Statistics monthly data, based on a basket of weighted foreign currencies
West Texas Intermediate	WTI	The United States West Texas light crude oil. (in bn. of USD)
Trade Openness	OPEN	Calculated as volume of imports and exports to GDP (in %)
Dummy variable	DUM	DUM takes value 0 for period 2000Q1 to 2007Q4 and value 1 for period 2008Q1 to 2018Q4 to capture a structural break

Source: The National Bureau of Statistics; CEIC Data

The influence of both trade openness and exchange rate on inflation captures the following equation.

$$\Delta INFL = \alpha_0 + \sum_{i=1}^{p} \theta_i \Delta INFL_{t-i} + \sum_{i=0}^{q_1} \varphi_i \Delta NEER_{t-i} + \sum_{i=0}^{q_2} \gamma_i \Delta OPEN_{t-i} + \sum_{i=0}^{q_3} \delta_i \Delta REG_{t-i} +$$
$$\sum_{i=0}^{q_4} \zeta_i \Delta WTI_{t-i} + \sum_{i=0}^{q_5} \omega_i \Delta WAG_{t-i} + \sum_{i=0}^{q_6} \nu_i \Delta M2_{t-i} + \beta_1 INFL_{t-1} + \beta_2 NEER_{t-1} + \beta_3 OPEN_{t-1} + \beta_4 REG_{t-1} +$$
$$\beta_5 WTI_{t-1} + \beta_6 WAG_{t-1} + \beta_7 M2_{t-1} + \beta_8 DUM_{t-1} + \varepsilon_t \qquad (1)$$

Where $\theta, \varphi, \gamma, \delta, \zeta, \nu, \omega$ are short run parameters and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8$ are long run parameters.

The ARDL model enables us to distinguish between the long-term and short-term effects of selected factors on inflation. The independent variable in the model may be both $I(1)$ and $I(0)$, and the obtained regression coefficients remains consistent and effective. In addition, China grows constantly, therefore studying the long-term effects has strong practical value and policy implications.

4 Results and Discussion

Due to space constrains, we present only selected statistics of the ARDL model and its error correction representation. We run several versions of the model while modifying the lags of both dependent and independent variables. The presented version is selected based on the Schwartz information criterion and the significance of estimated coefficients.

Table 3 Estimation Result of ARDL

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFL(-1)	0.8232	0.0580	14.198	0.0000
M2	-0.0379	0.0202	-1.8726	0.0663
NEER	-0.0387	0.0197	-1.9689	0.0538
OPEN	-0.0013	0.0162	-0.0786	0.9376
OPEN(-1)	0.0100	0.0222	0.4519	0.6530
OPEN(-2)	0.0419	0.0144	2.9186	0.0050
REG	0.3904	0.0546	7.1534	0.0000
WAG	0.0211	0.0182	1.1588	0.2514
WTI	0.0032	0.0026	1.2517	0.2158
WTI(-1)	-0.0035	0.0037	-0.9337	0.3544
WTI(-2)	-0.0126	0.0028	-4.4939	0.0000
DUM	1.7103	0.3028	5.6489	0.0000
C	-3.6818	0.5936	-6.2024	0.0000
R-squared	0.9317	Akaike info criterion		1.9174

| Adjusted R-squared | 0.9173 | Schwarz criterion | 2.3350 |
| Prob(F-statistic) | 0.0000 | Durbin-Watson stat | 1.7900 |

Source: authors' calculations

The results suggest that inflation development is quite rigid, as the value of the estimated coefficient connected with inflation in the previous period equals 0.82, and is statistically significant at the 1% level. Similarly, previous values of openness and crude oil (WTI), and real economic growth significantly influence inflation in the economy at the 1% level. Furthermore, the negative effects of the nominal exchange rate and money supply are statistically significant only at the 10% level. Finally, the employed dummy variable is significant at the 1% level.

Table 4 Estimated Long Run Coefficients

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
M2	-0.2141	0.1196	-1.7906	0.0787
NEER	-0.2192	0.1351	-1.6218	0.1104
OPEN	0.2868	0.1234	2.3252	0.0236
REG	2.2082	0.7885	2.8005	0.0070
WAG	0.1196	0.0987	1.2119	0.2306
WTI	-0.0725	0.0418	-1.7323	0.0886

Source: authors' calculations

From a long-run perspective, our results presented in Table 4 suggest that four factors influence inflation. We find a highly significant effect of REG and a positive and statistically significant relationship between INFL and OPEN at the 5% level. We find that 1% increase in openness is connected with 0.29% increase in inflation in the long-run. We find a negative relationship between INFL and M2, which is robust across alternative specifications. However, the effect of NEER did not pass the significance test.

Table 5 Error Correction Representation

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Prob.*
C	-3.6818	0.3929	-9.3709	0.0000
D(OPEN)	-0.0013	0.0149	-0.0856	0.9321
D(OPEN(-1))	-0.0419	0.0138	-3.0498	0.0035
D(WTI)	0.0032	0.0033	0.9771	0.3327
D(WTI(-1))	0.0126	0.0033	3.8492	0.0003
DUM	1.7103	0.2369	7.2196	0.0000
CointEq(-1)*	-0.1768	0.0174	-10.181	0.0000
R-squared	0.7237	Akaike info criterion		1.7460
Adjusted R-squared	0.6974	Schwarz criterion		1.9708
Prob(F-statistic)	0.0000	Durbin-Watson stat		1.7900

Source: authors' calculations

Error correction representation in Table 5 reveals that the coefficient of ECM ($\text{CointEq}\ (-1) = -0.1768$) is significantly negative. This result suggests that nearly 17.67% of any deviation from the long-run equilibrium is corrected within one period (quarter).

5 Conclusions

Through performing several robustness checks, our result shows in the long run a significantly positive relationship between trade openness and inflation. Therefore, increasing trade openness can lead to the rise of inflation in China in the long-run. There is no clear evidence of a significant effect of exchange rate change on inflation. It should be clear that our model and conclusions are based on a specific period (2000-2018) in China. In an economy with strict controls, the exchange rate has only a limited effect on inflation. For instance, because the Chinese government controls the exchange rate, the foreign exchange market is not affected by the domestic currency situation. China's foreign exchange rate is completely controlled by the state through market transactions. Under such strong control, the impact on domestic inflation is relatively insignificant.

In the short run, there is a significantly negative relationship between trade openness and inflation. It shows that increasing trade openness will cause a decline in inflation in China. In the short-run, there is no clear evidence of a significant effect of exchange rate change on inflation. When an expansionary monetary policy is implemented, the central bank in China usually deviates from its previously announced policy objectives. This leads to higher sub-optimal inflation. For more open economies, the depreciation of exchange rates after such a discretionary action by the central bank would be greater, thus increasing the costs of households and businesses. Therefore, greater openness could act as an implicit commitment mechanism by restraining policy makers from participating in unexpected monetary expansion and could lead to lower inflation. However, except for countries with low trade openness and high inflation rates, there is no clear evidence that trade openness has a significant effect on reducing inflation. The Chinese government has been working hard to set a stable and low inflation target. However, the actual inflation in China is actually higher than the official data

shows, and only a few people noticed that China's trade openness has always been relatively low. According to data from the World Bank, since 2015, China's trade openness has continued to decline, ranking behind the 100th place in the world. From a policy point of view, in the time interval we analyzed, implementing more liberal trade policy may help reduce inflation in the short-run. Nevertheless, opening the economy will increase inflation in the long-run.

In the current situation where the world economic growth continues to slow down, global financial turmoil and risks have increased significantly, China's monetary policy must continue to be prudent, so that the growth of money and credit can be adapted to economic development.

References

Barro, R. J., & Gordon, D. B. (1983). A Positive Theory of Monetary Policy in a Natural Rate Model. Journal of Political Economy 91, no. 4: 589-610.

Daniels, J., & VanHoose, D. (2006). Openness, the sacrifice ratio, and inflation: Is there a puzzle? Journal of International Money and Finance, vol. 25, issue 8, 1336-1347. ISSN 0261-5606.

Jin, J. C. (2000). Openness and growth: an interpretation of empirical evidence from East Asian countries, The Journal of International Trade & Economic Development: An International and Comparative Review Volume 9 Issue 1. ISSN 0963-8199.

Kaufman, R. & Segura-Ubiergo, A. (2001). Globalization, Domestic Politics, and Social Spending in Latin America: A Time-Series Cross-Section Analysis, 1973–97. World Politics, 53(4), 553-587. doi:10.1353/wp.2001.0016.

Kydland, F. E., & Prescott, E. C. (1977). Rules Rather than Discretion: The Inconsistency of Optimal Plans. Journal of Political Economy 85, no. 3: 473-92.

Lane, P. (1997). Inflation in open economies. Journal of International Economics, 42, 327–427.

Mussa, M. (1974). Tariffs and the Distribution of Income: The Importance of Factor Specificity, Substitutability, and Intensity in the Short and Long Run, Journal of Political Economy, 82, 970–985. ISSN 0022-3808.

OECD (2011). Trade openness, in OECD Science, Technology and Industry Scoreboard 2011, OECD Publishing, Paris, https://doi.org/10.1787/sti_scoreboard-2011-60-en.

Richard, W. E. (2007). Is Openness Inflationary? Imperfect Competition and Monetary Market Power. Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute Working Paper, no.1. ISSN 9287-3223.

Romer, D. (1993). Openness and inflation: Theory and evidence, Quarterly Journal of Economics,1993, 58 p. 869-903. ISSN 0033-5533.

Squalli, G., & Wilson, K. (2011). A New Measure of Trade Openness. The World Economy, Vol. 34, Issue 10, pp. 1745-1770.

Temple, J. (2002). Openness, Inflation, and the Phillips Curve: A Puzzle. Journal of Money, Credit and Banking, 34(2), 450-468.

Interest in Reverse Mortgage in the Czech Republic

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Abstract: The Czech pay-as-you-go pension system may suffer from a lack of capital due to the aging of the Czech population and it may not maintain the current level of paid out pensions in the future if it does not undertake necessary changes. One option of how the retired may cover their everyday expenses is a reverse mortgage which is nowadays also available on the Czech financial market. This paper presents the results of an analysis of a questionnaire survey focusing on the amount of interest of the respondents in taking a reverse mortgage to secure their standard of living when retiring.

1 Introduction

Pension systems around the world are facing serious, multidimensional challenges. Policy makers are grappling with the demographic phenomenon of aging societies, a low-interest financial environment that provides insufficient returns on pension savings, and policy legacy issues such as low contribution rates, generous retirement age and early withdrawal rules (Knaack, Miller & Stewart, 2020). Also the Czech Republic is facing, according to the official website of the European union, demographic population ageing. In 2018, the pre-productive population part (0–14 years) represented 15.9 %, the productive part (15–64 years) 64.5 % and the post-productive (65 years and more) 19.6 % of the total population. According to the development forecast, the population will be ageing mainly due to higher age groups, i.e. the number of elderly people will increase while the proportion of the productive part of population will decrease (https://eacea.ec.europa.eu).

At the same time, since the life expectancy is growing, Czechs spend, according to the yearbook 2019 published by the Czech Social Security Administration, on average in retirement 24 years (https://www.cssz.cz). In recent years, successive Czech governments have been trying to reform the pension scheme, to support the citizens of the Czech Republic to be more responsible for their future when they retire and to promote supplementary pension schemes in which citizens could make savings for their retirement. This is so that they would not be dependent solely on the state guaranteed pensions which are supposed to decrease significantly in future years as the Czech society is getting gradually older and the pay-as-you-go pension system will probably suffer from a lack of capital to keep the current level of paid out pensions (Schneider & Šatava, 2012). For these reasons, if the current pension system does not change, there are justified concerns that the lowered level of pensions will not secure a dignified standard of living of the elderly.

However, if they possess a housing estate, one option how to cover their expenses when retired is, nowadays also available on the Czech financial market, to take a reverse mortgage, which allow, according to (Knaack, Miller & Stewart, 2020) elderly homeowners to consume their housing wealth without having to sell or move out of their homes. The target group for reverse mortgages are elderly people who want to turn their relatively illiquid housing equity into cash. Because the borrower can remain in the mortgaged house until they move out or die, this financial instrument provides homeowners with an attractive alternative to selling the house and moving to a smaller housing or to a rental property.

Unlike typical mortgages that are repaid in recurring instalments, the outstanding loan balance on a reverse mortgage is repaid once, at termination. This means that the usual assessments of willingness and ability to pay are not necessary. The value of the house borrowers pledge as collateral is the only asset of relevance in the mortgage assessment. Reverse mortgages are nonrecourse loans, that means borrowers are not liable to repayment of more than the house they own, and neither are their spouses nor descendants.

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2 Methods

The main objective of this paper is to present interest of 123 survey respondents aged between 25 to 70 years in taking a reverse mortgage to improve their standard of living when retiring. The age and gender structure of the respondents is presented in Table 1.

Table 1: Age and gender structure of the respondents

age	men	women
25-34 years	14	48
36-59 years	7	25
60-70 years	14	15

Source: Own processing

Regarding the respondents' education, there were representatives of three educational levels: 19% apprenticeship, 46% secondary education and 45% university education. The net monthly income of the respondents is presented in Table 2.

Table 2: Net income (in CZK) of the respondents with respect to the age groups

Age	less than 11.000	11.001-15.000	15.001-20.000	20.001-25.000	25.001-30.000	more than 30.001
25-34	27%	3%	16%	25%	16%	13%
35-59	3%	5%	13%	15%	29%	35%
60-70	10%	52%	28%	3%	0%	7%

Source: Own processing

The obtained data were processed to reveal:

- if men save monthly more than women to gain capital when getting retired,
- what the average monthly deposit is,
- in which financial products the respondents invest,
- if there are concerned about the state quarantined pension,
- in what type of housing the respondents live,
- the number of real estates they possess,
- if they consider their real estate as a form of financial security for their retirement,
- if the respondents are interested in taking a reverse mortgage to secure their future standard of life,
- what regular payment the respondents consider to be sufficiently complementary to their state pension to secure their standard of living when retiring, and
- if men think about taking a reverse mortgage more than women.

In connection with the stated objectives, the authors formulated two hypotheses:

- Men and women make approximately the same monthly deposits for their retirement.
- Men and women thing about taking a reverse mortgage in the same extent.

The above stated hypotheses were tested using the Pearson's Goodness-of-Fit Test, more about the test may be found, for example, in (Maydeu-Olivares & García-Forero, 2020). All the testing was conducted on the significance level α equal to 1 %.

3 Research Results

The analysis of the obtained questionnaire data brings several outcomes. 77 % of the respondents admit they save for their retirement. The average monthly deposit (arithmetic mean) made by the respondents is 3.433 CZK, however the median is only 1.800 CZK. The respondents invest mainly into three financial products: pension insurance (72 %), saving with a building society (43 %) and (19 %). Almost 17% on them do not save at all.

Their concerns about their future state guaranteed pension were expressed by 80 % of the respondents, more exactly: only 2 % of them think the pension will be sufficient, 2% rather sufficient, 18 % rather insufficient, 52 % definitely insufficient, and 16 % of them do not know. The concerns are mainly expressed by younger respondents as presented in Table 3.

Table 3: Concerns of the respondents regarding the sufficiency of their future pension provided by the state

age	sufficient	rather sufficient	I do not know	rather insufficient	definitely insufficient
25-34	0%	3%	0%	19%	78%
35-59	0%	3%	16%	23%	58%
60-70	0%	7%	34%	24%	34%

Source: Own processing

The respondents live mainly (69 %) in their own housing which corresponds with the housing situation in the Czech Republic where 80 % of the citizens, according to the Eurostat, live in their own housing. More detailed information about the form of housing of the respondents is provided in Table 4.

Table 4: Form of housing of respondents

age	own housing	rental housing	collective housing	relatives' housing	partner's housing
25-35	53%	28%	0%	13%	6%
35-59	81%	5%	3%	11%	0%
60-70	66%	10%	14%	10%	0%

Source: Own processing

The fact that so many respondents own their own housing opens a possibility for them of taking a reverse mortgage. The questionnaire also uncovered how many real estates the respondents possess. This is important with respect to the reverse mortgage, as only those possessing a real estate may take it. The situation in the Czech Republic is, in this respect, favourable. It is not surprising that the youngest respondents mostly do not possess any real estate, but the respondents from the other two groups usually own at least one real estate – 81% in the age group of a35-59 years and 72 % in the age group of 60-70 years.

One of the objective of the presented research was to identify, whether the respondents perceive the ownership of their housing as a form of financial security for their retirement. The results are presented in Figure 1. 70 % of the respondents perceive the real estates they own in this way. It is a positive finding as it seems that they do not rely only on the state pension scheme and take their own responsibility of the future.

**Figure 1:** Perception of real estate as a form of financial security for retirement
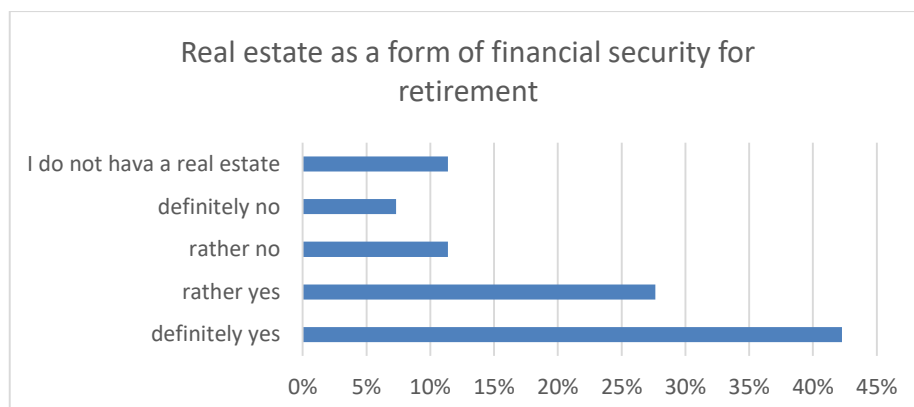
Source: Own processing

Now, we get to the interest of the respondents in a reverse mortgage. As mentioned above, this financial product is rather new as it has been on the Czech financial market since 2015 and it is so far offered only by two financial institutions. This is the reason, why the public awareness about this product is very poor. This is in accordance with one of the findings of the questionnaire analysis, when 80 % of the respondents did not know about the existence of this financial product. However, 37 % of the respondents from the oldest age group heard or know about the reverse mortgage either from mass media, the dTest journal or the internet.

Figure 2 presents the answers of the respondents to the question whether they would be interested in the future to take a reverse mortgage to secure their standard of living when retiring. Only 26 % of the respondents declared that they would be interested. The rest of them answered that they would not or rather not be interested (42 %) in it or that they do not know yet (32 %). However, there is a difference between particular age groups of the respondents. The youngest age

group is more open to take a reverse mortgage (34 %) than the older respondents in the age group of 35-59 years (20 %) and in the age group of 60-70 years (17%).

Figure 2: Interest of the respondents in taking a reverse mortgage
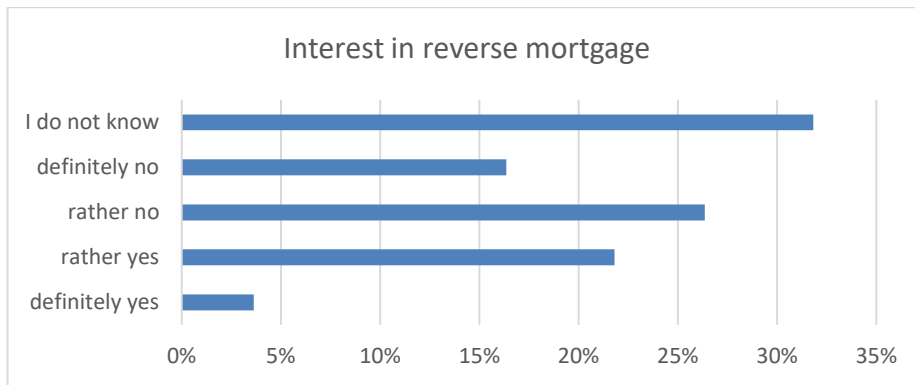
Source: Own processing

The respondents would prefer, if they took a reverse mortgage, taking a single lump payment (67 %) to a regular monthly payment (27 %), the rest of the respondents cannot decide. The regular monthly payments, which the respondents consider to be sufficiently complementary to their pension paid from the state pension scheme to secure their standard of living when retiring, are presented in Table 5. Most of the respondents chose the monthly payment of 10.000 CZK. The average monthly payment is 8.538 CZK.

Table 5: Form of housing of respondents

0 CZK	5.000 CZK	8.000 CZK	10.000 CZK	15.000 CZK	20.000 CZK
22%	15%	6%	36%	10%	12%

Source: Own processing

The last objective of analysis was to test the formulated hypotheses. The first of the hypotheses concerns the difference between men and women when saving regularly for their retirement. For testing reasons, the following null and alternative hypotheses were stated:

- H_0 – *Men and women save regularly for their retirement in the same way.*
- H_A – *Men and women save regularly for their retirement differently.*

Table 6: Regular saving for retirement

	yes	no
men	24	15
women	71	13

Source: Own processing

Testing of the null hypothesis using the Pearson's Goodness-of-Fit Test comes with p-value = 0.0047. As the obtained p-value is lower than the significance level, the null hypothesis is rejected. It means that men and women do not save regularly for their retirement in the same way. Observing more closely the Table 6, it is obvious that women save for their retirement more often than men.

The second of the hypotheses concerns the difference between men and women when saving regularly for their retirement. For testing reasons, the following null and alternative hypotheses were stated:

- H_0 – *Men and women are interested in a reverse mortgage to the same extent.*
- H_A – *Men and women are not interested in a reverse mortgage to the same extent.*

Table 7: Interest in a reverse mortgage

	yes	no
men	6	33
women	22	62

Source: Own processing

Testing of the null hypothesis comes with *p*-value = 0.1835. As the obtained *p*-value is higher than the significance level, the null hypothesis is not rejected. Men and women are interested in a reverse mortgage to the same extent.

4 Conclusion

The current reverse mortgage market is young in the Czech Republic in comparison with some other countries such as the United States, which has the oldest and largest reverse mortgage market to date. Smaller reverse mortgage markets also exist in Canada, Australia, Hong Kong SAR, China, Spain and the United Kingdom (Ong, 2008). According to the dTest journal, currently there are only two non-bank financial institutions that offer this product and just one of the commercial banks in the Czech Republic (https://www.dtest.cz/). In addition, the awareness about the possibility to use a flat or house to access this financial instrument among potential clients is very low. The majority of the respondents, regardless their gender, are not interested in the financial product. The reason may be due to a limited offer, unfamiliarity or limited experience.

On the other hand, it seems that the younger generation is fully aware of the fact that their future standard of living is jeopardised if they fully depend only on the state pension scheme, which needs urgent reform to be able to secure a better future for younger generations when they retire. According to the conducted survey, the younger generation understand the prospective problems and they know they will need some extra income to maintain a dignified retirement. The data show that women are more responsible regarding their future retirement than men are, as they make regular retirement saving deposits more than men.

Although there is big potential for the reverse mortgage product in the Czech Republic as the majority of the inhabitants live in their own housing, it will take more time for the promotion of this product, plus a better legislative background and greater interest of commercial banks to offer this product to their clients. The ignorance regarding this product among potential clients may also be caused by a rather negative reputation based on an investigation conducted by the dTest journal in 2017 (https://www.dtest.cz). The investigation revealed that the current settings and conditions are less favourable for the elderly than selling their real estate and moving into smaller housing with lower expenses and the extra money gained from the sale may be used to improve their standard of living.

References

Knaack, P., Miller M. & Steward, F. (2020). *Reverse Mortgages, Financial Inclusion, and Economic Development: Potential Benefit and Risks* [online]. The World Bank, 2020 [cit. 2020-09-28]. Policy Research Working Papers. Dostupné z: doi:10.1596/1813-9450-9134

Maydeu-Olivares, A. & Garc9a-Forero, C. (2010). Goodness-of-Fit Testing. *International Encyclopedia of Education* [online]. Elsevier, 2010, 2010, s. 190-196 [cit. 2020-09-26]. ISBN 9780080448947. Dostupné z: doi:10.1016/B978-0-08-044894-7.01333-6

Ong, R. (2008). Unlocking Housing Equity Through Reverse Mortgages: The Case of Elderly Homeowners in Australia. *European Journal of Housing Policy* [online]. 2008, **8**(1), 61-79 [cit. 2020-09-28]. ISSN 1461-6718. Dostupné z: doi:10.1080/14616710701817166

Schneider, O. & Šatava, J. (2012). *Český důchodový systém na rozcestí: Pro koho je výhodný přechod do druhého pilíře?* [online]. 2012, 4.10.2012 [cit. 2020-09-28]. Dostupné z: https://idea.cerge-ei.cz/documents/studie_2012_04.pdfhttps://www.cssz.cz/web/cz/-/tz-statisticka-rocenka-2019-shrnuje-nejdulezitejsi-ukazatele-v-oblasti-duchodoveho-pojisteni [cit. 2020-09-28]

https://www.dtest.cz/clanek-5977/seniorska-hypoteka-vstupenka-do-raje-nebo-do-pekla [cit. 2020-09-28]

https://eacea.ec.europa.eu/national-policies/eurydice/content/population-demographic-situation-languages-and-religions-21_en [cit. 2020-09-28]

Simulation of the development of core/periphery structures in networks

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Abstract: Creating new links in the social network facilitates the exchange of knowledge and affects the positional advantage. Nodes with a large number of links can usually affect the operation of the entire network. An example of such a network is a network with a core/periphery structure. It consists of main nodes that are densely interconnected and less interconnected peripheral nodes. Unlike the community structure, which is a different structure of meso-scale networks, core nodes can be connected to peripheral nodes and peripheral nodes are not densely interconnected. In this article we deal with the development of a network with a core/periphery structure. We model the conditions for the formation of such a network. In doing so, we examine important and interrelated topics in the theory of complex networks: the core/periphery structures in the network, network development and the integration of new nodes. To do this, we use the apparatus of game theory on networks. We present the results of simulations that may help to answer various questions from the economic or social field, which relate to the creation of cores or peripherals in network systems.

1 Introduction

Network models are used to represent systems in which there are certain connections and interactions between entities (represented by nodes). These models are successfully used in economics, computer science, social sciences and natural sciences. In terms of topology, networks can be described using a combination of local, global and intermediate (meso-scale) views. Using various analytical tools, it is possible to discover the functions and topologies of networks that give an idea of the dynamic processes operating on these networks. An example is the study of structures known as community structure (Fortunato, 2010). Communities consist of nodes that are densely connected to each other, and connections between nodes in different communities are relatively sparse (Girvan & Newman, 2002; Newman & Girvan, 2004; Porter et al,, 2009; Ahn et al. 2010; Ball et al. 2011; Palla et al., 2005). The analysis of communities in complex networks has found its place, for example, in the analysis of mobile telephone networks (Onnela et al. 2007), biological networks (Lewis et al., 2010), e-commerce networks (Beranek & Remes, 2019, 2020), in political sciences [40] and others (Stencl & Stastny, 2010). In this paper, we discuss the structure of the network, which is known as the core-periphery structure (Mucah et al. 2010). The core is understood as a central and densely interconnected set of network nodes, while the periphery of the network is understood to be a sparsely interconnected, usually non-central set of nodes, which, however, are connected to the core nodes. It is possible to find more definitions of this structure, it is important that all kernel nodes tend to be "central" in the network (e.g., in terms of the shortest network paths). Some authors state that the kernel can be considered as part of a complex system, where entities (nodes) can replace and / or support each other due to a large number of interconnections (edges) (MA & Zheng, 2003; Kitano, 2004; Csete. & Doyle, 2004; Nowak et al., 2004). Often, some IT products and processes also have a core structure with peripherals, such as a firmware core.

In various networks, holding a central position is considered beneficial. This position allows the timely acquisition of various information and influence on other entities. We ask the paper questions like: How do new nodes integrate into a dynamic network? How can the core / periphery structure in the network be created? What relationship building processes are present? We assume that this is a dynamic network, where there are types of relationships between entities, which can be characterized as cooperation or, conversely, a refusal to cooperate. Under this assumption, we can use evolutionary game theory, which combines game theory with dynamics (Szolnoki et al. 2009a; Tan et al., 2016; Tieri et al., 2010; Xu et al, 2019; Bu et al, 2019; Xia et al., 2017, Wang et al., 2012). In our proposed model, we consider multi-games, where we divide entities in the entire population into two types. Part of the population participates in the Prisoner's Dilemma game (PD), while the rest participate in the Snowdrift game (SD). Both games have a very different strategic structure: PD is a game with one dominant strategy (defection), while SD is an "escape game", where defection is the best response

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to cooperation, while cooperation is the best response to defection. This means that individuals are in different social dilemmas. Both games are played by agents whose interactive neighborhood is characterized by network links.

The rest of the paper is arranged as follows. First, in Part 2, we introduce the mechanism of development of the core / peripheral structure in the network in the application of spatial multi-game and describe in detail the corresponding game model. The results and analyzes will be provided in Part 3. Finally, we will conclude the paper with a few observational remarks in Part 4.

2 Methods

We start from the dynamics of the network, where the nodes are the units of the source receiving the state according to which of the other nodes has contact with them. The interaction between nodes depends on their current states. These are described by matrix H. The elements h_{ij} of matrix H correspond to the probability that there is an oriented edge (link) from state node i towards state node j. Each node represents only one entity with two attributes, i.e., strategy attribute s_x and payout attribute F_x, which determine the state of the entity. The strategy $s_x \in \{C, D\}$ and the payout F_x represent the final payout of the individual entities participating in the game. Edges therefore represent interactions between individuals.

Each node (entity) makes a decision whether to implement a cooperation strategy (C) or a defection strategy (D). This affects the amount of payout received. At the same time, in this decision on the adoption of the strategy, the nodes do not know each other's strategy within their interaction. If the strategy develops into mutual cooperation then the result is a payout R. Mutual defection of interacting entities will result in a loss of P. If the strategy of both nodes is different, then the node choosing the cooperation strategy will receive a payout S. The defection strategy means that the node choosing this strategy to obtain the payment for the defector T. For the rules thus determined, the payments meet the order $T > R > P > S$ and $2R > T + S$ for PD. For a game played only once, defection is the optimal strategy regardless of the opponent's decision. For the game SD, we change the order of payouts to the order $T > R > S > P$. Slight variability in the evaluation of payouts leads to a significant change in the dynamics of the game, so the best action for individuals strongly depends on the opponent's strategy. For this reason, PD and SD are often used to represent different types of social dilemmas or ways of conflict (Deng et al., 2018; Wang et al, 2012; Szolnoki & Perc, 2009b, Li et al., 2020). However, in our model, we assume that the interacting nodes will know each other's current payout size obtained in previous rounds. This will most likely affect the adoption of one of the two strategies.

In each step, the randomly selected node chooses the strategy $s_x \in \{C, D\}$ with respect to the state of the node at the end of the randomly selected incoming edge. At this stage, after changing the total payout (state) of the node, its incoming and outgoing edges are redrawn to reflect its new state. Thus, nodes change their state and change their strategies accordingly. Such a network, where the edges (or their weights) change with the states of the nodes, offer a good way to model the respective interactions. You can also specify which nodes interact and how they interact, depending on their states.

In our model, we use a multi-game model, as we described above. When modeling, we start with a regular square $N = L \times L$ network. This means that each entity has 4 nearest neighbors at the beginning. This network models well the situation where individuals often interact with those peers who share close geographical proximity.

In the initial phase of each game round, we assign each entity a starting strategy. It is either a strategy of a cooperating entity, we denote the strategy as $[C, S_x = (1, 0)^T]$ or a strategy refusing to cooperate (defection), we denote the strategy by $[D, S_x = (0, 1)^T]$. Both of these strategies will be assigned randomly with the same probability. Thus, the whole set of all entities can be divided into two groups. These groups can be referred to as group O and group O'. Group O is a group that participates in the game of PD. Group O' is a group that participates in the game SD. The relative share of group O in the total number of entities in the network is denoted as γ. Then the relative share of group O' in the total number of entities in the modeled network will be $1 - \gamma$. At the beginning of the distribution, members of groups O and O' are randomly distributed in the network. All entities can communicate with each other. In this paper, we also assume that at each step, a randomly selected node can change its strategy according to the state of the node at the end of the randomly selected incoming edge. As soon as a node changes state, its incoming and outgoing edges are redrawn according to the values of the matrix H, so that its new strategy is represented.

The payout matrix for PD and SD games can be written as follows:

$$A_O = \begin{pmatrix} R & S \\ T & P \end{pmatrix} \quad \text{a} \quad A_P = \begin{pmatrix} R & -S \\ T & P \end{pmatrix}. \tag{1}$$

To achieve greater clarity, we adjust the matrices using the following parameter values (all without losing the generality): for the game PD we set $R = 1$, $T = b$, $S = -\varepsilon$, $P = 0$ and for the game SD then $R = 1$, $T = b$, $S = \varepsilon$, $P = 0$. After this adjustment, the payroll matrices will have the following form:

$$A_O = \begin{pmatrix} 1 & -\varepsilon \\ b & 0 \end{pmatrix} \qquad a \qquad A_P = \begin{pmatrix} 1 & \varepsilon \\ b & 0 \end{pmatrix}. \tag{2}$$

It is clear from this matrix that the parameter b, for which $b \in (1, 2)$ applies, is a temptation to refuse to cooperate. The parameter ε and $-\varepsilon$ then represents the payout for the entity with the cooperation strategy that has interacted with the entity adhering to the non-cooperation strategy. At the beginning, we set the value of γ to $\gamma = 0.5$. This means that half of the total number of entities participate in PD and half in SD.

Even during the simulation, each entity reacts with its current neighbors and gradually gets paid according to its current strategy. For example, if entity i interacts with entity j (where we denote the respective strategies of entities as s_i and s_j), we can express the following relation:

$$\pi_i = s_i^T A\, s_j \tag{3}$$

Similarly, entity j also receives a payout. If we denote the set of neighbors of entity i as Ω_i, then we can express the payout from the neighbors of entity i by the relation:

$$\Pi_i = \sum_{j \in \Omega_i} s_i^T A\, s_j \tag{4}$$

Similarly, entities j adjust their payout size.

In the next step, entity i will interact with another entity j in the network and changes its strategy according to its status and the status of entity j. Consider the case that entity i has a high value of the total payout (greater than the average value of the total payout of all entities) and the new entity j will interact with it (according to the values of the probability matrix H).

We assume that entity j also has a high value of the total payout and has the same strategy as entity i. However, if there is no such neighbor, the payout of the entity does not change. We can write this with the following relation:

$$\Pi_i(t) = \Pi_i(t - 1) + \tau \sum_{j \in \Phi_i} s_i^T(t - 1) A\, s_j(t - 1) \tag{5}$$

Where Φ_i is the set of entities in neighborhood of the entity i that have a high total payout value and the same strategy as the entity i.

At each step, entities calculate their original payouts and the value of the total payout. Furthermore, edges are added with a certain probability according to the values of the matrix H. In each time step, a certain entity i is selected with a certain probability, neighboring entities and their total payouts are determined. The change in the total payout according to equation (5) is calculated. Furthermore, the entity also holds or changes the strategy of the game with a certain probability by comparing its own total value of the payout and the payout of neighboring entities. Entity i changes strategy with probability, which we express by the relation:

$$\Gamma = \frac{1}{1 + k \exp\left(\frac{\Pi_i}{\Pi_j}\right)} \tag{6}$$

where k is a parameter.

We performed numerical simulations with an initial square network with $L = 20$. We chose the parameters for performing the simulations as follows:

We chose the value of $\gamma = 0.5$; we chose the value $\tau = 0.05$; we chose the value $k = 0.5$; we chose the values of the matrix H at the beginning 0.25.

We performed several 20 independent calculations for each set of parameter values, averaging the results to ensure the accuracy of our results.

Figure 1 Example of a network. Dark and light nodes represent entities that participate in PD type games resp. SD.
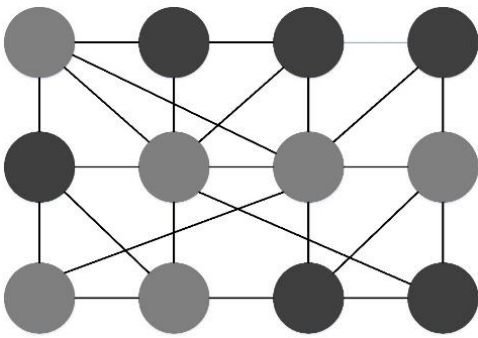

3 Research results

During the simulation, we tried to monitor the level of cooperation in the specified network. This changes both with the value of the entered parameters and with the values of the matrix H. The heterogeneity of the payout parameter can facilitate the development of cooperation and the alliance mechanism can even dramatically improve the development of cooperation in a structured population. This is reflected in the network structure. In our simulations, we observed how the core / periphery structure evolves. The following pictures illustrate this. We used the tools of the R environment and the CONCOR! Library. For our analyzes, we used a block model, which illustrates the development of the structure of the network.

Figure 2 The block model illustrates the development of the network structure at different times a) (left) after 50 time steps b) (right) after 150 steps.

(a)　　　　　　　　　　　　　　　　(b)
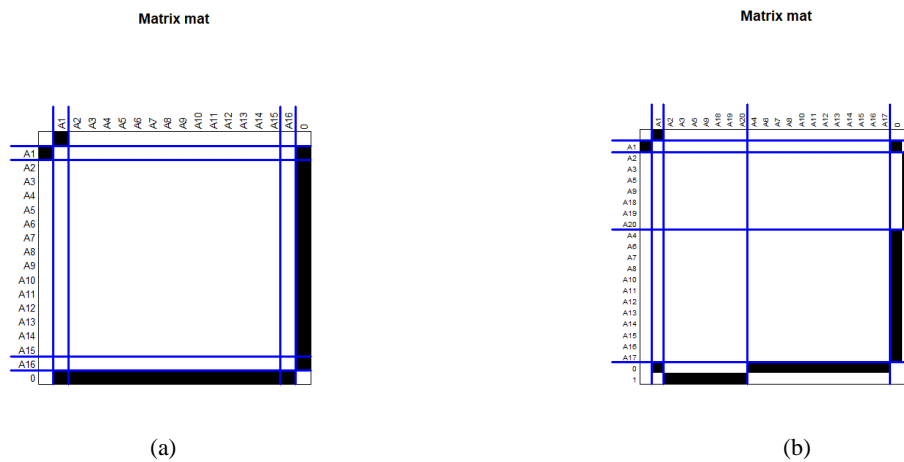
Entities in a structured population receive a paycheck from neighbors who have a similar total payout value with them. This means that the influence of entities will increase under the support of neighbors whose status is similar. From the original network at the beginning (Fig. 2a) a structure corresponding to the formation of local cores is formed (Fig. 2b). Entities form alliances here and the predominant strategy, here it is a cooperative strategy. In the next phase, the larger core grows further and the typical core / periphery structure gradually develops. In particular, cooperative individuals in the core have the highest total payout value, so their transmission capacity is the strongest and close clusters can form, the possible defective individual has the lowest total payout value, the weakest transfer capacity and will develop peripheral structures.

Figure 3 The relative share of the group playing the PD game as a function of time steps.
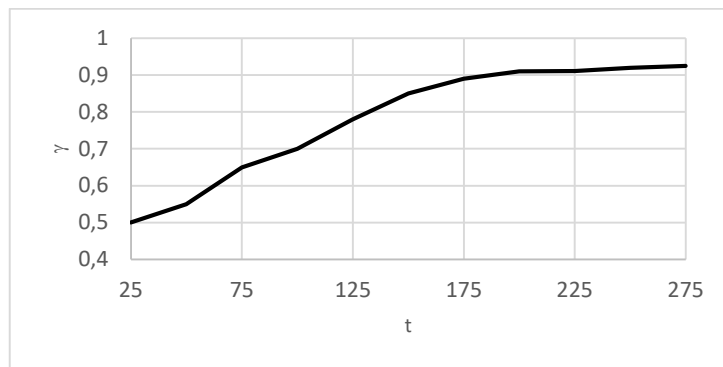
The relative share of the group playing the PD game as a function of time steps presented on Figure 3. It can be seen that the value of g increases from the initial selected value of g = 0.5 to a certain value. This corresponds to the formation of cores in the network, where the cooperation (PD game) between entities is greater than in periphery structures.

The results were obtained in a time-varying environment of multiple games. The perception of entities in a network can change over time. The key point is that players can still perceive the same dilemma situation differently and therefore can use different payout matrices. Our primary goal here is to present the results obtained with a minimal model, although of course it is possible to expand towards more complex and realistic models.

4 Conclusion

In this paper, we have studied the development of the network, especially with regard to the structure of the network. We used multigame as a model, and assumed that the same dilemma is often perceived differently by entities in the network. They can use different pay matrices to interact with their opponents. This makes the modeled evolutionary game on the network heterogeneous. The results can be used to understand the emergence of different structures in network systems in the real world.

References

Ahn, Y. Y., Bagrow, J. P. & Lehmann, S. (2010). Link communities reveal multiscale complexity in networks, *Nature*, 466, 761–764.

Axelrod, R. (1984). *The Evolution of Cooperation*, Basic Books: New York, USA.

Ball, B., Karrer, B, & Newman, M. E. J. (2011) An efficient and principled method for detecting communities in networks, *Physical Review E*, 84, 036103.

Beranek, L., Remes, R. (2020). Distribution of node characteristics in evolving tripartite network, *Entropy* 22(3), 263. doi.org/10.3390/e22030263

Beranek, L., Remes, R. (2019). E-commerce network with price comparator sites, In *Proceedings of the 9th International conference on advanced computer information technologies* (ACIT'2019), Ceske Budejovice, Czech Republic, Jun 05-07, 401 – 404.

Bu, Z., Li, H. J. & Gao, J., Wang, Z. & Gao, G. (2019). Dynamic cluster formation game for attributed graph clustering, *IEEE Transactions on Cybernetics*, 49(1), 328-341. doi: 10.1109/TCYB.2017.2772880.

Csermely, P., London, A., Wu, L. Y. & Uzzi, B. (2013). Structure and dynamics of core-periphery networks, *Journal of Complex Networks*, 1, 93–123.

Csete, M. & Doyle, J. (2004) Bow ties, metabolism and disease, *Trends in Biotechnology*, 22, 446–450.

Deng, Z. H., Huang, Y. J., Gu, Yang, Z. & Gao, L. (2018). Multigames with social punishment and the evolution of cooperation, *Physica A: Statistical Mechanics and its Applications*, 505 164-170. doi.org/10.1016/j.physa.2018.03.054.

Fortunato, S. (2010). Community detection in graphs, *Physics Reports*, 486, 75–174.

Girvan, M & Newman, M. E. J. (2002). Community structure in social and biological networks, *Proceedings of the National Academy of Sciences* (PNAS) 99, 7821–7826.

Kitano, H. (2004). Biological robustness, *Nature Reviews Genetics*, 5, 826–837.

Lewis, A. C., F. Jones, N. S., Porter, M. A. & Deane, C. M. (2010). The function of communities in protein interaction networks at multiple scales, *BMC Systems Biology*, 4, 100.

Li, X., Wang, H., Hao, G. & Xia, Ch. (2020). The mechanism of alliance promotes cooperation in the spatial multi-games, Physics Letters A, 384(20), 126414, doi.org/10.1016/j.physleta.2020.126414.

Ma, H. W. & Zheng, A. P. (2003). The connectivity structure, giant strong component and centrality of metabolic networks. *Bioinformatics*, 19, 1423–1430.

Mucha, P. J., Richardson, T., Macon, K., Porter, M. A. & Onnela, J. P. (2010). Community structure in time-dependent, multiscale, and multiplex networks, *Science*, 328, 876–878.

Newman, M. E. J. & Girvan, M. (2004). Finding and evaluating community structure in networks, *Physical Review E*, 69, 026113.

Nowak, M.A., Sasaki, A., Taylor, C. & Fudenberg, D. (2004). Emergence of cooperation and evolutionary stability in finite populations, *Nature*, 428, 646–649.

Onnela, J. P., Saramaki, J., Hyvonen, J., Szabo, G., Lazer, D., Kaski, K., Kertesz, J. & Barabasi, J. L. (2007). Structure and tie strengths in mobile communication networks, *Proceedings of the National Academy of Sciences* (PNAS), 104, 7332–7336.

Palla, G., Derenyi, I., Farkas, I. & Vicsek, T. (2005). Uncovering the overlapping community structure of complex networks in nature and society, *Nature*, 435, 814–818.

Porter, M. A., Onnela, J. P. & Mucha, P. J. (2009). Communities in networks, *Notices of the American Mathematical Society*, 56, 1082–1097, 1164–1166.

Stencl, M., Stastny, J. (2010). Neural network learning algorithms comparison on numerical prediction of real data. In *Proceedings of the 16th International Conference on Soft Computing MENDEL 2010*, Brno, 280-285, ISBN 978-80-214-4120- 0.

Szolnoki, A., Perc, M. & Szabo, G. (2009a). Topology-independent impact of noise on cooperation in spatial public goods games, *Physical Review E*, 80, 56109.

Szolnoki, A., Perc, M. (2009b). Promoting cooperation in social dilemmas via simple co-evolutionary rules, *The European Physical Journal B*, 67, 337.

Tan, S.L., Wang, Y.N., Lov, J.H. (2016). Analysis and control of networked game dynamics via a microscopic deterministic approach, *IEEE Transactions on Automatic Control*, 61, 4118–4124.

Tieri, P., Grignolio, A., Zaikin, A., Mishto, M., Remondini, D., Castellani, G. C. & Franceschi, C. (2010) Network, degeneracy and bow-tie. Integrating paradigms and architectures to grasp the complexity of the immune system. *Theoretical Biology and Medical Modelling*, 7, 32.

Wang, Z., Szolnoki, A. & Perc, M. (2012). Evolution of public cooperation on interdependent networks: the impact of biased utility functions, *Europhysics Letters*, 97, 48001.

Xia, C.Y., Ding, S., Wang, C. J., Wang, J. & Chen, Z. (2017). Risk analysis and enhancement of cooperation yielded by the individual reputation in the spatial public goods game, *IEEE Systems Journal*, 11(3), 1516-1525, doi: 10.1109/JSYST.2016.2539364.

Xu, J. Deng, Z. Gao, B., Song, Q., Tian, Z., Wang, Q., Gao, M. & Niu, Z. (2019). Popularity-driven strategy updating rule pro-motes cooperation in the spatial prisoner's dilemma game, *Applied Mathematics and Computation*, 353, 82–87.

Market Research and Sustainable Marketing in Trade and Tourism

Measurement of Customer Relationship Intensity

Petra Martíšková[1]

Abstract: This paper aims to verify through empirical testing a chosen existing theoretical model dealing with degrees of relationship intensity between a brand (i.e. a company) and a customer. Necessary data were collected through CAWI ($n = 2,000$). The chosen theoretical model by Hang & Ferguson (2016) describes five degrees of customer relationship intensity ("Awareness", "Identification", "Satisfaction", "Loyalty" and "Recommendations") but another one degree needed to be added during empirical measurement (called "Initial stage" for purposes of this paper). Determination of the degrees of relationship intensity for individual customers/respondents is useful for further analytical works, e.g. segmentation. To maintain a manageable length, this research is focused on the consumer electronics market.

Keywords: customer relationship management, CRM, customer relationship intensity, customer-company relationships

JEL Classification: M31

1 Introduction

Customer relationship management (abbreviated as CRM) deals with "managing detailed information about individual customers" (Armstrong, Kotler, Trifts, Buchwitz, & Gaudet, 2017, p. 178). Detailed information about individual customers can be used as a basis for segmentation. In this context, various models or frameworks have emerged to explain the hierarchy of customer relationships.

Entering a combination of terms *framework/model/hierarchy* and *consumer/customer relationship* into the Web of Science database (Advanced Search) shows there are 365 relevant published results (on June 25, 2020); there was a search condition these terms had to be included in the article title or its keywords (either as author keywords or keywords additionally generated using the Clarivate Analytics algorithm). From a thematic point of view, about 59% of the results are related to business or management and about 41% to computer science, which indicates a significant interconnectedness of these areas – in other words, it means a clear link between CRM and IT. In terms of time, the most found results come from the year 2010, while since 2008 there has been a noticeable increase in the number of published results, which continues to this day. In terms of referencing these results, there has been a significant increase in the number of citations since 2009, which continues to this day. It indicates this is currently a living topic that is being discussed.

The most often cited papers

The most cited results were examined at first because it is reasonable to assume such results will point to the most fundamental works in the set of results found. By far the most often cited paper (cited 645x; June 25, 2020) is a study by Payne & Frow (2005), dealing with a conceptual framework of CRM to develop customer value – CRM is considered to be a strategic issue. Payne & Frow (2005) also distinguish five key processes in their framework: strategy development, value creation, multichannel integration, information management and performance assessment. However, their study does not directly address the hierarchy of customer relationships.

Another helpful paper by Netzer, Lattin, & Srinivasan (2008) is focused on the dynamics of customer relationships through transactional data using a hidden Markov model. The use of transaction data suggests that degrees of relationship intensity are evaluated by the lens of money. In the application part of the study, the authors empirically tested their model on graduates and their willingness to donate money to the universities where they graduated. It means the authors diverged from the general focus on business customers. These authors tried to capture the dynamics of customer relationships with regard to the focus on graduates and their willingness to donate and described three relationship states (called as "Dormant", "Occasional" and "Active"). They endeavour to generalize the principles and claim that the customer's experience should influence his/her later shopping behaviour.

A certain effort to create a hierarchy can be found in a paper by Verhoef & Donkers (2001), who present a numerical model for predicting the potential value of a current customer in the insurance industry. Their considerations on customer classification are based on a four-field matrix, simply sorting customers by their current value and potential value (potential value is calculated as the total profit margin from all purchases of a given customer, with respect to socio-demographic characteristics and shopping behaviour of a given customer). Both current and potential value of a customer are described rather vaguely through two levels: high and low. However, the authors also add it is possible to detail the matrix and

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create more fields in it. Such sorting of customers results in specific recommendations for created customer segments – instead of treating all customers equally, it is more advantageous to prepare multiple strategies for various customer segments. In conclusion, these authors present a somewhat general idea that models (or conceptual frameworks) working with a high level of aggregation are less difficult to create, however, aggregation can lead to the loss of information.

Other relevant papers and studies

Although the papers mentioned above offer interesting and valuable insights, they do not address the hierarchy of customer relationship intensity in detail. Therefore, for further work with the literature, author's own theoretical experience and awareness of suitable available resources were used, which quote other relevant papers and studies (this kind of gradual obtaining resources can be considered an analogy of the snowball effect, described by Kozel 2011).

When determining the level of customer bonding, resp. degrees of relationship intensity with a customer, a study by Cross (1992) contains a crucial concept: this study distinguishes five degrees of customer relationship intensity. At the bottom of this ranking is "Awareness", the second degree is "Identity", the third degree is called "Relationship", the fourth degree is "Community" and the fifth degree is "Advocacy".

Paswan & Troy (2004) comment on the introduced degrees of relationship intensity by Cross (1992) somewhat in general and broadly: according to these authors, it is an effort to improve customer relationships and maintain them. The last three degrees of customer relationship intensity are considered a key to relationship marketing because they emphasize two-way interaction (Baron, Conway, & Warnaby, 2010). The authors Stokburger-Sauer (2010), Bhattacharya & Sen (2003) and Gupta & Pirsch (2006) equally mention in the fourth degree of relationship intensity the idea of using so-called membership conferences, which is connected with information about the loyalty programme of the Holiday Inn hotel chain, taken directly from the paper by Cross (1992). Stokburger-Sauer (2010) examines this fourth degree in more depth, specifically addressing the question how to facilitate and develop functioning of communities that assemble fans/supporters of a particular brand. Ashman (2012) further points out that higher degrees of relationship intensity presume a willingness to share brand experience with other people. This is, moreover, evident from the description relating to the fifth degree of relationship intensity by Cross (1992).

Hang & Ferguson (2016) comprehensively comment on the degrees of customer relationship intensity described above by Cross (1992), claiming that each degree means a certain level of trust and interaction. It is clear that the lowest level is in the lowest degree (i.e. "Awareness") and the highest level belongs to the highest degree of relationship intensity (i.e. "Advocacy"). Hang & Ferguson (2016) further point out that English terms denoting degrees of relationship intensity can be modified (these authors use the term "Customer satisfaction" instead of the term "Relationship", the term "Customer loyalty" is used instead of "Community" and the term "Recommendations" appears instead of "Advocacy"). However, closer inspection of characteristics describing these terms leads to serious confusion: e.g. the degree "Relationship" by Cross (1992) is characterised by using loyalty programmes but the modified term "Customer satisfaction" by Hang & Ferguson (2016) does not correspond to this; it should be described rather as "Customer loyalty", however, this term is assigned to another degree. It indicates there is conceptual confusion.

For example, Bhattacharya & Sen (2003) created a framework (a model) for understanding customer relationships, based on the synthesis of available knowledge, where the basis is considered consumers' identification. These authors deal with the identity of a company and identification of a customer with the company which results in customer loyalty and promotion, as well as in more successful customer acquisition, and better resistance to negative news.

Other authors Dong, Wan, & Wang (2014) divide customers into individual segments based on customer life cycle theory and examine the influence of social media on the relationship between a company and its customers. However, their study does not provide a detailed view of customers based on relationship intensity.

When comparing the terminology and considering its suitability in the current environment, it seems reasonable to use the terms by Hang & Ferguson (2016) who distinguish degrees called "Awareness", "identification", "Satisfaction", "Loyalty" and "Recommendations". Their model, based on ideas by Cross (1992), contains specific statements describing clearly degrees of customer relationship intensity from the customer's point of view, and so it is examined in this paper.

Aim of this paper

This paper aims to verify through empirical testing the chosen existing theoretical model, dealing with degrees of relationship intensity between a brand (a company) and a customer, by means of real data. To maintain a manageable length, this research is focused on the consumer electronics market.

2 Methods

A questionnaire survey (CAWI) was used to collect data from respondents in the Czech Republic. At the beginning of the questionnaire, respondents were asked to fill in their most favourite brand of consumer electronics (i.e. the questionnaire captured those respondents who were in a more advanced level of customer's life cycle towards a particular brand).

This paper presents partial results; it deals with the first part of the above-mentioned questionnaire, which consisted of a battery of questions, designed to determine relationship intensity between respondents and their favourite brands (which represent companies). The battery was based on a five-point Likert scale to measure the degree of agreement.

The questionnaire was designed for respondents who are at least 18 years old, i.e. it was designed only for adults for whom it is possible to assume that they already have a certain holistic view of the world and can think critically. Data collection took place from 8 March to 25 April 2019 and 5,164 questionnaires were obtained (after eliminating questionnaires which did not comply with the control mechanisms, 4,539 questionnaires remained).

It was decided additionally that for the subsequent analysis, the questionnaires filled in by respondents, who most often do online shopping from a general point of view, will be further processed and analysed. Such narrowing seems to be logical with regard to the focus on consumer electronics because electronics belong to the goods which are purchased online most frequently (Úšela & Kačer 2019). Based on this fact, it can be assumed that a group defined in this way will be familiar with consumer electronics and will have their own opinion in this area.

According to Redakce (2019), people aged 18-44 do online shopping most often and account for 82% of online purchases (people aged 45+ participate in online purchases from 18%, therefore they were not taken into account in the subsequent analysis). There were 3,713 usable questionnaires, which were filled in by respondents at the age of 18-44 years. To ensure the balance of the sample to the age of respondents, $n = 2,000$ questionnaires were systematically selected (the need for this additional selection was since that the questionnaire did not include built-in age quotas to monitor filling the age quotas directly during data collection).

It is obvious that the number of selected questionnaires for subsequent analysis has decreased significantly; however, it is still sufficient working with a set of 2,000 respondents (according to Kozel 2011, household/consumer research should traditionally work with 1,000 respondents). In addition, in the created sample $n = 2,000$; representativeness was ensured with respect to age groups (18-20, 21-23, 24-26, 27-29, 30-32, 33-35, 36-38, 39-41, 42-44), which must be perceived as added research value. In terms of gender, the sample ($n = 2,000$) consists of 877 men (44%) and 1,123 women (56%).

3 Research results

The theoretical basis for measuring relationship intensity between a customer and a brand (i.e. a company) is described in the section "Introduction". After comparing terminology and considering its suitability in the contemporary environment, it seems useful to work with the terms by the authors Hang & Ferguson (2016). The reason for the preference for these terms is also the fact that their model contains specific statements that clearly describe various degrees of relationship intensity from the customer's point of view (for details see Table 1).

Respondents assessed given statements through the five-point Likert scale; i.e. according to the terminology by Kozel (2011) it was a scale with an odd number of categories, containing an intermediate category with a neutral meaning "I don't know, I'm not sure".

It is also important to point out the limits of presented statements, which serve to classify every respondent into a certain degree of relationship intensity. Each respondent could perceive the statements slightly differently (subjectively), which could lead to different individual interpretations. According to Kotler et al. (2007), it is a selection bias in which an individual attaches his/her meaning to a message. However, it is considered that the statements presented here have been prepared with all professional care, so it is possible to work with them.

3.1 Determining the degree of customer relationship intensity

Every respondent is classified into a particular degree of relationship intensity (based on his/her responses). To determine the degree, the responses of the Likert scale were quantified, where the answer "Strongly agree" got 2 points, "Rather agree" 1 point, "Rather disagree" got a negative value −1 point and "Strongly disagree" got a value of −2 points. The intermediate (or neutral) answer "I don't know, I'm not sure" got 0 points because it could happen that in the case of non-zero point value a certain respondent would distort his/her total sum of obtained points by stating neutral responses for offered statements. This could lead to classification into a different degree of relationship intensity than it actually is.

Since the number of presented statements for every degree of relationship intensity was not balanced, it was necessary to allocate points at the individual degrees equally, as shown in Table 1.

Table 1 Allocation of points within statements and degrees of relationship intensity

Degrees of relationship intensity (by Hang & Ferguson, 2016) and related statements	Strongly agree	Somewhat agree	I do not know; un-decided	Somewhat disagree	Strongly disagree
AWARENESS					
I can clearly distinguish the BRAND among other brands.	2.00	1.00	0.00	−1.00	−2.00
Total points for „Awareness"	*2.00*	*1.00*	*0.00*	*−1.00*	*−2.00*
IDENTIFICATION					
The BRAND is a part of my personality.	0.50	0.25	0.00	−0.25	−0.50
I wonder what other people think of the BRAND.	0.50	0.25	0.00	−0.25	−0.50
When someone commends the BRAND, it pleases me.	0.50	0.25	0.00	−0.25	−0.50
When someone criticizes the BRAND, I take it personally.	0.50	0.25	0.00	−0.25	−0.50
Total points for „Identification"	*2.00*	*1.00*	*0.00*	*−1.00*	*−2.00*
SATISFACTION					
I have a good feeling when I choose a product of the BRAND.	1.00	0.50	0.00	−0.50	−1.00
It would be nice to try out also other products of the BRAND.	1.00	0.50	0.00	−0.50	−1.00
Total points for „Satisfaction"	*2.00*	*1.00*	*0.00*	*−1.00*	*−2.00*
LOYALTY					
I will definitely consider the BRAND when shopping in the future.	1.00	0.50	0.00	−0.50	−1.00
Compared to other brands, the BRAND is the first choice for me.	1.00	0.50	0.00	−0.50	−1.00
Total points for „Loyalty"	*2.00*	*1.00*	*0.00*	*−1.00*	*−2.00*
RECOMMENDATIONS					
I recommend the BRAND to my friends and relatives.	2.00	1.00	0.00	−1.00	−2.00
Total points for „Recommendations"	*2.00*	*1.00*	*0.00*	*−1.00*	*−2.00*

Source: Own processing
Note 1: The word "BRAND" serves as a placeholder for the respondent's favourite brand of consumer electronics.
Note 2: Some statements in this table are similar to statements suggested by Bhattacharya & Sen (2003).

Answers of each respondent can be evaluated within a range from -10 points (min.) to 10 points (max.). To classify each respondent into one certain degree of relationship intensity, point limits were created (mathematically expressed through intervals) by which each respondent is classified into a certain degree – see Table 2. Any similar quantitative approach was not found in the literature so it was necessary to develop author's own approach, based on testing statements presented in Table 1.

Table 2 Point limits (intervals) for classifying respondents into a certain degree of relationship intensity

Relationship intensity degree	Point limits (intervals)	Calculation of minimum value in the interval
0. Initial stage	<−10; −7) points	0 times 1 point ("Somewhat agree") + 5 times −2 points ("Strongly disagree")
1. Awareness	<−7; −4) points	1 times 1 point ("Somewhat agree") + 4 times −2 points ("Strongly disagree")
2. Identification	<−4; −1) points	2 times 1 point ("Somewhat agree") + 3 times −2 points ("Strongly disagree")
3. Satisfaction	<−1; +2) points	3 times 1 point ("Somewhat agree") + 2 times −2 points ("Strongly disagree")
4. Loyalty	<+2; +5) points	4 times 1 point ("Somewhat agree") + 1 times −2 points ("Strongly disagree")
5. Recommendations	<+5; +10> points	5 times 1 point ("Somewhat agree") + 0 times −2 points ("Strongly disagree")

Source: Own processing
Note: Hang & Ferguson (2016) do not state "Initial stage"; however, this degree seems to be very important, because it cannot be assumed that every respondent/customer is at least at the degree called "Awareness".

The setting of point limits (intervals) must be seen as an auxiliary step for determining the degree of relationship intensity for every respondent and also for subsequent detailed analysis. In this way, one more identification attribute (in the form of information about the degree of relationship intensity) was determined for each respondent, which can be further worked with (as with other identification data such as respondents' age, gender and highest completed education).

From the point of view of practice, creating point limits is an artificial construct. A common objection to it may be an argument that customers can be categorised through the amount spent. However, it is worth noting that simple sales evaluating can often be misleading, as some customers do not spend very much and are still very beneficial and valuable to companies – these customers recommend the brand to others, spread positive references and participate in building a positive image of the company. This can be very difficult to translate into specific monetary expression, relating to one particular customer (Hommerová 2012). If one customer helps to build a positive image of the company and influences another customer to buy, then spending incurred is usually understood as a part of the value of a customer who actually bought, not a part of the one who helped purchase realisation by his/her influence.

3.2 Classification of respondents concerning relationship intensity degrees

After classifying the respondents concerning relationship intensity degrees and displaying it graphically through a histogram (see Figure 1), it is obvious that most of them (53.00%) is in the fifth degree ("Recommendations"). This result was expected because respondents in the questionnaire survey were asked to work with their own most favourite brand of consumer electronics, so, understandably, their attitude reflected a high degree of relationship intensity. The second most common degree is "Loyalty" (30.15%). Respondents at the degrees of "Loyalty" and "Recommendations" make up a total of 83.15% of the sample.

The remaining 16.85% belong to respondents at the degrees of "Satisfaction" (13.00%), "Identification" (3.35%), "Awareness" (0.45%) and "Initial stage" (0.05%, i.e. 0.5‰). Degree of "Satisfaction", resp. "Identification" is also appropriate to perceive positively – respondents included in these degrees show a positive attitude towards the brand (which represents a particular company).

On the other hand, the degree of "Awareness" indicates that such a respondent is not personally identified with the brand very much (share of such respondents in the sample is negligible; it is only 0.45%). At the beginning of the questionnaire survey, such respondents probably chose a brand that is not exactly their favourite one, resp. they may not even have their most favourite brand, and they simply listed the first brand that just came to their minds.

A pre-stage called "Initial stage" was identified only once. In the context of the research, when respondents had to work with their most favourite brand, this result is somewhat embarrassing. Although this respondent declared a positive attitude towards the brand he/she has chosen (this was detected through control mechanism), he/she did not demonstrate any other positive attitudes, he is even more unable to clearly recognize the brand among others.

Figure 1 Classification of respondents with respect to relationship intensity degrees ($n = 2,000$)
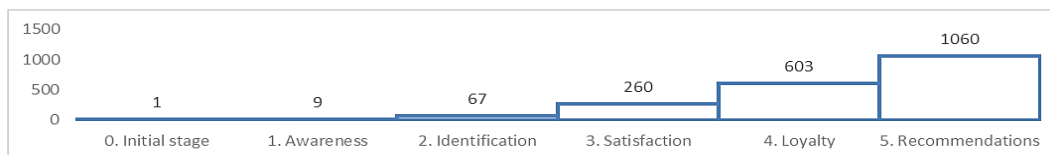
Source: Own processing

If the questionnaire survey concerned a single specific brand of consumer electronics, it can be expected that the histogram of frequency distribution would be more balanced, resp. degrees of "Loyalty" and "Recommendations" would be significantly less represented.

Figure 2 Classification of respondents with respect to relationship intensity degrees – 10 most frequently mentioned favourite brands of consumer electronics
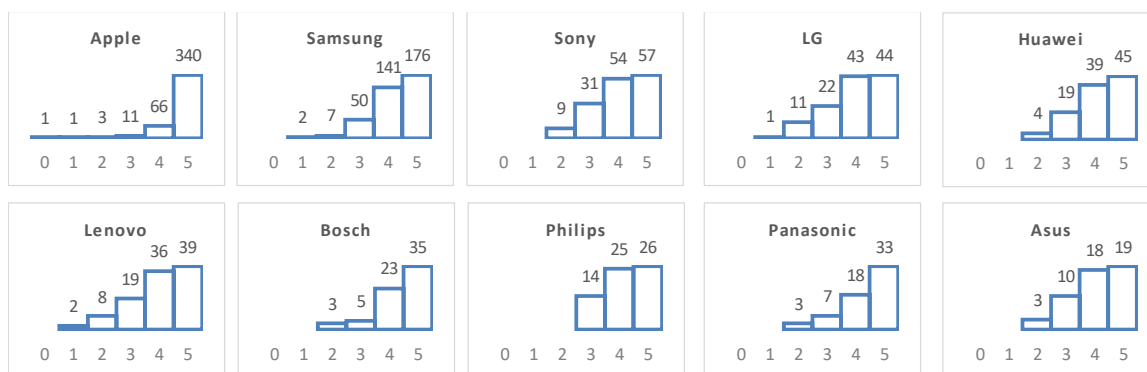
Source: Own processing
Note 1: Numbers on the x-axis indicate the relationship intensity, where 0 = "Initial stage", 1 = "Awareness", 2 = "Identification", 3 = "Satisfaction", 4 = "Loyalty", 5 = "Recommendations".
Note 2: The maximum of each histogram is given by the highest frequency value of respondents included in individual degrees.

For a more detailed view, Figure 2 is made as a set of histograms dividing the respondents into relationship intensity degrees for the 10 most frequently mentioned favourite brands (these brands were mentioned by 1,523 respondents, i.e. 76.15% of the sample $n = 2,000$). Figure 2 shows that the degree of "Recommendations" is predominant. Histograms generally have a similar shape – the only exception is the brand of Apple company, which has the vast majority of respondents (approximately 81%) at the degree of "Recommendations". It seems this brand causes very strong emotions. At the same time, it is the only brand within which one of the respondents was identified at the degree of "Initial stage". The brand of Apple company is, therefore, at first sight, different from the other analysed brands.

4 Conclusions

Empirical verification of the chosen existing theoretical model described by Hang & Ferguson (2016) through real data is possible. However, it seems that the effort to specify precisely particular degrees of relationship intensity results in creating a rather artificial construct, based on author's own mathematical approach (see Table 2) – it is obvious, it depends on author's own approach.

Hang & Ferguson (2016) claim there are five degrees of customer relationship intensity but another one degree needed to be added during empirical measurement (called "Initial stage" for purposes of this paper). Determination of the degree of relationship intensity for every single customer/respondent is useful for further analytical works, e.g. segmentation of a customer base – it can be understood as another one of identification attributes which describe respondents (in addition to respondents' age, gender, highest completed education etc.).

As this paper focuses on brands of consumer electronics, an interesting fact has emerged: the brand of Apple company seems to differ from others as it has the vast majority of respondents (approx. 81%) at the degree of "Recommendations". This finding should be investigated more deeply in further research to determine what causes this difference.

References

Armstrong, G., Kotler, P., Trifts, V., Buchwitz, L. A., & Gaudet, D. (2017). *Marketing: An introduction.* Toronto: Pearson. ISBN 978-0-13-409580-6.

Ashman, R. (2012). *Simulating attachment to pure-play fashion retailers.* (Dissertation theses). The University of Manchester. Available at: https://pdfs.semanticscholar.org/de0d/87dc9477a87195bb302cab2284f1558a4209.pdf.

Baron, S., Conway, T., & Warnaby, G. (2010). Relationship marketing themes. In *Relationship marketing: A consumer experience approach* (pp. 25-44). London: SAGE Publications Ltd. doi: 10.4135/9781446251096.n2.

Bhattacharya, C. B., & Sen, S. (2003). Consumer-company identification: A framework for understanding consumers' relationships with companies. *Journal of Marketing, 67*(2), 76-88. doi: 10.1509/jmkg.67.2.76.18609.

Cross, R. H. (1992). The Five Degrees of Customer Bonding. *Direct Marketing, 55*(6), 33-35, 58.

Dong, L. L., Wan, Y. H., & Wang, X. J. (2014). The Dynamics of Social Media Metrics and Intensity of Customer Relationship-An Empirical Investigation of the IT Industry. *Proceedings of the 2014 International Conference on Management Science and Management Innovation,* 277-284.

Gupta, S., & Pirsch, J. (2006). The company-cause-customer fit decision in cause-related marketing. *The Journal of Consumer Marketing, 23*(6), 314-326. doi: 10.1108/07363760610701850.

Hang, L. M. D., & Ferguson, D. L. (2016). Customer Relationship Enhancements from Corporate Social Responsibility Activities Within the Hospitality Sector: Empirical Research from Vietnam. *Corporate Reputation Review, 19*(3), 244-262. doi: 10.1057/s41299-016-0001-4.

Hommerová, D. (2012). CRM v podnikových procesech. Praha: Grada Publishing. ISBN 978-80-247-4388-2.

Kotler, P. et al. (2007). *Moderní marketing.* 4. evropské vydání. Praha: Grada Publishing. ISBN 978-80-247-1545-2.

Kozel, R. (2011). Dotazování. In *Moderní metody a techniky marketingového výzkumu* (pp. 185-220). Praha: Grada Publishing. ISBN 978-80-247-3527-6.

Netzer, O., Lattin, J. M., & Srinivasan, V. (2008). A hidden Markov model of customer relationship dynamics. *Marketing Science, 27*(2), 185-204. doi:10.1287/mksc.1070.0294.

Paswan, A. K., & Troy, L. C. (2004). Non-profit Organization and Membership Motivation: An Exploration in the Museum Industry. *Journal of Marketing: Theory and Practice, 12*(2), 1-15.

Payne, A., & Frow, P. (2005). A strategic framework for customer relationship management. *Journal of Marketing, 69*(4), 167-176. doi:10.1509/jmkg.2005.69.4.167.

Redakce (2019). Infografika: Jak Češi nakupují na internetu? Dominují ženy, nejsilnější měsíc je listopad. *TyInternety.cz.* Available at: https://tyinternety.cz/e-commerce/infografika-jak-cesi-nakupuji-na-internetu-dominuji-zeny-nejsilnejsi-mesic-je-listopad/.

Stokburger-Sauer, N. (2010). Brand community: Drivers and outcomes. *Psychology & Marketing, 27*(4), 347.

Úšela, J., & Kačer, J. (2019). Nejvíce se v e-shopech utratí za elektroniku. Roste zájem o nákup jídla a nápojů. *Hospodářské noviny.* Available at: https://infografiky.ihned.cz/nakupy-cechu-na-internetu/r~dd427500508e11e9b38a0cc47ab5f122/.

Verhoef, P. C., & Donkers, B. (2001). Predicting customer potential value an application in the insurance industry. *Decision Support Systems, 32*(2), 189-199. doi:10.1016/s0167-9236(01)00110-5.

Explaining green purchase behaviour through generational cohort theory: A conceptual study

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Abstract: The term "Green" is attracting considerable attention within the lodging sector (Chen et al., 2009, Kim and Han, 2010). The interchangeable use of terms—green, sustainable, eco-friendly, and environmentally responsible—is quite common when describing a green lodging firm (Pizam, 2009). There has been a growing awareness of the environmental impact of hotel operation and development among customers, operators, and investors (Chen et al., 2009, Jones et al., 2014, Pryce, 2001). Lodging customers in recent years have become increasingly concerned about the environmental impact of the hotel industry (Lee et al.; 2011). A multi-dimensional instrument, known as the Theory of Green Purchase Behaviour (Han, 2020) has been developed to gauge tourists' behaviour towards the purchase of green tourism products and services, this conceptual study aims to extend the above theory by incorporating the Cohort Generational Theory (Manheim, 1952) with an aim to estimate purchase propensities among Millennials and Generation Z. The study intends to investigate the intentions and estimate probable causes that lead to sustainable tourism consumption patterns across the generational cohorts taken into consideration.

Introduction

A critical aspect of the tourism and hospitality industry is the accommodation sector which is an exhibitor of heavy carbon footprints in the most ecologically delicate places on the tourist map. The accommodation sector is further divided into two broad segments the conventional and unconventional. The former consists of the established operators providing lodging and boarding services for tourists like hotels, motels, guest houses, paying guest accommodation and other types of stay services that appeal to the mid-centric and psycho-centric tourist typologies which majorly consists of retirees, family with young children and BTMICE (Business Travel, Meetings, Incentives & Exhibitions) these facilities are mostly based in around urban centres. The latter sub-segment of the accommodation industry is usually staple with allocentric tourist types as their offerings, location and amenities do not confirm to traditional standards of hospitality services. These establishments are off-the-track lodging and boarding services that appeal to a diversity of tourists.

Numerous studies have studied the green intentions of young people but have remained confined to the space of intentions (Line et al., 2010), hardly there are studies that have focussed predicting actual behavioural patterns among tourists. This was further proved by a keyword search ("generational cohort theory" & "green purchase behaviour") conducted across leading scientific directories like WoS, Scopus and Ebsco which yielded null results. For marketers to understand consumer behaviour towards green decisions, a profound understanding of the generational realities need to be taken into consideration (Joshi, Rahman & Yatish, 2010), therefore based on existing literature the study identifies one broad problem statement defined below:

    a.   *The generational effect in the green purchasing behaviour*

1 Tourist Propensity for Green Lodging

There is evidence that consumers are willing to pay premium for green hotel practices and at the same time consumers seem reluctant to pay more or even state that green hotels should charge less money. Interestingly, (Baker et al., 2014) identified perceived inconvenience, perceptions of corporate cost cutting and decreased luxury as the most significant barriers for consumers' intention to book or pay premium for a green hotel. In an attempt to segment consumers in regard to green hotel premium pricing (Kang et al, 2012) state that consumers with greater environmentalism, male consumers and customers of luxury or mid-priced hotels are the three groups that are more inclined to pay premium for green hotels.

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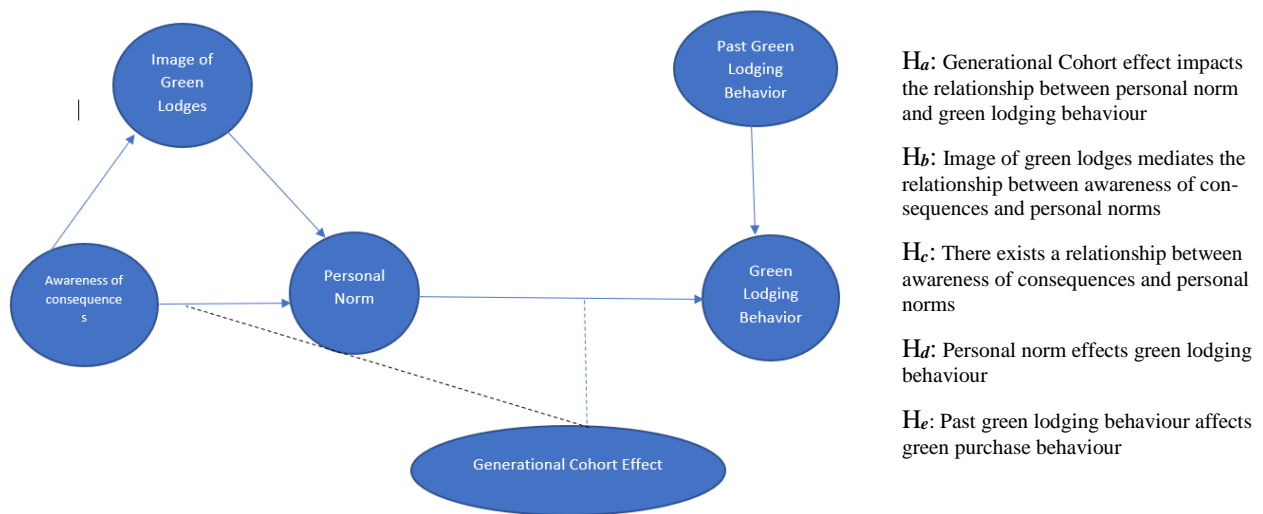[3] Tomas Bata University in Zlin, FaME,tuckova@ utb.cz.
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2 The Theory of Green Purchase Behavior

An increasing number of hospitality firms have engaged in diverse sustainable initiatives in order to protect nature, preserve environmental resources, and obtain socioeconomic benefits. The research successfully developed the theory of green purchase behaviour. Second, some previous studies indicated the importance of anticipated feelings, commitment, desire, and attachment for eco-friendly product purchase/consumption. However, these concepts were not integrated into the TGPB. Future research should actively explore other explanatory constructs and incorporate them into the proposed theory, for example, theory broadening. Third, one buying behaviour process differs based on individual and situational factors. Future research should consider the effect of self-caused and circumstances-caused factors when applying the theory of green purchase behaviour, for instance, theory deepening. This study addresses a key limitation of this study, that is testing the robustness of the theory in a different context (Han,2020)

3 Conceptual Model and Hypothesis Formulation

Figure 1 Hypothetical Model

H$_a$: Generational Cohort effect impacts the relationship between personal norm and green lodging behaviour

H$_b$: Image of green lodges mediates the relationship between awareness of consequences and personal norms

H$_c$: There exists a relationship between awareness of consequences and personal norms

H$_d$: Personal norm effects green lodging behaviour

H$_e$: Past green lodging behaviour affects green purchase behaviour

Source: Own processing

3a. Image of green lodges affecting personal norms

Image of a particular product and its attributes have always impacted personal norms of customers (Klöckner & Ohms, 2009; Prakash & Pathak, 2017) further elaborate the fact that when it comes to the image of eco-friendly or green products, there is an intrinsic association with the personal norms of the individual. An early study into the domain by (Thogersen & Olander, 2006) who studied the dynamic interaction between green product image and personal norm formulation through a panel data experiment, observed fundamental strains of association.

3b. Awareness of consequences affects formulation of green product image

According to studies by (Suki & Norbayah, 2018) there exists a correlation between the awareness of consequences of using an eco-friendly product and the particular image or "greenness" of the product concerned. In extant scholastic pursuits to understand the finer nuances of the drivers of conscious consumption by (Ko et al., 2008), it was further comprehended that there exists a symbiotic relationship among the above variables where-in the awareness positively predicts the image formulation, this has been further elucidated by (Suki, 2013) in their study to predict product imagery.

3c. Moderating Role of Generational Cohort Theory: Awareness and Personal Norms

(Herrando et al., 2019) identified a robust moderating pathway between awareness of consequences and personal norms, it is it to be noted that previous scholarships in the domain have investigated the moderating feature of inter-generational consumers in terms of mall usage (Jackson et al., 2011). Similar interactions have been noticed in a study by (Gilal et al., 2020) in their study to deduce the components of personal norms. Given the above antecedents, it will be interesting to study the CGT effect in the context of green consumption.

3d. Moderating Role of Generational Cohort Theory: Personal norms and green behaviour

(Quoquab et al., 2020) outlined the fact that, the dynamics among multiple generations had an impact between the relationship between personal faith frameworks and future behaviour, furthermore in an attempt to understand millennial behaviour, it is understood that generational differential does leave an impact on how factors like knowledge, believes, conditionings affect green purchase decisions. In an extant study to determine green behaviour among generation Y (Muposhi et al., n.d.) it was understood through moderation analysis that there was a distinct association between behaviour propensities and personal norms of consumers who were studied towards their attitudes towards personal green products, in a similar study to understand the pro-environment behaviour of hospitality professionals (Kim et al., 2016), it was expedited that generational differentials influenced personal inhibitions towards acting in pro-environmental manner.

Extant studies in the vertical of personal believes and its implication on future consumption propensities have outlined the importance of demographic factors like age, sexual orientation and normative believe systems (Wallace et al., 2018). In a study to evaluate the relationship between Indian retail customers, it was concluded that generational differences do cause flux between the personal norms of the consumer and their actual behaviour (Khare, 2012), therefore it would be of high academic importance to study the moderating effect of this be relationship (Eyoun et al., 2020)

3e. Daily Green Behaviour and Green P2P Behaviour

Daily green behaviour has been used to quantify habitual eco-friendly practices adopted by individuals (Liu et al., 2020), early studies in employee behaviour by (Lee et al., 1995; Siero et al., 1996) identified activities like paper recycling, printing double-side and conservation of resources as antecedents of daily green behaviourally Green Behaviour and have the capacity to predict possible green behaviours.

4 Research Methodology

4a. Data Collection

This investigation will test and put further focus on analysis into post-positivism paradigms and theories (Bougie & Sekaran, 2016). The inquiry would take advantage of the analysis method of inference, which is that of the more general to the more particular. Moreover, the study progresses with hypothesis, mostly focused on the analysis of scholarly literature, and the researcher develops a research method to validate the hypothesis, a deductive approach is used (Trochim & Donnelly, 2008). This study would apply a sample methodology that uses a combination of qualitative and quantitative approaches for the inquiry. The qualitative stage would be used for the semi-structured interview technique to investigate what essential factors or interactions are absent from the model. The quantitative process of the pilot study and the final study will be investigated.

4b. Qualitative Analysis

In this phase of research, semi-structured questionnaires will be administered to 10 managers and executives of P2P accommodation firms like Airbnb, OYO and guesthouser.com, the interviews will be codified through NVIVO, this exercise will be done to understand any underlying pattern.

4c. Quantitative Analysis

The application of the Partial Least Square Regression will be used to capture and attempt to predict consumer behaviour on the basis of the moderating effect of cohort generational theory on green purchase behaviour, the SMART-PLS Package by (Rai et al., 2013) will be utilised for the analysis. Test for Common Method Bias to identify probability of scale misinterpretation among the responses will be conducted through the Factor Analysis Module of SPSS by IBM. A close ended questionnaire with adapted items will be deployed in the sample space through online medium and intercept method.

Figure 2 Interventions to be used for Model Estimation

Critical Criteria	Parameter
Establishment of Reflective and Composite Construct	Composite Reliability Testing and Average Variance Extracted for the factor loadings
Discriminant Validity	Fornell Larcker Criterion and Heterotrait-Monotrait Approaches
Multicollinearity Isolation	Variance Inflation Factors
Composite Construct Validation	Nomological Net
Model Fit	Standardized Root Mean Square Residual Analysis of the Saturated Model

Source: Own processing

4c. Sample Size

The convenience sampling method will be used in this study. A total of 350+ is ideally required for such studies in psychometric analysis (Hair et al., 2019) e-questionnaires copies are to be made available online. After questionnaire copies are returned, the statistic software Smart PLS us used for carrying out data analysis. Statistic methods, including the factor analysis and reliability analysis, regression analysis, and structural equation models, are used for examining each for the hypothesis.

5 Expected Contribution

The study will open new avenues for exploration in the realm of consumer behaviour. For the managers, the study will help to explain the diversity among millennial and generation z consumers, aiding them to strategize their marketing endeavours efficiently. The academic contribution of the study includes theoretical expansion of the theory of green purchase behaviour by incorporating the elements of the generational cohort theory, thereby adding to the existing corpus of knowledge.

Acknowledgement

References

Baker, M. A., Davis, E. A., & Weaver, P. A. (2014). Eco-friendly attitudes, barriers to participation, and differences in behavior at green hotels. Cornell Hospitality Quarterly, 55(1), 89-99.

Han, H. (2020). Theory of green purchase behavior (TGPB): A new theory for sustainable consumption of green hotel and green restaurant products. Business Strategy and the Environment, 29(6), 2815-2828.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2012). Using partial least squares path modeling in advertising research: basic concepts and recent issues. In Handbook of research on international advertising. Edward Elgar Publishing.

Holland, T., Smit, B., & Jones, G. V. (2014). Toward a conceptual framework of terroir tourism: A case study of the Prince Edward County, Ontario Wine Region. Tourism Planning & Development, 11(3), 275-291.

Joshi, Y., & Rahman, Z. (2015). Factors affecting green purchase behaviour and future research directions. International Strategic management review, 3(1-2), 128-143.

Kang, K. H., Stein, L., Heo, C. Y. H., & Lee, S. (2012). Views on environmentalism and consumers' willingness to pay for environmental sustainability in the hotel industry. International Journal of Hospitality Management, 31(2), 564-572.

Lee, J. S., Hsu, L. T., Han, H., & Kim, Y. (2010). Understanding how consumers view green hotels: how a hotel's green image can influence behavioural intentions. Journal of sustainable tourism, 18(7), 901-914.

Lee, M., Han, H., & Willson, G. (2011). The role of expected outcomes in the formation of behavioral intentions in the green-hotel industry. Journal of Travel & Tourism Marketing, 28(8), 840-855.

Legrand, W., Sloan, P., & Chen, J. S. (2016). Sustainability in the hospitality industry: Principles of sustainable operations. Routledge.

Line, T., Chatterjee, K., & Lyons, G. (2010). The travel behaviour intentions of young people in the context of climate change. Journal of Transport Geography, 18(2), 238-246.

Mannheim, Karl (1952). "The Problem of Generations". In Kecskemeti, Paul (ed.). Essays on the Sociology of Knowledge: Collected Works, Volume 5. New York: Routledge. p. 276–322.

Pizam, A. (2009). Green hotels: A fad, ploy or fact of life? International Journal of Hospitality Management, 1(28), 1.

Pryce, A. (2001). Sustainability in the hotel industry. Travel & Tourism Analyst, (6), 95-114.

Bougie, R., & Sekaran, U. (2016). *Research Methods For Business: A Skill Building 7 ed.* http://repository.fue.edu.eg/xmlui/handle/123456789/5585

Eyoun, K., Chen, H., Ayoun, B., & Khliefat, A. (2020). The relationship between purpose of performance appraisal and psychological contract: Generational differences as a moderator. *International Journal of Hospitality Management*, 86, 102449. https://doi.org/10.1016/j.ijhm.2020.102449

Gilal, F. G., Gilal, N. G., Tariq, B., Gilal, R. G., Gilal, R. G., Gong, Z., & Channa, N. A. (2020). Intergenerational differences in fans' motivation to watch the T20 world cup: a generation cohort theory perspective. *International Journal of Sports Marketing and Sponsorship*. https://doi.org/10.1108/IJSMS-09-2019-0094

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. In *European Business Review* (Vol. 31, Issue 1, pp. 2–24). Emerald Group Publishing Ltd. https://doi.org/10.1108/EBR-11-2018-0203

Herrando, C., Jimenez-Martinez, J., & Martin-De Hoyos, M. J. (2019). Tell me your age and I tell you what you trust: the moderating effect of generations. *Internet Research*, *29*(4), 799–817. https://doi.org/10.1108/IntR-03-2017-0135

Jackson, V., Stoel, L., & Brantley, A. (2011). Mall attributes and shopping value: Differences by gender and generational cohort. *Journal of Retailing and Consumer Services*, *18*(1), 1–9. https://doi.org/10.1016/j.jretconser.2010.08.002

Khare, A. (2012). Moderating effect of age and gender on consumer style inventory in predicting Indian consumers' local retailer loyalty. *International Review of Retail, Distribution and Consumer Research*, *22*(2), 223–239. https://doi.org/10.1080/09593969.2011.652644

Kim, S. H., Kim, M., Han, H. S., & Holland, S. (2016). The determinants of hospitality employees' pro-environmental behaviors: The moderating role of generational differences. *International Journal of Hospitality Management*, *52*, 56–67. https://doi.org/10.1016/j.ijhm.2015.09.013

Klöckner, C. A., & Ohms, S. (2009). The importance of personal norms for purchasing organic milk. *British Food Journal*, *111*(11), 1173–1187. https://doi.org/10.1108/00070700911001013

Ko, Y. J., Kim, K., Claussen, C. L., & Kim, T. H. (2008). The effects of sport involvement, sponsor awareness and corporate image on intention to purchase sponsors' products. *International Journal of Sports Marketing & Sponsorship*, *9*(2), 79–95. https://go.gale.com/ps/i.do?p=AONE&sw=w&issn=14646668&v=2.1&it=r&id=GALE%7CA177868121&sid=googleScholar&linkaccess=fulltext

Lee, Y.-J., De Young, R., & Marans, R. W. (1995). Factors Influencing Individual Recycling Behavior in Office Settings. *Environment and Behavior*, *27*(3), 380–403. https://doi.org/10.1177/0013916595273006

Liu, A., Ma, E., Qu, H., & Ryan, B. (2020). Daily green behavior as an antecedent and a moderator for visitors' pro-environmental behaviors. *Journal of Sustainable Tourism*, *28*(9), 1390–1408. https://doi.org/10.1080/09669582.2020.1741598

Muposhi, A., Surujlal, J., & Dhurup, M. (n.d.). *The green dilemma : reflections of a Generation Y consumer cohort on green purchase behaviour*.

Prakash, G., & Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: A study on developing nation. *Journal of Cleaner Production*, *141*, 385–393. https://doi.org/10.1016/j.jclepro.2016.09.116

Quoquab, F., Jaini, A., & Mohammad, J. (2020). Does it matter who exhibits more green purchase behavior of cosmetic products in Asian culture? A multi-group analysis approach. *International Journal of Environmental Research and Public Health*, *17*(14), 1–20. https://doi.org/10.3390/ijerph17145258

Rai, A., Goodhue, D. L., Henseler, J., & Thompson, R. (2013). To PLS or Not to PLS: That is the Question. *AMCIS 2013 Proceedings*. https://aisel.aisnet.org/amcis2013/Panels/PanelSubmissions/2

Siero, F. W., Bakker, A. B., Dekker, G. B., & Van Den Burg, M. T. C. (1996). Changing organizational energy consumption behaviour through comparative feedback. *Journal of Environmental Psychology*, *16*(3), 235–246. https://doi.org/10.1006/jevp.1996.0019

Suki, N. M. (2013). GREEN AWARENESS EFFECTS ON CONSUMERS' PURCHASING DECISION: SOME INSIGHTS FROM MALAYSIA. In *IJAPS* (Vol. 9, Issue 2).

Suki, N. M., & Norbayah, N. M. (2018). Correlations between awareness of green marketing, corporate social responsibility, product image, corporate reputation, and consumer purchase intention. In *Corporate Social Responsibility: Concepts, Methodologies, Tools, and Applications* (pp. 143–154). IGI Global. https://doi.org/10.4018/978-1-5225-6192-7.ch008

Thogersen, J., & Olander, F. (2006). The Dynamic Interaction of Personal Norms and Environment-Friendly Buying Behavior: A Panel Study1. *Journal of Applied Social Psychology*, *36*(7), 1758–1780. https://doi.org/10.1111/j.0021-9029.2006.00080.x

Trochim, W., & Donnelly, J. P. (2008). The research methods knowledge base Mason. *OH: Cengage Learning*.

Wallace, M. J., Gull, G., Petrick, J., Parham, P., & Capron, R. (2018). *A QUANTITATIVE EXPLANATORY ANALYSIS EXAMINING THE MODERATING EFFECT OF GENERATIONAL COHORT ON EMOTIONAL INTELLIGENCE AND ORGANIZATIONAL COMMITMENT AMONG NONPROFIT EMPLOYEES*.

Bougie, R., & Sekaran, U. (2016). *Research Methods For Business: A Skill Building 7 ed.* http://repository.fue.edu.eg/xmlui/handle/123456789/5585

Eyoun, K., Chen, H., Ayoun, B., & Khliefat, A. (2020). The relationship between purpose of performance appraisal and psychological contract: Generational differences as a moderator. *International Journal of Hospitality Management*, *86*, 102449. https://doi.org/10.1016/j.ijhm.2020.102449

Gilal, F. G., Gilal, N. G., Tariq, B., Gilal, R. G., Gilal, R. G., Gong, Z., & Channa, N. A. (2020). Intergenerational differences in fans' motivation to watch the T20 world cup: a generation cohort theory perspective. *International Journal of Sports Marketing and Sponsorship*. https://doi.org/10.1108/IJSMS-09-2019-0094

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. In *European Business Review* (Vol. 31, Issue 1, pp. 2–24). Emerald Group Publishing Ltd. https://doi.org/10.1108/EBR-11-2018-0203

Herrando, C., Jimenez-Martinez, J., & Martin-De Hoyos, M. J. (2019). Tell me your age and I tell you what you trust: the moderating effect of generations. *Internet Research*, *29*(4), 799–817. https://doi.org/10.1108/IntR-03-2017-0135

Jackson, V., Stoel, L., & Brantley, A. (2011). Mall attributes and shopping value: Differences by gender and generational cohort. *Journal of Retailing and Consumer Services*, *18*(1), 1–9. https://doi.org/10.1016/j.jretconser.2010.08.002

Khare, A. (2012). Moderating effect of age and gender on consumer style inventory in predicting Indian consumers' local retailer loyalty. *International Review of Retail, Distribution and Consumer Research*, *22*(2), 223–239. https://doi.org/10.1080/09593969.2011.652644

Kim, S. H., Kim, M., Han, H. S., & Holland, S. (2016). The determinants of hospitality employees' pro-environmental behaviors: The moderating role of generational differences. *International Journal of Hospitality Management*, *52*, 56–67. https://doi.org/10.1016/j.ijhm.2015.09.013

Klöckner, C. A., & Ohms, S. (2009). The importance of personal norms for purchasing organic milk. *British Food Journal*, *111*(11), 1173–1187. https://doi.org/10.1108/00070700911001013

Ko, Y. J., Kim, K., Claussen, C. L., & Kim, T. H. (2008). The effects of sport involvement, sponsor awareness and corporate image on intention to purchase sponsors' products. *International Journal of Sports Marketing & Sponsorship*, *9*(2), 79–95.

https://go.gale.com/ps/i.do?p=AONE&sw=w&issn=14646668&v=2.1&it=r&id=GALE%7CA177868121&sid=googleScholar&linkaccess=fulltext

Lee, Y.-J., De Young, R., & Marans, R. W. (1995). Factors Influencing Individual Recycling Behavior in Office Settings. *Environment and Behavior*, *27*(3), 380–403. https://doi.org/10.1177/0013916595273006

Liu, A., Ma, E., Qu, H., & Ryan, B. (2020). Daily green behavior as an antecedent and a moderator for visitors' pro-environmental behaviors. *Journal of Sustainable Tourism*, *28*(9), 1390–1408. https://doi.org/10.1080/09669582.2020.1741598

Muposhi, A., Surujlal, J., & Dhurup, M. (n.d.). *The green dilemma : reflections of a Generation Y consumer cohort on green purchase behaviour*.

Prakash, G., & Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: A study on developing nation. *Journal of Cleaner Production*, *141*, 385–393. https://doi.org/10.1016/j.jclepro.2016.09.116

Quoquab, F., Jaini, A., & Mohammad, J. (2020). Does it matter who exhibits more green purchase behavior of cosmetic products in Asian culture? A multi-group analysis approach. *International Journal of Environmental Research and Public Health*, *17*(14), 1–20. https://doi.org/10.3390/ijerph17145258

Rai, A., Goodhue, D. L., Henseler, J., & Thompson, R. (2013). To PLS or Not to PLS: That is the Question. *AMCIS 2013 Proceedings*. https://aisel.aisnet.org/amcis2013/Panels/PanelSubmissions/2

Siero, F. W., Bakker, A. B., Dekker, G. B., & Van Den Burg, M. T. C. (1996). Changing organizational energy consumption behaviour through comparative feedback. *Journal of Environmental Psychology*, *16*(3), 235–246. https://doi.org/10.1006/jevp.1996.0019

Suki, N. M. (2013). GREEN AWARENESS EFFECTS ON CONSUMERS' PURCHASING DECISION: SOME INSIGHTS FROM MALAYSIA. In *IJAPS* (Vol. 9, Issue 2).

Suki, N. M., & Norbayah, N. M. (2018). Correlations between awareness of green marketing, corporate social responsibility, product image, corporate reputation, and consumer purchase intention. In *Corporate Social Responsibility: Concepts, Methodologies, Tools, and Applications* (pp. 143–154). IGI Global. https://doi.org/10.4018/978-1-5225-6192-7.ch008

Thogersen, J., & Olander, F. (2006). The Dynamic Interaction of Personal Norms and Environment-Friendly Buying Behavior: A Panel Study1. *Journal of Applied Social Psychology*, *36*(7), 1758–1780. https://doi.org/10.1111/j.0021-9029.2006.00080.x

Trochim, W., & Donnelly, J. P. (2008). The research methods knowledge base Mason. *OH: Cengage Learning*.

Wallace, M. J., Gull, G., Petrick, J., Parham, P., & Capron, R. (2018). *A QUANTITATIVE EXPLANATORY ANALYSIS EXAMINING THE MODERATING EFFECT OF GENERATIONAL COHORT ON EMOTIONAL INTELLIGENCE AND ORGANIZATIONAL COMMITMENT AMONG NONPROFIT EMPLOYEES*.

Lee, Y.-J., De Young, R., & Marans, R. W. (1995). Factors Influencing Individual Recycling Behavior in Office Settings. *Environment and Behavior*, *27*(3), 380–403. https://doi.org/10.1177/0013916595273006

Liu, A., Ma, E., Qu, H., & Ryan, B. (2020). Daily green behavior as an antecedent and a moderator for visitors' pro-environmental behaviors. *Journal of Sustainable Tourism*, *28*(9), 1390–1408. https://doi.org/10.1080/09669582.2020.1741598

Siero, F. W., Bakker, A. B., Dekker, G. B., & Van Den Burg, M. T. C. (1996). Changing organizational energy consumption behaviour through comparative feedback. *Journal of Environmental Psychology*, *16*(3), 235–246. https://doi.org/10.1006/jevp.1996.0019

Czech wine regions in the context of tourist loyalty

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Abstract: The rural landscape has been used quite extensively in recent years for the purpose of rural tourism, which plays a substantial role in the entire tourism industry. Rural tourism can be seen as a contrast to the problem with overtourism. Not only does rural tourism respect the principles of sustainable development, it also respects the needs of the particular rural area. One of the many forms of rural tourism is wine tourism, which has recently gained in popularity. Therefore, it is crucial to know what influences loyalty among visitors of Czech wine regions. Based on the obtained data, two loyalty indicators (intention to revisit and recommend the wine region) as well as the expectations prior to arrival and satisfaction were closely examined. Generally speaking, there are three loyalty factors that have an influence on all four variables. Those factors are: quality of wine, natural attractions as well as wine culture and traditions. Furthermore, women and respondents older than 60 years old, evaluated the four variables higher. Nonetheless, the respondents are not only satisfied, but are also willing to recommend and revisit the Czech wine regions. The results of this paper provide a deeper understanding of loyalty to Czech wine regions among Czech visitors, which might be helpful for service providers that focus on domestic tourists.

Keywords: Wine tourism, tourist loyalty, the Czech Republic
JEL Classification: Z30, Z32, M30

1 Introduction

Wine tourism is one of the many forms of rural tourism, that covers activities typical to countryside areas connected with the presence of vineyards and producers of wine (Hall et al., 2000). As the awareness of this type of tourism grows, the interest of active participation in diverse activities is growing as well. For instance, visiting wine cellars with the winemaker or owner of the winery, wine tasting in specially equipped wine tasting rooms, accommodation within the vineyards or folklore and gastronomy events are among the most popular ones (Kubát, 2019; Sigala & Robinson, 2019; Veselá & Malacka, 2015). In the Czech Republic the wine production area is mainly located in the southeast, where 96 % of Czech vineyards are located (wineofczechrepublic.cz, 2018). Furthermore, the main as well as the largest wine-growing region, Moravia, also lies in this area (Prokeš, 2019).

Wine tourism and its activities can be used to build long-term social and emotional ties with the visitors of a particular destination. Therefore, development and marketing strategy is crucial not only for the winery itself, but also for the whole wine region (Getz & Brown, 2006). Not only can wine tourism build long-lasting emotional ties with visitors, it can also drive long-term financial, promotional and marketing benefits (Sigala & Robinson, 2019). Those strong and lasting emotional ties might lead to favorable images of the destination, that, according to Chen & Tsai (2007), are one of the contributors to the potential tourist selection of a particular destination. Similarly, according to Pratt (2019), favorable images of a destination may determine the intent to visit the destination. Therefore, the visitors' final choice of the destination and their loyalty are important for service providers and winemakers in the given area (Králiková et al., 2020; Králiková, 2019; Hall, 2013), even more so now in the current Covid-19 situation.

One of the biggest advantages of loyalty is that the marketing costs of attracting loyal visitors are lower than the costs of attracting first-time visitors (Lončarić et al., 2017). Furthermore, loyal tourists generally spend more time in the destination and consume more goods (Zhang et. al., 2014). According to Kotler & Keller (2013), loyal customers are also more likely to spread positive references and recommend the destination or product to others. Additionally, Wang et al. (2010) consider satisfaction as a substantial contributor to revisiting intentions. That being said, according to Chi & Qu (2008) the actual behavior of visitors is better predicted by loyalty than by satisfaction. That is one of the reasons why

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loyalty is the subject of many tourism studies (e.g. Almeida-Santana & Moreno-Gil, 2018, Bowen & Chen, 2001). Therefore, the focus of this paper is, among other things, to investigate what factors influence loyalty among visitors of Czech wine regions. Consequently, the main focus of this study is the identification of loyalty factors that have an influence on loyalty, satisfaction as well as the expectations of domestic visitors of Czech wine regions. The paper also aims to identify factors that might form the winescape (Bruwer et al., 2016) in the Czech Republic context, which was never defined in previous studies.

2 Methods

The primary data were collected from May to June 2020. Due to the current pandemic situation, an online questionnaire was used in order to collect data to fulfill the goal of this study. Overall, a sample of 365 respondents was collected among Czech tourists that visited one of the six wine subregions of the Czech Republic (Znojmo, Mikulov, Velke Pavlovice, Slovacko, Litomerice and Melnik) in the last five years. Moreover, a quota sampling based on gender and age was applied. A detailed structure of respondents can be seen in Table 1.

The main focus of this paper lies in the detailed analysis of destination loyalty and satisfaction towards the wine regions of the Czech Republic as a key factor of sustainable tourism. Overall, there are two loyalty indicators according to Chen and Tsai (2007). Namely the intention to revisit a particular wine subregion and the willingness to recommend it to friends and family. Furthermore, variables such as satisfaction and expectations prior the arrival to destination were also analyzed. To summarize, there are four variables that will be closely analyzed. Specifically, the intention to revisit the wine destination, a willingness to recommend it, expectations prior to arrival and respondent satisfaction.

Moreover, based on the previous studies (Ryglová et al., 2017, Byrd et al., 2016; Bruwer et al., 2016, 2013a, 2013b; Cohen & Ben-Nun, 2009; Getz & Brown, 2006) seventeen loyalty factors were formulated in order to closely analyze the four variables mentioned above. Namely, the factors are natural attractions, quality of wine, wine tasting, relaxation, friends, wine culture and traditions, wine events, wine purchase, vineyard excursion, information about wine, cultural monuments, friendly acceptance by the locals, traveling, wineries, social interaction, gastronomy and transport accessibility. These loyalty factors as well as the four variables were evaluated on a five-point Likert scale, where the number 5 represents "strongly agree with the given statement".

Due to the non-normality and ordinality of the data, the Kruskall-Wallis test was used to evaluate the dependence of the above-mentioned variables on various respondent characteristics, such as gender, income or with whom they visited the wine subregion. The null hypothesis for the Kruskall-Wallis test assumes the same distribution for the above-mentioned respondent characteristics (Sheskin, 2011). Furthermore, a regression analysis using the OLS method was used to evaluate the four variables mentioned before (Nunkoo & Ramkissoon, 2012).

Table 1 The structure of respondents

Category of respondents	Absolute number of respondents	Relative number of respondents (%)
Men	162	44.38
Women	203	55.62
18-23 years old	65	17.81
24-30 years old	54	14.79
31-40 years old	71	19.45
41-50 years old	58	15.89
51-60 years old	47	12.88
61-70 years old	35	9.59
over 71 years old	35	9.59

Source: Own processing

3 Research results

As shown in Table 2, respondents are more inclined to revisit a particular wine subregion than they are to recommend it. That being said, both loyalty factors as well as the expectations and satisfaction were evaluated very high (all variables have a median of four or higher). Accordingly, the respondents were satisfied with their visit to the wine subregion and were willing to recommend and revisit the destination. By taking a closer look at the four variables mentioned in Table 2, women evaluated all four variables higher than men. Moreover, respondents older than 60 years old evaluated the four variables higher than those younger than 60 years old, while respondents with a monthly income below CZK 30,000 (approximately EUR 1,155) evaluated these variables higher.

Table 2 also shows the results of the Kruskall-Wallis test. The value YES represents the dependence of the given variable on the particular respondent characteristic at a 10% significance level. Moreover, the value YES+ represents the dependence at a 5% significance level. On the other hand, when the dependence on the particular characteristic was not proven, the value NO is stated in Table 2.

Table 2 Result of dependence analysis

Variable	Mean	Median	Std. dev.	KW test gender	KW test income	KW test frequency of visit	KW test econ. activity	KW test education	KW test with whom they visited
Intention to revisit	4.38	5.00	0.99	NO	NO	YES+	NO	NO	NO
Recommendation	4.34	5.00	1.02	NO	NO	YES+	NO	YES	YES
Expectations	4.00	4.00	0.99	YES	NO	YES+	YES	YES	NO
Satisfaction	4.25	4.00	0.96	YES+	YES	YES+	YES+	NO	NO

Source: Own processing

Starting with the intention to revisit variable, the frequency of visit is the only characteristic that has an influence on this particular variable. Respondents who visit wine destinations and wine events more than 3 times per year are more willing to revisit this destination sometime in the future. Furthermore, a regression analysis was used to explore the influence of loyalty factors on the intention to revisit a specific wine region. As can be seen from Table 3, there are four factors where the influence was statistically proven. Those four factors are quality of wine, natural attractions, wine culture and traditions as well as friends.

Table 3 Regression analysis Intention to revisit

Intention to revisit	Reg. coef.	P-value
Const.	1.66	1.,37e-13
Quality of wine	0.21	3.00e-04
Natural attractions	0.19	0.0004
Wine culture and traditions	0.17	6.00e-04
Friends	0.09	0.0500

Source: Own processing

$R^2 = 0.32$; R2 adj. = 0.31, 5% significance level

The second variable that was closely examined is the willingness to recommend a wine destination. There are three characteristics that have an influence on this variable: frequency of visit, education and with whom respondents visited the wine subregion. Similarly, as for the intention to revisit, those respondents who visit the wine destination more than 3 times per year are more willing to recommend it to their friends and family. Moreover, if the respondent visited the

destination with their partner, they are more likely to recommend the destination. The same goes for respondents without a high school diploma or technical training. By looking at Table 4, there are three loyalty factors (quality of wine, natural attractions as well as wine culture and traditions) that have an influence on the willingness to recommend a particular wine subregion.

Table 4 Regression analysis Recommendation

Recommendation	Reg. coef.	P-value
Const.	1.69	2.61e-03
Quality of wine	0.28	2.37e-06
Natural attractions	0.19	0.0002
Wine culture and traditions	0.16	0.0015

Source: Own processing

R2 = 0.29; R2 adj. = 0.29, 5% significance level

Generally speaking, the Czechs are very loyal to Czech wine regions. More than one fifth of respondents (21.37 %) visit wine events more than 3 times per year and almost half of respondents (48.77 %) visit them two or three times per year. A relatively high evaluation of both loyalty indicators also contributes to the claim of high loyalty among Czech visitors. A very positive sign is also the influence of the frequency of visit on the willingness to recommend the wine destination. Furthermore, more than 75 % of respondents get their information about wine events from their friends and family. Therefore, these results confirm the findings of Banki et al. (2014) as well as Byrd et al. (2016), that loyal visitors are more likely to recommend the wine destination along with the particular wine events to their acquaintances.

Another variable that was closely examined is expectations prior to arrival to the destination. Similar to the loyalty indicators, the frequency of visit has an influence on this variable. Not only that, but also gender, economic activity as well as the education of respondents has an impact on expectations as well. The highest evaluation of this variable was recorded in women, respondents older than 71 years old and in retired persons. Judging by these impacts, the results suggest that the expectations were more fulfilled among the older generation. Therefore, it might be important to focus more on the needs of those younger than 60 years old. That being said, there are three loyalty factors that have an influence on expectations prior to arrival. As can be seen from Table 5, these factors are the quality of wine, wine culture and traditions as well as the natural attractions. In all these three factors, the evaluation of respondents above 60 years old was higher.

Table 5 Regression analysis Expectations

Expectations	Reg. coef.	P-value
Const.	1.40	2.56E-10
Quality of wine	0.27	2.49E-06
Wine culture and traditions	0.18	0.0003
Natural attractions	0.17	6.00E-04

Source: Own processing

R2 = 0.30; R2 adj. = 0.29, 5% significance level

The final variable that was examined was respondent satisfaction in Czech wine regions. There are four respondent characteristics that have an influence on satisfaction. The first one being the frequency of visit, that has the same influence on all four of the examined variables. Moreover, gender, income and economic activity have a significant impact on satisfaction as well. A closer look at these characteristics will tell us that women were more satisfied than men as well as respondents with an income lower than CZK 30,000 (approximately EUR 1,155) along with retired respondents. Similarly, as for the expectations, it is crucial to focus on the needs and satisfaction of people younger than 60 years old. It is

also inevitable to focus on four loyalty factors that have an influence on satisfaction. As mentioned in Table 6, those factors are quality of wine, relaxation, natural attractions as well as wine culture and traditions.

Table 6 Regression analysis Satisfaction

Satisfaction	Reg. coef.	P-value
Const.	1.59	1.88E-13
Quality of wine	0.23	4.18E-05
Relax	0.15	4.70E-03
Natural attractions	0.13	0.0132
Wine culture and traditions	0.12	0.0084

Source: Own processing

$R^2 = 0.33$; R^2 adj. $= 0.32$, 5% significance level

4 Conclusions

Generally speaking, there are four loyalty factors that have an influence on the loyalty of visitors in Czech wine regions. Namely, quality of wine, natural attractions, wine culture and traditions as well as friends. It is inevitable to focus on them while creating a marketing strategy. It was proven that Czech visitors are very loyal to wine subregions in the Czech Republic. The high loyalty among Czech visitors of rural areas was also proven by Ryglová et al. (2018). This suggests a huge advantage, especially in the highly competitive environment in the tourism sector regarding the post Covid-19 era.

Moreover, by taking a look at all four variables from the point of view of loyalty factors, there are three factors that marketers and managers of a particular winery or wine destination should focus on more. These three factors, quality of wine, natural attractions as well as wine culture and traditions, have a significant influence on the loyalty and satisfaction of Czech visitors. All three factors are closely related to wine cellars and can easily be controlled by the winemaker. Judging from the results of this study, Czech visitors of wine destinations are more satisfied and loyal to wineries that are located directly in vineyards and provide quality wine and wine related activities. As also emphasized by Bruwer et al. (2016), the visitors may admire the complexity of an area by its permanent attributes of mostly nature (environment) and culture (heritage, habits), supplemented by attributes such as wine products, events, experiences and visits, in a given region. These attributes may be called winescape, which has not been defined in the Czech context before. The results of this paper provide a deeper understanding of loyalty and satisfaction in the context of wine tourism, that has many specific features compared to other types of tourism. Not only that, the paper also identified the key attributes of winescape in the Czech Republic, quality of wine, natural attractions and wine culture and traditions.

That being said, the respondents with higher income (more than CZK 30,000, approximately EUR 1,155) evaluated the loyalty factors as well as the four researched variables lower than respondents with lower monthly income. Therefore, it is crucial for those wineries that are targeting higher income clientele to focus more on their needs and satisfaction, which might lead to loyalty of their visitors. These visitors will not only be more likely to spend more money at the destination or in the winery, they will also be more likely to stay longer as well as being more likely to further recommend the destination together with the winery and the entire experience (Lau & McKercher, 2004).

The limitation of this paper lies in the low percentage of explained variability in regression analysis. That might be caused by the existence of other loyalty factors that were not examined in this study, such as weather at the destination, or by the factors that are hard to capture, like the attention of respondents while filling in the questionnaire. Therefore, future studies should also focus on other loyalty factors that were not the part of this study.

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References

Almeida-Santana, A., & Moreno-Gil, S. (2018). Understanding tourism loyalty: Horizontal vs. destination loyalty. *Tourism Management*, 65, 245-255.

Banki, M.B., Ismail, H.N., Dalil, M., & Kawu, A. (2014). Moderating Role of Affective Destination Image on the Relationship between Tourists Satisfaction and Behavioural Intention: Evidence from Obudu Mountain Resort. *Journal of environment and earth science*, 4, 47-60.

Bowen, J. T., & Chen, S. L. (2001). The relationship between customer loyalty and customer satisfaction. *International Journal of Contemporary Hospitality Management*, 13(5), 213-217.

Bruwer, J., Gross, M. J., & Lee, H. C. (2016). Tourism destination image (TDI) perception within a regional winescape context. *Tourism Analysis*, 21(2-3), 173-187.

Bruwer, J., Coode, M., Saliba, A., & Herbst, F. (2013a). Wine tourism experience effects of the tasting room on consumer brand loyalty. *Tourism Analysis*, 18(4), 399-414.

Bruwer, J., Lesschaeve, I., Gray, D., & Sottini, V. A. (2013b). Regional brand perception by wine tourists within a winescape framework. In *7th AWBR International Conference*, St. Catherines.

Byrd, E. T., Canziani, B., Hsieh, Y. C. J., Debbage, K., & Sonmez, S. (2016). Wine tourism: Motivating visitors through core and supplementary services. *Tourism Management*, Elsevier Ltd., 52(C), 19-29.

Chen, C. F., & Tsai, D. C. (2007). How destination image and evaluative factors affect behavioral intentions? *Tourism Management*, 28(4), 1115-1122.

Chi, C. G. Q., & Qu, H. (2008). Examining the structural relationships of destination image, tourist satisfaction and destination loyalty: An integrated approach. *Tourism management*, *29*(4), 624-636.

Cohen, E., & Ben-Nun, L. (2009). The important dimensions of wine tourism experience from potential visitors' perception. *Tourism and Hospitality Research*, 9(1), 20-31.

Getz, D., & Brown, G. (2006). Critical success factors for wine tourism regions: a demand analysis. *Tourism Management*, 27 (1), 146-158.

Hall, C. M. (2013). *Wine, food, and tourism marketing*. London: Routledge. ISBN 9781135406707.

Hall, C. M., Sharples, L., Cambourne, B., & Macionis, N. (eds.) (2000). *Wine Tourism Around the World: Development, Management and Markets.* Oxford: Butterworth- Heinemann, 348 p. ISBN 07-506-4530-X.

Kotler, P., & Keller, K. L. (2013). *Marketing management-14. vydání*. Grada Publishing as. ISBN 978-80-247-4150-5.

Králiková, A., Peruthová, A., & Ryglová, K. (2020). Impact of Destination Image on Satisfaction and Loyalty. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 68(1), 199-209.

Králiková, A. (2019). Visitor's Loyalty Towards the Destination. *PEFnet 2019 – 23rd European Scientific Conference of Doctoral Students*, 75-77. Mendel University in Brno. ISBN 978-80-7509-692-0.

Kubát, P. (2019). Development of Wine Tourism in Šumadija Region. *PEFnet 2019 – 23rd European Scientific Conference of Doctoral Students*, 79-81. Mendel University in Brno. ISBN 978-80-7509-692-0.

Lau, A.L.S., & McKercher, B. (2004). Exploration Versus Acquisition: A Comparison of First-Time and Repeat Visitors. *Journal of Travel Research*, 42(3), 279–285. DOI: https://doi.org/10.1177/0047287503257502

Lončarić, D., Prodan, M. P., & Dlačić, J. (2017). Co-creating tourist experiences to enhance customer loyalty and travel satisfaction. *International Scientific Conference ToSEE - Tourism in South East Europe*, 4, 321-334.

Nunkoo, R., & Ramkissoon, H. (2012). Structural equation modelling and regression analysis in tourism research. *Current Issues in Tourism*, 15(8), 777–802.

Pratt, M. (2019). The Image of a Wine Tourist and Impact on Self-Image Congruity. In *Wine Tourism Destination Management and Marketing* (eds. M. Sigala & R. N. S. Robinson). Palgrave Macmillan, Cham, 45-66. DOI: https://doi.org/10.1007/978-3-030-00437-8_22.

Prokeš, M. (2019). Wine trails in the Czech Republic. In *Wine Tourism Destination Management and Marketing* (eds. M. Sigala & R. N. S. Robinson). Palgrave Macmillan, Cham, 341-355. DOI: https://doi.org/10.1007/978-3-030-00437-8_22.

Ryglová, K, Rašovská, I and Šácha, J. (2017). Rural Tourism–Evaluating the Quality of Destination. European Countryside 9 (4): 769-788

Ryglová, K., Rašovská, I., Šácha, J., & Maráková, V. (2018). Building Customer Loyalty in Rural Destinations as a Pre-Condition of Sustainable Competitiveness. *Sustainability*, 10 (4): 957.

Sheskin, D. J. (2011). *Handbook of Parametric and Nonparametric Statistical Procedures*, Fifth Edition. Chapman and Hall/CRC.

Sigala, M., & Robinson, R. N. S. (eds.). (2019). *Management and Marketing of Wine Tourism Business: Theory, practice, and cases*. Cham, Switzerland: Palgrave Macmillan. DOI: https://doi.org/10.1007/978-3-319-75462-8_1

Veselá, J., & Malacka, L. (2015). Use of The Wine Tourism in The Region Development: The Comparative Study. *DOKBAT – 11th International Bata Conference for Ph.D. Students and Young*, Zlín.

Wang, Y. J., Wu, C., & Yuan, J. (2010). Exploring visitors' experiences and intention to revisit a heritage destination: The case for Lukang, Taiwan. *Journal of Quality Assurance in Hospitality & Tourism*, *11*(3), 162-178.

Wineofczechrepublic.cz (2019). *Vinařské region*. Retrieved from https://www.wineofczechrepublic.cz/nase-vina/vinarske-regiony/vinarska-oblast-morava.html

Zhang, H., Fu, X., Cai, L. A., & Lu, L. (2014). Destination image and tourist loyalty: A meta-analysis. *Tourism management*, *40*, 213-223.

Impact of Integrated Public Transportation System on Tourism

Michaela Koubková[1], Lucie Samková[2]

Abstract: This article focuses on the impact of the Integrated Public Transport System (IPTS) on tourism. The first part deals with the basic principles of Integrated Public Transport System. Furthermore, the article is devoted to the advantages and disadvantages of the IPTS and it also shows the relationship between transportation and tourism. Last but not least, the article deals with the role of public transport in tourism. At the end of the article, the possibilities of practical research are presented. **The aim is to examine the current state of knowledge in the field of IPTS. Based on the definition of the relationship between transport and tourism determine the relationship between IPTS and tourism, or the impact of IPTS on the development of tourism services.**

Keywords: tourism, IPTS, transport, public transportation
JEL Classification: H27, L83, L91, R40

1 Introduction

Transport is one of the basic elements of mobility which is important for participation in tourism. Transport and tourism are closely connected. Every year, transport enables millions of people around the world to participate in tourism. However, the relationship between transport and tourism is difficult to quantify.

In some cases, transport contributes to the development of tourism, e.g. low-cost airlines. Transport in tourism can also play a secondary role or can be a direct part of it, e.g. sightseeing cruises.

In the area of the integrated public transportation system, three stakeholders are participating in public transportation, i.e. providers of public transportation, passengers and authorities.

Public transportation providers have to be willing to provide interconnection of their systems in connection to transport, economic, organisational and tariffs.

Passengers, users of public transport, are the decision-makers. They stand in demand side, and they also decide about the attainment of the transport system by their behaviour.

Authorities order the performance. They create the legislative framework and determine how the integrated public transportation system should work, and they provide requirements from buyers to the operators (Poliaková & Kubasáková, 2014).

A considerable benefit of an IPTS is the integration of tariffs. As you can see in Figure 1 from McDowell (2017), there is a noticeable change before and after the implementation of an integrated transport system.

Figure 1 Implementation of the IPTS
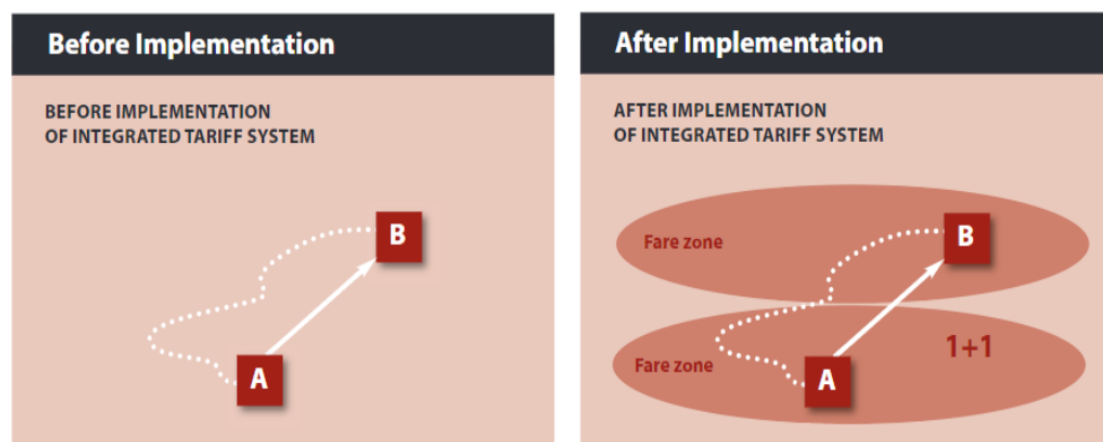
Source: McDowell (2017)

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2 Integrated Public Transportation System – basics principles of IPTS

The integrated public transport system consists of the interconnection of several transport modes into one elaborate system. Based on this principle, the public transport system should be rationalised, simple, and clear. This transport system is based on interval transport with the lines connection of all involved carriers. This system should then guarantee not only the continuity of lines, but also timetables for coordinated transfers. It is the coordination of the transfer that is one of the key features of the integrated public transport system. These integrated public transport systems are formed according to the passengers' requirements to meet their needs. The integrated transport system is based on basic transport principles and is using in individual as well as in public transport (Mojžíš, Garaja & Vančura, 2008).

In the area of the integrated public transportation system, we cannot focus only on one part of this complex system. As Charles (2019) states, the integrated public transportation system has to consists of three inseparable parts:

- Integrated planning,
- integrated infrastructure,
- integrated operations.

Integrated planning is important for the coordination of the whole system. It is necessary to ensure transport policy, networks and additional services. Coordination of different modes also includes spatial and temporal crossing of connections, their continuity and easy transitions. This will lead to travel with minimal disruption, discomfort or safety concerns.

Integrated infrastructure is essential for the seamless connection of different transport modes, which ensures a durable and quality transport for passengers. Interchanges must guarantee a smooth connection between public transport and parking or driving stations, between cycle paths and public transport stations, as well as connections to business premises.

Integrated operations should be planned in connection with the infrastructure and transport services need to be coordinated to ensure a quality transport process. The route plan for the various means of transport (e.g. car, bicycle, bus, trolleybus, subway, ferry) must be ensured from the place of origin to the destination. This is especially important because the waiting time is one of the most important factors for a passenger.

As can be seen in the Figure 2, the integration process involves many sub-steps; each can contribute to the success of an integrated public transport system. The key success factors can be identified as the scope and quality of services, advantageous prices and a clear tariff system and promotion. It is desirable to all these parts interact with each other (Poliaková, 2013).

Figure 2 The key factors of IPTS success and their interconnection
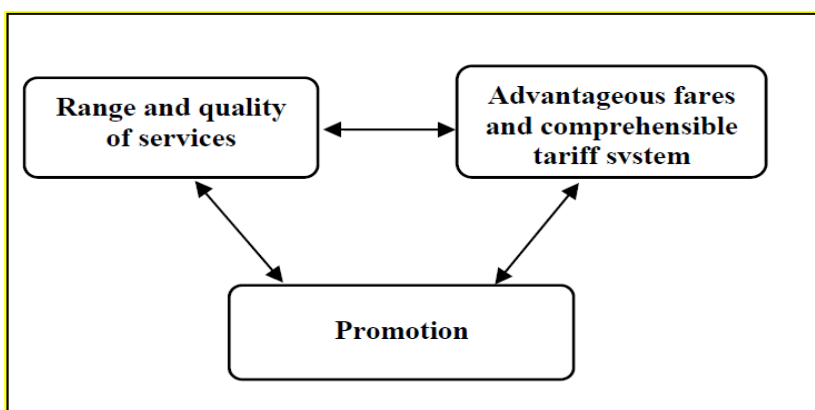
Source: Poliaková (2013)

For the parties involved in the integrated public transport system, it is necessary to secure integration in three areas. These areas are:

- Traffic integration - coordination and optimisation of timetables and route tracing, the construction and operation of transfer terminals, transfer between different mode of transport, secure and convenient transmission knots.

- Organisational-economic integration - manage and realise financial flows between stakeholders, subsidy flows to cover costs not covered by revenues, planning and designing future concepts, development plans, agreements between all stakeholders, information system, promotion.

- Tariff integration - creation of a single tariff system (tariff zones), scope of the ticket, transport conditions (Poliaková, 2013).

The problems of the integrated public transport system have been in the focus of many scholars in last 20 years and even recently. Ibrahim (2003) and Hull (2005), for instance, saw the IPTS as a potential improvement of the public transport system and creation of synergic effects. Many others just explored the experience from implementing such a system (e.g., Yee, & Chin, 2005; Bucknell, Muñoz, Schmidt, Navarro, & Simonetti, Denke, 2011; 2016; Guzman, Oviedo, & Cardona, 2018). Many aspects and the whole context of the implementation and operating the system are also studied (e.g. Šťastná & Vaishar, 2017; Poliak et al., 2017; Cabrera-Moya, & Reyes, 2018; Liu, Wang, & Xie, 2019).

3 Advantages and disadvantages of IPTS

Nowadays, many people complain about insufficient integration in the public transportation system. According to Li (2015) passenger satisfaction surveys confirm this fact. Tourist is often forced to reach a destination by taking multiple modes of transport. Multiple routes have different schedules and transfer station without coordination. Because of it, tourist often has to take a long walk to reach the transfers and pay multiple fares. Network integration contributes to minimise route duplication and transfer requirements. There are several benefits of the integrated public transportation system, which are:

- Comfort, no need to buy more than one ticket, and customer also does not need to face non-transparent tariff systems.

- Reduction of unhealthy competitions and encourages free and healthy competitions.

- Using of all transportation modes as a single system to provide comprehensive transport system.

- Effective using all transportation modes – timetables and connections between operators are harmonised.

- Environmentally friendly system in comparison with each mode operated independently.

- Capacity to achieve bigger productivity and economy.

- Unity and cooperation between transport industries (Owinje, 2018).

On the other hand, there are also some implementation disadvantages of the integrated public transportation system such as big investments in the beginning, complicated cooperation between operators, infrastructural changes (the new infrastructure), and problem of profit dividing. According to Poliaková (2013) there are also institutional barriers of integrated transportation, as can be seen in Figure 3.

Figure 3 Institutional barriers of the integrated public transportation system

Institutional barriers	Overcoming those barriers requires
Split or duplicated responsibility	More coordination between the tiers of government, and between agencies at each level
Process	Consistency in planning over the long term
Identifying objectives, specifying problems, selecting possible solutions, appraisal, implementation	A problem-led approach to developing solutions and strategies
Political and public acceptability	Political champions and more positive involvement of the public and media
Information and sills	More effective use of data, models and appraisal methods
Financial	Financial support for strategies, without inducing policy bias
Legislative and regulatory	Legislation and regulations to support these requirements

Source: Poliaková (2013)

4 Relationship between public transportation and tourism

There is a clear and interrelated relationship between tourism and public transport. According to Nelson (2013), tourism creates an important demand for transport services, and at the same time, transport is an essential component of tourism. Transport is considered to be one of the most important components, which laid the foundation for the emergence of tourism as a whole industry.

Transport can also be perceived as part of the realization assumptions of tourism. Implementation preconditions mean communication networks and accessibility of the area together with the tourism infrastructure, which is mainly represented by accommodation facilities and other potentials for tourism in the area. The realization assumptions form the spatial concretization of the relations connecting offer with demand (Vystoupil, 2009).

Crouch and Ritchie (1999) perceive transport as part of supporting factors and resources that affect access to a destination. On a global as well as local scale, transport is an integral part of the basic activity in tourism and its quality can significantly shape destination competitiveness.

Prideaux (2000) also states that transport is an important factor in the development of tourism destinations. This author also considers the role of transport to be one of the key ones in the tourism implementation and development. At the same time, the public transport system also perceives it as an interaction between different types of transport, which form different routes and terminals, enabling the flow of visitors arriving and leaving the destination. A wider range of transport modes allowing access to the destination, therefore, ensures that a wider market of potential visitors is reached. It also does not forget the role of the public transport system within the destination.

However, the development of transport can also have a negative impact on the destination, as reported by Duval (2007) or Hall (1999), who with the development of transport point out the emergence of traffic congestion or degradation of the destination by air pollution, which is part of the development of motorized transport in the modern world.

Lumsdon and Page (2007) point to the need to distinguish between the use of transport for tourism and the fact that transport itself is tourism. The use of transport just for the purpose of relocation is a necessary movement of passengers. In the second case, transport is considered to be an attraction, where passengers purposefully move by a given means of transport (e.g., due to some peculiarity). This way of transport brings added value. These two forms of transport intertwine. They merge into each other and form a continuum (as recorded in Figure 4).

Figure 4 Traffic continuum
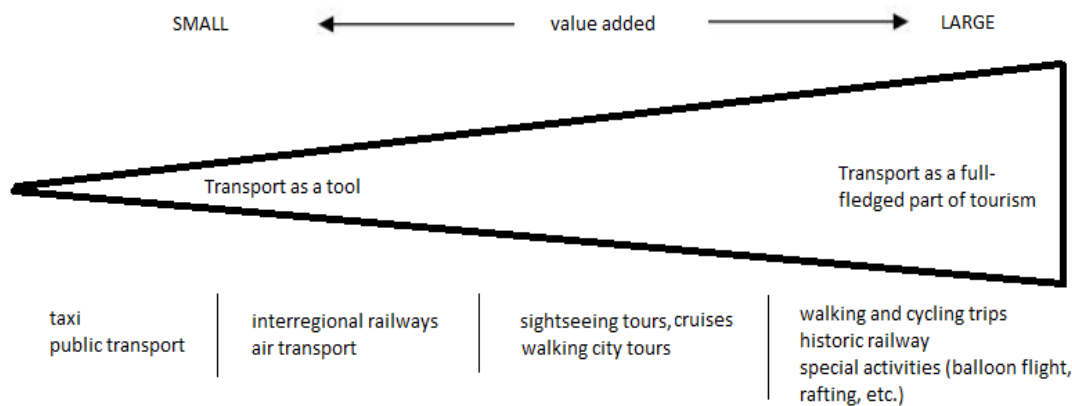
Source: Own according to Lumsdon and Page (2007)

5 Role of public transportation in tourism

Currently, public transportation is more and more used in the tourism area. For increasing public transport, functionality is necessary to use suitable planning and organization. It is desirable to provide information about the potential mode of transport to the tourist before he or she starts to travel to the destination. It is good to know that using alternative transport mode does not mean a decrease in mobility but there is a possibility to use other transport modes (Hoenninger, 2003). A quality public passenger transport encourages tourism (Mrníková, Poliak, Šimurková, & Reuter, 2018)

There are many possible steps towards to support of public transportation used in leisure and for participation in tourism. The basics are to identify the target groups, which are crucial for a destination. Another step is the quality of transport connection to public transport. Transportation to the requested place should be provided by a suitable route and

in the right time. Last but not less important is to promote the offer to a potential customer in a suitable way (Gronau & Kagermeier, 2007). To increase the use of public transport for recreation in connection with tourism is also convenient to offer something more, such as a discount for entrance ticket to a museum.

An appropriate solution to increase the use of public transport may be a restriction of the accessibility of the destination by individual car transport. An example of such restrictions may be the adjustment of parking management. (Gronau & Kagermeier 2007) provide an example in the Munich metropolitan area. In Munich is introduced a parking fee at one of the amusement parks. The price for the parking lot is 2 euros; it helped increase the use of public transport by 5 %.

However, in introducing restrictions for passenger cars in order to increase the share of public transport in tourism in selected areas, visitors must always be offered a suitable alternative. The only alternative is a well-organized and well-functioning public transport system. Most countries are aware of this when it comes to transport service plans on their territory and with regard to sustainability. The Czech Republic has also joined the system of public transport planning, which is currently organized into the integrated transport systems. For example, the South Moravian Region, with its integrated public transport system, is trying to increase the share of the use of public transport in leisure time for recreation and participation in tourism. It introduces regular weekend connections to frequently visited and attractive locations or, for example, special lines for transporting bicycles.

6 Conclusion

Mobility is one of the most important factors in tourism. It can be provided by many different means of transport and have different functions and weights in tourism. Sometimes transport is taken only as a necessity to transport to the destination; in other cases, transport can be taken as a benefit and the journey becomes an experience. In most cases, individual transport is faster, but there are also public transport connections that are able to compete with cars. These are, for example, railway connections, or the subway and other public transport in larger cities with high congestion. However, public transport has other benefits, such as lower emissions, reduced congestion, and safety.

Tourism has a great multiplier effect; the expenses incurred by tourists are reused in the local economy. Thanks to tourism multipliers, governments can estimate the overall impact of tourism on the state's economy and employment. The development of transport is involved in tourism, which then has an impact on many other aspects.

For more convenient public transport in cities and outskirts, integrated public transport systems are being set up, which combine several modes of transport into one unit. Passengers can transfer without problems, connect and get better information. IPTS is thus beneficial for the city and has an impact on tourism. Cities with IPTS offer tourists better access to all parts; it is easy to plan routes and circuits around the city; passengers can easily get to sights, refreshments, and entertainment. Last but not least, IPTS also has an impact on accommodation. In cities with a good transport system, tourists can choose accommodation on the outskirts of the city, because they still have good connections to the centre or the station / airport.

This problem is a suitable topic for further scientific research. It would be possible to monitor the impact of IPTS on accommodation, to compare the frequency of choosing accommodation on the outskirts (or even out) of cities with and without IPTS. It would be possible to compare, for example, the Pilsen and South Bohemian regions.

References

Bucknell, C., Muñoz, J. C., Schmidt, A., Navarro, M., & Simonetti, C. (2016). Impact of a loan-based public transport fare system on fare evasion: experience of Transantiago, Santiago, Chile. *Transportation Research Record*, *2544*(1), 20-27.

Cabrera-Moya, D. R., & Reyes, G. E. (2018). Resource-based view (RBV) review, conceptual model and application methodology for the integrated public transport system (IPTS) of Bogotá-Colombia. *Revista ESPACIOS*. 39(22), 25-39.

Crouch, G. I., & Ritchie, J. R. (1999). Tourism, Competitiveness, and Societal Prosperity. *Journal of Business Research 44*, 137-152.

Denke, Z. (2011). Implementing of Integrated Public Transport Services–Examples of Budapest Transport Association. *Acta Technica Jaurinensis*, *4*(2), 273-280.

Duval, D. T. (2007). Tourism and Transport: Modes, Networks and Flows. Clevedon: Chanel View Publications.

Grounau, W., & Kagermeier, A. (2007). Key factors for successful leisure and tourism public transport provision. *Journal of Transport Geography 15*, 127-135.

Guzman, L. A., Oviedo, D., & Cardona, R. (2018). Accessibility changes: Analysis of the integrated public transport system of Bogotá. *Sustainability*, *10*(11), 3958.

Hall, D. R. (1999). Conceptualising tourism transport: inequality and externality issues. *Journal of Transport Geography 7*, 181-188.

Hoenninger, P. (2003). MobiHarz project: Integrated mobility management and services for visitors. In: ECOMM Managing Transport Demand to Attain Sustainable Transport Demand and Economic Effectiveness – Why and How? Karlstad, 21-23.

Hull, A. (2005). Integrated transport planning in the UK: From concept to reality. *Journal of transport Geography*, *13*(4), 318-328.

Charles, P. (2019). What does transport integration really mean? Retrieve from: https://medium.com/@philch/what-does-transport-integration-really-mean-bd83a15a50b8.

Ibrahim, M. F. (2003). Improvements and integration of a public transport system: the case of Singapore. *Cities*, *20*(3), 205-216.

Li, L. (2015). Integrated Public Transport Systems Make Travel Easier and More Affordable. Retrieve from: https://www.worldbank.org/en/news/press-release/2015/04/07/integrated-public-transport-systems-make-travel-easier-and-more-affordable.

Liu, Y., Wang, S., & Xie, B. (2019). Evaluating the effects of public transport fare policy change together with built and non-built environment features on ridership: The case in South East Queensland, Australia. *Transport Policy*, *76*, 78-89.

Lumsdon, L. M., & Page, S. J. (2007). Tourism and Transport, Issues and Agenda for the New Millennium. Routledge.

McDowell, G. (2015). Public Transport Integration. Retrieve from: https://silo.tips/download/public-transport-integration.

Mojžíš, V., Garaja, M., & Vančura, P. (2008). Integrované dopravní systémy. První vydání. Praha, 115 s.

Mrníková, M., Poliak, M., Šimurková, P., & Reuter, N. (2018, April). Why is important establishment of the organizer in integrated transport system in Slovak republic?. In 2018 XI International Science-Technical Conference Automotive Safety (pp. 1-6). IEEE.

Nelson, V. (2013). An Introduction to the Geography of Tourism. Rowman & Littlefield Publishers.

Owinje, P. (2018). 10 most notable benefits of the integrated transport systems. Retrieve from: https://globaltransportandlogistics.com/10-most-notable-benefits-of-the-integrated-transport-systems/.

Poliak, M., Poliakova, A., Mrnikova, M., Šimurková, P., Jaśkiewicz, M., & Jurecki, R. (2017). The competitiveness of public transport. *Journal of Competitiveness*. 9, (3), 83–97.

Poliaková, B. I., & Kubasáková, I. (2014). The problematic implementation of integrated transport systems in Slovakia. Centre of excellence for systems and services of intelligent transport II.

Poliaková, B. (2013). Key Success Factors of Integrated Transport Systems. Proceedings of the 13th International Conference "Reliability and Statistics in Transportation and Communication", 16–19 October 2013, Riga, Latvia, 83–90.

Prideaux, B. (2000). The role of the transport system in destination development. *Tourism Management 21*, 53-63.

Šťastná, M., & Vaishar, A. (2017). The relationship between public transport and the progressive development of rural areas. *Land use policy*, *67*, 107-114.

Tirachini, A., Hurtubia, R., Dekker, T., & Daziano, R. A. (2017). Estimation of crowding discomfort in public transport: results from Santiago de Chile. *Transportation Research Part A: Policy and Practice*, *103*, 311-326.

Vystoupil, J. (2009). Geografie cestovního ruchu. Masarykova univerzita, Ekonomicko-správní fakulta, Brno. 153 s.

Yee, J., & Chin, K. K. (2005). An integrated land transport system-the Singapore experience. *Traffic engineering & control*, *46*(2).

Marketing application in the practice of selected Czech firms

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Abstract: The article deals with the problems connected with the marketing usage in some Czech entrepreneurial subjects in practice. It reveals their practices, experience, methods, ways and forms by which they use the marketing, what are their views on it and how they work with it. It finds a possible answer to the question which is asked by a whole number of entrepreneurs: Why their firm is not successful on the market even when they spend high costs on the marketing from their point of view. An expected success does not come on and they do not know an answer. By the research in selected firms there has been found a confusion of the marketing with a financially demanding activity – i.e. advertising and promotion. The using of advertising and promotion lies in a different basis and its utilization, in relation to marketing, is different, to wit both for a firm and for a customer or consumer. The marketing finds an answer to the question: Who is our customer. The advertisement (advertising) and promotion inform a customer about a product and they try to get and keep a customer. **Havelka (2019) states that: "A Customer is to be a King on the top". His statement proceeds from his experience with firms.**

1 Introduction

As many publications have been written about the marketing, an understanding of the marketing content is still unclear. This may be caused by a mistaken translation from the English language because a Czech entrepreneur has no experience from periods of the First republic, consequently with the time when the marketing was plentifully used by a content, i.e. it was grasped correctly and realized in practise, but the term „marketing" (English word) was not used. T. Baťa, an outstanding Czech entrepreneur with the world eminence who can be considered as a founder of the marketing in our territory, projected the marketing content into the slogan: „Our Customer, our Lord".

On the same basis in the half of the fifties Drucker[1] said: „Whether firms like it or not, their chief is the customer".

His thesis proceeded from the classic economic rule that a customer decides what will be produced and whether an enterprise will prosper and how this enterprise will look like. The economics has already contained this version since the time of Adam Snith. (Goldman, K. 2010).

If our customer is our lord or our chief, it is consequently necessary to know who is our customer. To know to what extent we know him/her. It consequently depends neither on a form of entrepreneurship, nor on a product which we create (product or provided service), nor on a firm size. Marketing is necessary to realize always, that is why it is possible to say that marketing is fully applicable to any economic branch (production, trade, educational system, health service, sport, culture, politics etc.). The basis of the term marketing is: market – A market is a place where two parties can gather to facilitate the exchange of goods and services. The parties involved are usually buyers (demanding) and sellers (offerors).

A whole number of distinguished authors dealt with a definition and characterization of the marketing. For example: Sutton and Klein (2003) consider marketing: Marketing is still focused on understanding and developing a market and applying those traditional big levers of marketing, segmentation, and differentiation. Sharp (2013) characterize marketing activity as: Marketers use market research to help understand desires and market opportunities so that the organisation can adapt to stay competitive. Marketers ceaselessly promote the organisation´s services and products, so that customers maintain their awareness of the brand.

Solomon, Marshall, Stuart (2006) state that the marketing relates to real people. People who accept real decisions and they see the marketing value in:

- Marketing relates to satisfaction of needs

- Marketing means to create benefit

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[1] Drucker (* 1909 Vienna †2005 Claremont, California) was an outstanding management theorist and philosopher, economist and author of many meaningful publications. Drucker partially considered himself as our countryman. (Goldman, K. 2010)

- Marketing relates to relations based on exchange

A relation based on exchange means that we get something in return for anything else. A purchaser gains an object, service or idea satisfying his/her need and a purchaser gains something what has a corresponding value according to him/her. This relation is accompanied by a whole number of information about a product, its way of use etc., i.e. by advertising and other forms of a product promotion (promotion of product). Advertising uses information systems and informs, a promotion to the contrary uses communication channels and it not only informs but also persuades.

Clow, Baack (2008) states that more than 600 advertising appeals address an average man daily. For transmission of appeals there are used a whole range of information channels, from classical to present modern ones. A publicity gimmick (advertising appeal) decides about advertising attention attracting or how to present transmitted information to consumers. Among advertising appeals there can be for example included emotions, humour, logic etc.

For persuasion it is possible to use a whole range of forms of sale support and personal sale.

It this possible to say that Marketing basically uses communication systems. Promotion of product, i.e. one tool of 4P is used by information and communication systems, as stated by Kotler, Armstrong (1991) Marketing communication system and factors of the communication process. It is necessary to remind inaccurate translations of the English word „marketing" into the Czech language (marketing – sales¸ selling, market management system, market sale etc.).

When we do not differentiate terms it is consequently necessary to differentiate terms contents not to get inaccuracies. Using modern systems of information transmission and communication, for example internet, social networks, also contribute to these inaccuracies.

Many authors mention imperfection in marketing understanding – e.g. Kotler (2003) „But marketing is still a terrible misunderstood subject in business circles and in the public´s mind". Marketing is too often confused with selling. Marketing and selling are almost opposites. „Hard-sell marketing" is a contradiction. Long ago I said: „Marketing is not the art of creating genuine customer value. It is the art of helping your customers become better off. The marketer´s watchwords are quality, service, and value". Selling starts only when you have a product. Marketing starts before a product exist. Marketing is the homework your company does to figure out what people need and what your company should offer. Marketing determines how to launch, price, distribute, and promote your product (service) offerings to the Marketplace. Marketing then monitors the results and improves the offering over time. Marketing also decides if and when to end an offering.

All said, marketing is not a short-term selling effort but a longterm investment effort. When marketing is done well, it occurs before the company makes any product or enters any market, and it continues long after the sale. Toman, I. (2020) He stated that 75% people don´t understand marketing and interchange it to advertisement and selling according to his experience. Also the marketing director of company Gumex, Mr. Libor Sedláček, mentioned this phenomenon.

Very interesting opinion is presented by Phillips and Rasberry (2008) in their book Marketing Wihout Advertising: Easy Ways to Build a Business Your Customers Will Love and Recommend „The best marketing you can do for your business is to concentrate on creating a high-quality operation that customers, employees and other businesspeople will trust, respect and recommend".

Make your business stand out without the cost of advertising!

The difference between marketing and advertising is defined by the American marketing association (AMA, 2020) "In basic termen, **marketing** is the process of identifying customer needs and determining how best to meet those needs. In contrast, **advertising** is the exercise of promoting a company and its products or services through paid channels. In other words, **advertising** is a component of **marketing"**.

2 Methodology

The aim of the paper is reveals practices, experience, methods¸ ways and forms by which selected Czech companies they use the marketing, what are their views on it and how they work with it.

This article has been elaborated on the basis of my own experience, general characteristics and knowledge about marketing, advertising and promotion. A substantial part is created by the realized research whose aim was to find a marketing awareness and its methods and its realization and perception in selected firms, enterprises and organizations in the Czech Republic. The selection of the Czech companies was made at random with the probabilistic sample of 85 Czech companies and it was under way at the turn of the years 2019 and 2020 (December – February). The collection ought to continue also in the following two months but in consequence of COVID-19 it was finished already in February which had an impact on a number and spreading of represented firms.

The research in Czech companies was realized in the form of questionnaires that were personally delivered to respondents from companies´ managers (TOP management and marketing management). The managers of the companies were asked to fill in a printed questionnaire with 21 questions.

For the purpose of this article, seven questions were selected from the questionnaires, and analysed. The selected questions were focused on revealing the methods and forms by which they use marketing, what their opinions are on it and how they work with it, and on identification. Obtained information was processed using the programme „R" and excel.

The research is a part of the several year´s proceeding collection of information (since the year 2002) with the same general subject in roughly two years intervals proceeding in various companies at the territory of the Czech Republic.

The investigated Czech firms are in enumeration of single regions and districts which are ranked according to a size of representation: South Bohemia Region 56.4 % (České Budějovice, Tábor, Jindřichův Hradec, Český Krumlov, Prachatice, Písek and Strakonice). Prague Region and South Moravia Region 9.4 % (Prague, Znojmo, Brno, Břeclav). Vysočina Region 8.2 % (Pelhřimov). Central Bohemia Region 7 % (Příbram, Benešov, Mělník). Liberec Region 5.9 % (Česká Lípa, Semily). Pardubice Region 2.4 % (Pardubice). Karlovy Vary Region 1.2 (Sokolov). Furthermore they are grouped according to a form of entrepreneurial activity. Two forms of business have the greatest representation: Limited Liability Company 50.5 % and sole traders 32.9 %. Furthermore joint-stock companies 8.2 % and cooperatives and state organizations (state schools) have a very small representation 2.35 %. Public business company, allowance organization and departmental association have coincidently 1.2 %. The classification according to a number of employees is arranged as follows: by 10 employees 56.4 %; 11-50 employees 24.7 %; 51-100 employees 10.6 %; 101-250 employees 5.9; above 250 employees 2.4 %.

In spite of a variety of districts, sizes of firms and forms of business there has not been proved any connection between a behaviour of firms on the market in relation to a marketing utilization. It is not possible to say that small firms apprehend this activity incorrectly or that they do not realize marketing and greater firms realize it. Or that companies with a form of business, possibly limited liability companies, are adept at a marketing activity and they work with it very well unlike traders.

3 Results

The number of companies participating in the research was, for the above mentioned reason, lower, i.e. 85 Czech firms, and it is divided into two spheres. Partly to companies who state that they do not realize marketing in their firms (organizations, companies etc,), and partly to the second sphere in which the companies state that they realize marketing.

In comparison with preceding years (researches have been already made since 2002) a great surprise is a great representation of firms who do no not realize marketing. Of the total number it is the question of 47 % ones and 53 % respondents state that they realize marketing. Results are surprising especially for that reason that in the research there are represented many companies whose form of business is: limited lability company and traders. Traders could be expected that they will favour a marketing realization. The problem is in the term, what they imagine under the term marketing.

Provided they state that they realize marketing in order to make themselves visible or they need to be known about them, that is why they use advertising and promotion. They state advertising in the use of classical advertising means i.e. leaflet, placard (also billboard), visiting cards, car stickers, advertisements, sending offers etc. As to promotion, they state also advertising means but they are more focused on a form of sales support, the most frequently: by lower price, bonuses etc. They furthermore state Public relations and very often also sponsorship (12 %).

In the research there were in a substantial measure named ways of transmission with the use of new technologies. It is not only internet but also social networks and newly the term On-line marketing with the use of SEO[2] and PPC[3] technologies. Social networks can also serve as a survey of the market, not only for information transmission and communication.

3.1 Companies not realizing the marketing

Of the total number of 85 Czech entrepreneurial subjects, 47% (i.e. 40 respondent companies) state that they do not realize marketing. The most frequent reason, as it is apparent from the graph 1, is the fact that a marketing is not important for them, they do not need it, this fact is stated by 72,5 %. 12 % respondents state that marketing is too expensive for them and 15 % respondents state another reason.

Graph 1 Survey of companies that do not realize a marketing and for what reason (in %)

Marketing unrealization

15   12,5

- It is too expensive
- It is not important for us
- Another reason

72,5
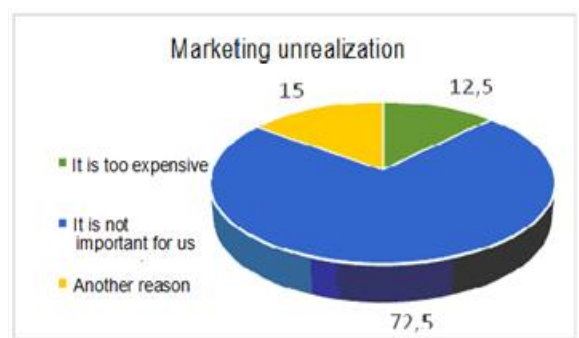
Source: My own work

The reason why some entrepreneurs do not realize marketing in their firms has been already mentioned. The question is what made the entrepreneurs to these conclusions:

- Why they consider marketing expensive.

- On which basis they have decided that marketing is not important for them, why they do not need it.

- And what other reasons led to the fact that they do not interest in it.

As an answer it can be considered the fact how they perceive or characterize marketing, see tab. 1. They consider marketing expensive and that is why they do not realize it (12.5 %) because 40 % these respondents consider marketing as advertising, promotion. Furthermore they state that marketing is a sale and activities connected with a sale are too expensive for them. A satisfaction of needs and assurance of needs, which they state (20 %) are aimed at this finding in a personal contact with a sale. Managers who do not realize marketing because *it is not important for them* (i.e. 72.5 %). Of the mentioned number of respondents 22.22 % consider marketing as advertising and promotion. 5.00 % consider marketing as sale or business (trade). Surprisingly the greatest share of respondent managers (27.77 %) state a correct perception of marketing as satisfaction of needs and 19.44 % respondents consider marketing as an activity finding needs of customers or firms. They state that do not realize marketing but they in spite of it use questionnaires (5.55 %). Other ones communicate with customers personally etc. Respondents who stated *another reason*, why they do not realize marketing in their firms (15 %), state for example the following reasons: it is unnecessary for me; marketing services are shared with a supplier´s firm that recommend them. They furthermore state a time demandingness, price, or that they are traders but also that orders are sent to them, or that there was no reason for a marketing realization for the time being, maybe in future.

Tab 1 Companies that do not realize marketing, reason and for which activity they consider marketing in % and numbers of answers

| They do not realize marketing							
Reason \ They consider marketing as*:		Advertising promotion	Sale, trade	Satisfaction of needs	Finding needs	Getting new customers	Other
- It is too expensive	12,5 % (5)	2	1	1	1	0	0
- It is not important for us	72,5 % (29)	8	2	10	7	3	6
- Another reason	15 % (6)	2	1	0	1	0	1
Total answers	100 % (40)	30 % (12)	10 % (4)	27,5 % (11)	22,5 % (9)	7 % (3)	17,5 % (7)

Explanatory notes: *Numbers of answers do not correspond to the total number respondents could answer by a selection of more variants.

Of the total number of answers there is evident that the way of marketing perception as advertising and promotion is mentioned in 30 %. 27.5 % respondents perceived marketing as satisfaction of needs and 22.5 % ones perceive marketing as finding needs in spite of the fact that they do not use this activity in management of their firms. They do not consider marketing as important, as already mentioned. Companies which stated that no marketing is realised by them consider no only companies with less than 10 employees, but also those with more than 250 employees. Form of business organization: Limited Liability Company, sole traders, joint-stock companies, state organizations, public business company and with line of business like: production - textile, joinery, construction, agricultural, machinery, in the area of trade – textile, clothes, food, in the area of services – transport, catering, medical, education, consulting, etc.

3.2 Companies realizing marketing

Approach of entrepreneurs to marketing use in firms (Graph 2). Marketing utilization in firms has many forms. Entrepreneurs (respondents) mostly state advertising and promotion in 38.78 % answers, i.e. 19. Only one respondent (2.04 %) states that he realizes marketing because he finds requirements of customers, the same quantity of answers is recorded at brand building and customer keeping. Another reason why to realize marketing in a firm is Improvement of market position and Customers attracting (4.08 %, i.e. 2 respondents). Higher data are recorded at sale and profit increase (14.29 %, i.e. 7 answers) and 16.32 %, i.e.. 8 answers, are the reason for Getting customers.

Graph 2 Survey of answers of managers who realize marketing in firms for given reasons (in %)
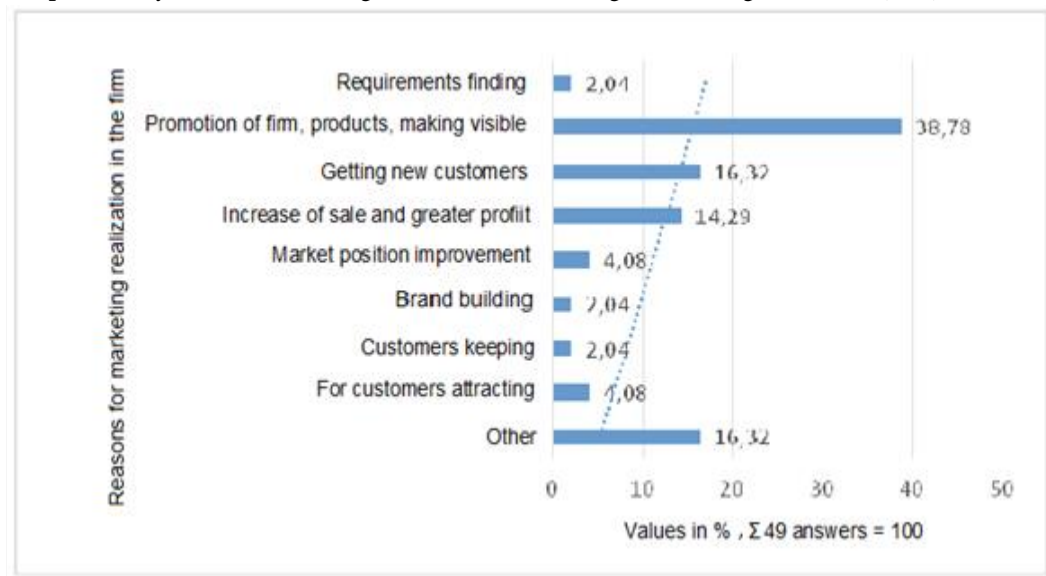
Source: My own work

From the indicated graph there is evident a survey for what aims the selected firms use marketing and for what purpose. According to the mentioned survey there is not recorded a way in which a reason of marketing realization is fulfilled. The survey is given in the tab 1. If the firm use marketing for the purpose of:

- Customers´ requirements finding: they realize this activity partly by inquiry but they also use advertising and promotion.

- Promotion of firm and products: in the greatest number (14 answers) they use advertising, they present products and also use forms of sale support. As forms they mostly state Internet (12 answers) and social networks (10 answers).

  Two answers state that marketing is realized for customers attracting using advertising, presentation and social networks.

- Getting new customers: it is realized in the form of advertising (6 answers), by promotion, advantageous price, personal communication and the greatest representation is again in the form of internet and social networks (total 10 answers). Customers can be also got in the form of On-line marketing or by sponsorship.

- Increase of sale and profit: Of seven answers there are again in the greatest measure represented advertising, promotion, presentation and using loyalty programmes (5 answers), but in the same number of answers it is represented the way using internet and social networks.

- Market position improvement: Some managers (2) are persuaded that position of their firm on the market can be improved by advertising. Furthermore brand building (1 answer). The most answers are assigned to utilization of internet and social networks (4 answers) by on-line marketing.

- Others: For its low number there was not possible to create another item of reasons for marketing realization in a firm, there are the following reasons: Without marketing it is not possible to do business (2 answers) because they must realize marketing, to meet personally with customers and they compare prices with the competition. Another answer relates to web pages (which is considered as marketing). Another business firm uses advertising, catalogues, leaflets and it uses marketing from suppliers. One firm state that marketing is their mission and the way in which they fulfil this mission, are complete activities of the offer presentation.

Tab 2 Survey of companies that realize marketing, for what reason and in which way

Reasons of marketing usage*	Total	Questionnaires satisfaction inquires	Ways and forms of marketing realization		Business representatives	Advantageous price	Communication with customer	Personal communication	Internet, Social networks		On-line marketing (SEO, PPS …)	Others
			Advertising (leaflets etc.)promotion, presentation, sales support									
Finding requirements	1	1	1	1	0	0	0	0	0	0	0	0
Promotion of firm, products	19	0	14	8	1	0	0	0	12	10	0	0
Getting new customers	8	0	6	3	0	1	0	1	6	4	1	2
Increase of sale and profit	7	0	2	3	0	0	2	1	2	3	0	0
Improvement of market position, brand building and keeping customers	4	0	2	0	0	0	0	0	3	1	1	1
Customers attracting	2	0	2	1	0	0	0	0	0	2	0	0
Others	8	0	5	3	0	1	0	0	0	1	1	0
Sum	49	1	32 + 19 = 50		1	2	2	2	23 + 21		3	3
Sum in %	108,89	4,08	65,30 +38,78		4,08	8,16	8,16	8,16	46,94 + 42,86		6,12	6,12

Explanatory notes: *Numbers of answers do not correspond to the total number (45 representatives of firms), respondents could answer by a selection of more variants.
Source: My own work

Basically, there can be stated that some answers relate only to advertising, some ones state only promotion and some ones state both advertising and promotion and that is why these items are divided in the tab 2. Of 49 answers of respondents 65,3 per cent use marketing and they see it in advertising and 38.78 per cent are assigned to promotion. Other high values are at answers to a way (form) in which marketing is realized in firms, to wit usage of internet (46.94 %) and use of social networks (42.86 %)

4 Conclusion

From the performed research there follows that a realization of marketing at selected firms is not fully appreciated and the attitude to this activity in the market environment is nearly irresponsible. Firms have not a survey of the market and they do not know their customer, his/her needs, from takings they read only the past and to forecast future is straight a risky business without knowledge of a possible behaviour of a customer.

Of the total number of 85 respondent entrepreneurs 47 % (as already mentioned) do not realize marketing and 72,5 % of them give reason that it is not important for them, 12,5 % respondents consider marketing as expensive and 15 % give another reason. 53 % ones do not realize marketing, of this number only 22.22 % (i.e. one respondent) stated a correct reason of marketing realization, i.e. finding requirements of customers, of the total number of respondent entrepreneurs (85) it is 1.17 %. 53 % respondents realize marketing (without a differentiation of a reason) through advertising (64.44 %) and with use of promotion (33.33 %).

From the stated results there follows the information which is in its essence very interesting. Respondents who state that they do not need marketing (85 = 100 %), i.e. 35.12 % and of this number there are prevailing answers which prove that managers perceive marketing correctly (finding needs or satisfaction of customers), but they do not use this activity intentionally. Unlike those respondents who state that they realize marketing but in fact they realize advertising and promotion (they perceive marketing mistakenly).

As meaningful facts there can be considered internet and social networks using for information handing on and communication. Of the total number of entrepreneurs (85) 23.53 % state that they use internet and 20 % use social networks. A significance of the report lies in a composition of respondents, as already mentioned, there are predominantly small firms with the number of employees by 10 employees (56.4 %) and 11-50 employees (24.7 %). As to a form of business there are mostly limited liability companies (50.5 %) and traders (32.9 %). In 2018 (as already mentioned researches are realized roughly in two years´ intervals) results of internet and social networks were utilized in a small measure, by 10 %.

It is true that milliards are invested into advertising but this does not mean that we need not do marketing, contrary is true. If we do not do marketing¸ milliard invested into advertising will be useless. Advertising will not replace marketing and marketing is not advertising. Internet and social networks using is possible not only in advertising, promotion but also in marketing - research, market segmentation (using SEO - Search engine optimization. Their aim is the determined internet page to be displayed on front places of spotters. PPC – so called Pay Per Sale. It is used in the sphere of internet advertising. Owners of the web displaying an advertising are remunerated for each brought customer - not for a visitor), information collection etc. If we proceed from researches, nearly eight of ten questioned Czechs visit (use) social networks daily or at least nearly daily. Several times a week is so done by more than 9 % people. People spend a much time on social networks, up to 30 %, to wit one hour to two hours daily and each sixth spends on social networks more than four hours daily. (Crha, 2020)

In conclusion a remark and experience of someone else who states, I cite: *„Boardrooms have been up to now governed by numbers, consequently by financial results as a primary intention (and not as „a result of our endeavour for a customer)". Only in a very small number of great firms it is „the King Customer" who really sits on the throne.*   Havelka, 2010.

There is a degressive tendency in the problems of marketing realisation reported in the research, which has been ongoing since 2002. We can state that the interchange of marketing to advertisement, promotion and sales increases among entrepreneurs. The root cause could be inaccurate translations and misleading information from media (internet, TV, press, broadcasting)

The use of marketing in firms does not lie in using and searching various English terms but in using people´s reason.

Sources

Belch, G., & Belch, A. (1995). *Advertising and Promotion: An Integrated Marketing Communications Perspective,* 3. ed.USA: Irwin/McGraw-Hill. ISBN 0-256-13696-3

Clow, KE., & Baack D. (2008). Advertising, promotion and marketing communication. Brno: Computer Press. ISBN 978-80-251-1769-9

Crha, V. (2020). Online time guzzlers. *MAN Marketing &Média.* (pp.18-20) 33:17:08:2020 Volume XXI.

Drucker, PF. (2010). You can not manage what you can not measure. *Marketing Magazine.* (pp. 32-33); 20:20:1:2010 Regular annex to the weekly Strategy.

Havelka, J. Customer is to be the king on the top. *MAN Marketing &Media.* (pp. 14); 20:5:2019 Volume XX.

Kotler, P., & Armstrong, G. (2010). *Principles of Marketing*. 13. ed. New Jersey: Prentice Hall, 2010. ISBN-13: 978-0-13-700669-4; ISBN-10: 0-13—700669-1

Kotler, P. (2003) Marketing Insights From A to Z: 80 Concepts Every Manager Needs to Know. 1 st Edition. USA: John Wiley & Sons, Inc. ISBN-13: 978-0471268673

Kotler, P., & Armstrong, G. (1991). *Principles of Marketing*. 1. ed. New Jersey: Prentice Hall, 1991. ISBN 0-13-721614-9

Kotler, P. (1998). *Marketing Management*. 9.ed. Prague Grada publishing, 1998. ISBN 80-7169-600-5. p 28

Phillips, M. & Rasberry. S. (2008). *Marketing Without Advertising: Inspire Customers to Rave About Your Business and Create Lasting Success.* 6th edition. Berkeley California,.USA: NOLO. ISBN-13: 978-1413306323

Sedláček, L. https://www.gumex.cz/blog/rozhovor-s-reditelem-marketingu-liborem-sedlackem-135

Sharp, B. (2013). *Marketing: theory, evidence, practice.* Melbourne: Oxford. ISBN 9780195573558. pp 5

Sutton, D. & Klein, T. (2003). *Enterprise Marketing Management: The New Science of Marketing.* 1 ed. New Jersey: Wiley & Son. ISBN 13-:978-0471267720

Solomon, MR., Marshall, GW., & Stuart, EW. (2006). *Marketing by eyes of world marketing managers.* Brno: Computers Press. ISBN 80-251-1273-X

Švarcová, M. (2016). Basic Marketing Principles. Prague: Idea servis. 272 pages ISBN 978-80-85970-87-6

Toman, I. (2011). *O úspěchu*. Praha: TAXUS INTERNATIONAL. ISBN 858-6-11-22031-3

AMA https://www.ama.org/pages/marketing-vs-advertising/

Perception and Evaluation of the Importance of Stakeholders in Strategic Planning in Tourism

Jitka Mattyašovská[1]

Abstract: The paper focuses on the process of strategic planning in tourism; in particular, the destination planning in the Czech Republic regions where there is an obvious effort to apply a stakeholder approach, which is important for setting strategic goals and ways of their implementation, and thus for their successful fulfilment.

The research is focused on the perception and evaluation of stakeholder involvement in the formulation of strategic documents in the field of tourism, evaluation of their importance in this process and evaluation of their importance in fulfilling the formulated strategic documents from the perspective of higher self-governing territorial units that are responsible for the strategic planning in the Czech Republic regions. Communication with stakeholder groups, participation and cooperation based on trust and motivation is crucial for the stakeholder approach. These attributes represent an essential basis for the work of destination management organisations.

1 Introduction

Tourism is a complex, dynamic and relatively complicated system, which is characterised by a large number of diverse links and interactions between a wide range of actors, both within the system and in its connection to the external environment. The purpose of these links is to satisfy their needs (Baggio et al., 2010; Jere Jakulin, 2017). The structures and elements of the complex system are interconnected, dependent, and influenced by interactions with internal subsystems as well as other external systems. Such influences change the environment of systems, and thus they are dynamic (Jere Jakulin, 2017).

Simultaneously, the system of tourism is an integral part of the economy at all levels (local, regional, national, global), and it demonstrably contributes to the development of regions (Franke, 2012). The Hague Declaration on Tourism (1989) emphasises tourism as an effective tool of socio-economic growth of countries and as a part of a national integrated development plan based on the concept of sustainable development (World Tourism Organization, 1989). In the Czech Republic, tourism is perceived as one of the ways to achieve a strategic goal, i.e. development of regions. It is necessary to pay considerable attention to the process of strategic planning and management within tourism, and to involve stakeholders who influence this process or, conversely, are affected by it. Especially when such impacts do not always have positive effects. The documents focused on sustainable development (e.g. Agenda 2030) emphasise the necessity of strategic planning and integration into other policies and strategies, the involvement of stakeholders and achieving consensus and continuous evaluation of strategies (Musil & Mattyašovská, 2020). Therefore, it can be concluded that the related public administration bodies, as well as managing organisations responsible for tourism in destinations, must understand the tourism system, take into account its complexity, and achieve economic, environmental and social goals through policies formulated on the basis of consensus and cooperation with stakeholders (European Commission, 2007; Simão & Partidário, 2012; Goeldner & Ritchie, 2012; Luštický & Musil, 2016). Such an approach goes against the concept of social responsibility (CSR), i.e. the concept based on the integration of social issues, environment-related issues and the stakeholders' approach towards the behaviour of companies on the basis of a voluntary commitment (European Commission, 2011). The inclusion of this broader context in the companies' behaviour contributes to cooperation, increase in competitiveness of entities and fulfilment of the principles of sustainable development (Mattyašovská & Tučková, 2019).

The process of planning is a challenging task and it should involve modern approaches and principles of planning, such as sustainable development, strategic orientation, monitoring, participation and cooperation, and the involvement of stakeholders in this process (McCartney, 2013). The importance of stakeholders has been emphasised, and the cooperation between private and public sectors represents one of the critical points (Dredge, 2006; Ritchie & Crouch, 2003). Firstly, the need for cooperation stems from the very nature of tourism where the public administration or organisations established by it (DMO – destination management organisation) are frequently involved in the management, strategic planning and financial resources in the Czech Republic (Ritchie and Crouch, 2003). The primary purpose of these institutions and

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organisations is, in particular, the management, marketing, communication, coordination, cooperation, data collection and analysation, education, etc. However, the marketability of the tourism offer is ensured by economic entities, to a large extent, by the private sector (Aqueveque & Bianchi, 2017). Another important stakeholder is resident who can significantly influence the development of tourism in a destination, especially in the destination that suffers from over-tourism. Secondly, within The New Public Management theory (NPM theory), citizen (= entrepreneur, too) is the essence of decision-making processes. What is expected is its greater involvement in communication and participation in solutions (Bourgon, 2007). These findings suggest that the use of stakeholder management is suitable for tourism, including strategic planning, which is often in the hands of the public sector in the Czech Republic.

The paper deals with the study of the application of the stakeholder approach in the process of the strategic planning in destination at the level of the Czech Republic regions. In particular, it examines which stakeholder groups are invited to cooperation, and how their importance in this process is assessed from the perspective of responsible regional authorities officers. According to Freeman (1984), the stakeholder approach is "*about groups and individuals who can influence the organisation, and about managers' behaviour acceptable in response to these groups and individuals*". According to Freeman and McVea (2001), "*the stakeholder approach emphasises active management of the business environment, relations and the promotion of shared interests*". Šimberová (2010) states that "*the stakeholder approach clarifies the fact that the entity's goal is not only to meet the requirements of their customers and employees, but also to represent the interests of other groups that exist outside market relations and affect political and social issues*".

2 Methods

Based on a literature search and analysis of secondary data, a questionnaire was created. The questionnaire has been tested on the officials responsible for the tourism administration, including the strategic planning in this area in one of the regions. Subsequently, questionnaire research was applied in all Czech Republic regions, including the capital city of Prague, i.e. 14 respondents. The response rate was 100%. In other regions and the capital city of Prague, the respondents were officials responsible for the area of tourism, including the strategic planning in the field of tourism, with the exception of two regions where the respondents were the officials responsible for strategic planning of the region, including tourism.

The questionnaire consists of four questions used for all 40 groups of stakeholders with a possibility to add other groups that are usually invited to cooperation. The questions are as follows:

- Has any stakeholder group been invited to cooperation?

- How do you evaluate the degree of stakeholder group involvement in cooperation on the strategy?

- How do you evaluate the importance of stakeholder group for the success of the strategy?

- How do you evaluate the degree of stakeholder group involvement in cooperation on fulfilling priorities of the strategy?

The first question is closed dichotomous, the other three questions are evaluative. The Likert scale $1 - 5$ (1 – minimum, 5 – maximum) is used for evaluation. This was followed by the synthesis of the obtained data and their processing using the method of descriptive statistics.

3 Research results

The subject of the research was the integration of stakeholders into the process of strategic planning in the Czech Republic regions. For the purposes of the research, the stakeholders are perceived as public entities and private entities that also include non-state non-profit organisations as economic entities. Individual persons or groups of them are also considered. These stakeholders are presented in strategic documents as, for example, "*entities involved in fulfilling the goals of given measures*" (Hruška et al., 2017). Fulfilment of goals should be realised in cooperation with these stakeholders (Mattyašovská &Tučková, 2019).

When compiling the questionnaire, stakeholders were defined based on the professional literature study and long-time hands-on experience of the author so as to cover as many stakeholders as possible from a comprehensive tourism system that respondents may encounter in practice. The basis represents 40 groups of stakeholders coming from the public as well as private sectors, including non-state non-profit entities, residents and visitors; an overview is given in Figure 2. The respondents had an opportunity to supplement these groups with other stakeholders that are not listed in the primary file. Only one of the regions used this opportunity and added one stakeholder to the list. It was the Wine Fund.

The research showed that the higher self-governing territorial units (regions) in the Czech Republic had elaborated a separate strategic document for the field of tourism, or tourism had been included in the overall strategic development plan for the given area (e.g. Strategy of Development, the Strategic Plan for Prague). All 14 respondents stated that they

consider the stakeholders important; they cooperate with them within the strategic process planning as well as within subsequent fulfilment of the set goals. It suggests an application of stakeholder approach and is in line with the facts mentioned above regarding the necessity to involve stakeholders in strategic planning. The differences in individual regions are between the number and groups of stakeholders who were invited to cooperation. An overview is given in Figures 1 and 2.

Figure 1 The number of stakeholders in the Czech Republic regions approached about involvement in work on strategic documents
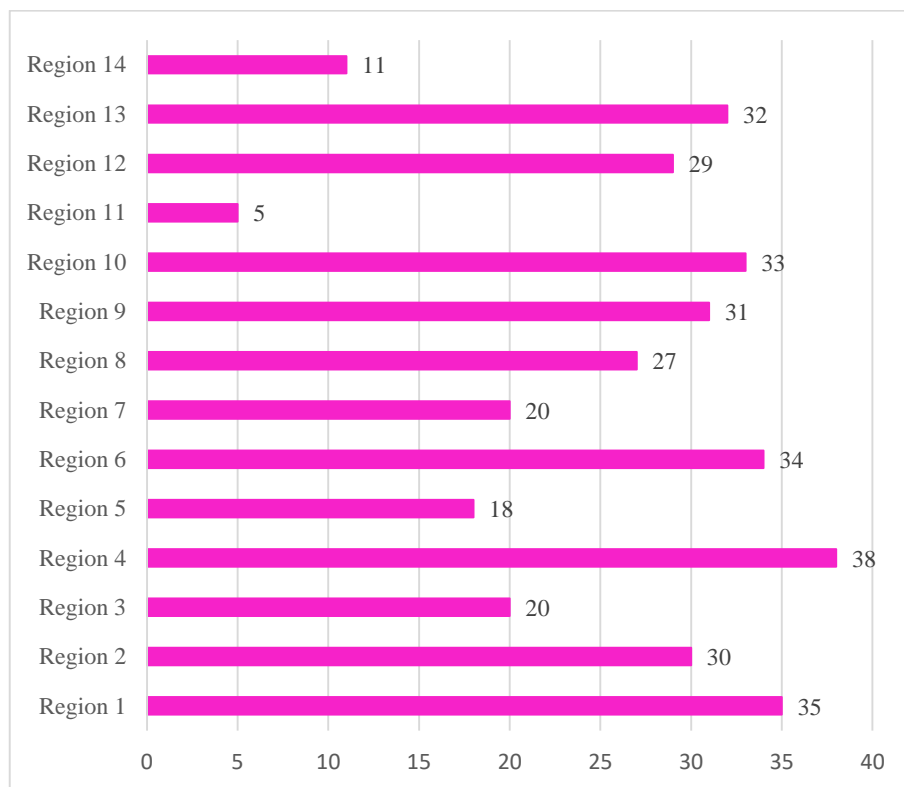
Source: Own processing

The overview in Figure 1 shows that the vast majority of regions approaches a relatively wide range of stakeholders about cooperation on the strategy in the field of tourism. In half of the regions, 30 and more stakeholders were contacted. Region No. 4 declares that almost all stakeholders are invited to cooperate, as two stakeholders do not currently operate in the region (a spa entity and a local DMO). Exceptions are regions No. 11 and 14 that approach, and thus find necessary for cooperation, only a limited number of stakeholders.

Figure 2 shows an overview of the frequency of involvement of individual stakeholders. Political representation at the regional level, regional DMOs, departments of regional authorities, profession-oriented organisations and tourist information centres are involved almost in all regions, with one exception. A DMO at the regional level is always involved, provided that it has been established in the region. Other important partners are municipalities which by law (Act No. 128/2000 Sb., on Municipalities) gave tourism an independent competence, and at the same time they are often the founders of territorial DMOs that also belong to very important stakeholders. Furthermore, they include business entities, most often collective accommodation and catering facilities, and services from the MICE and wellness segment. On the other hand, the entities which are the least invited to cooperation include municipal cultural centres, consulting and project companies, and District Chambers of Commerce.

Figure 2 Frequency of the involvement of stakeholders invited to cooperation on strategic documents in the field of tourism in the Czech Republic regions
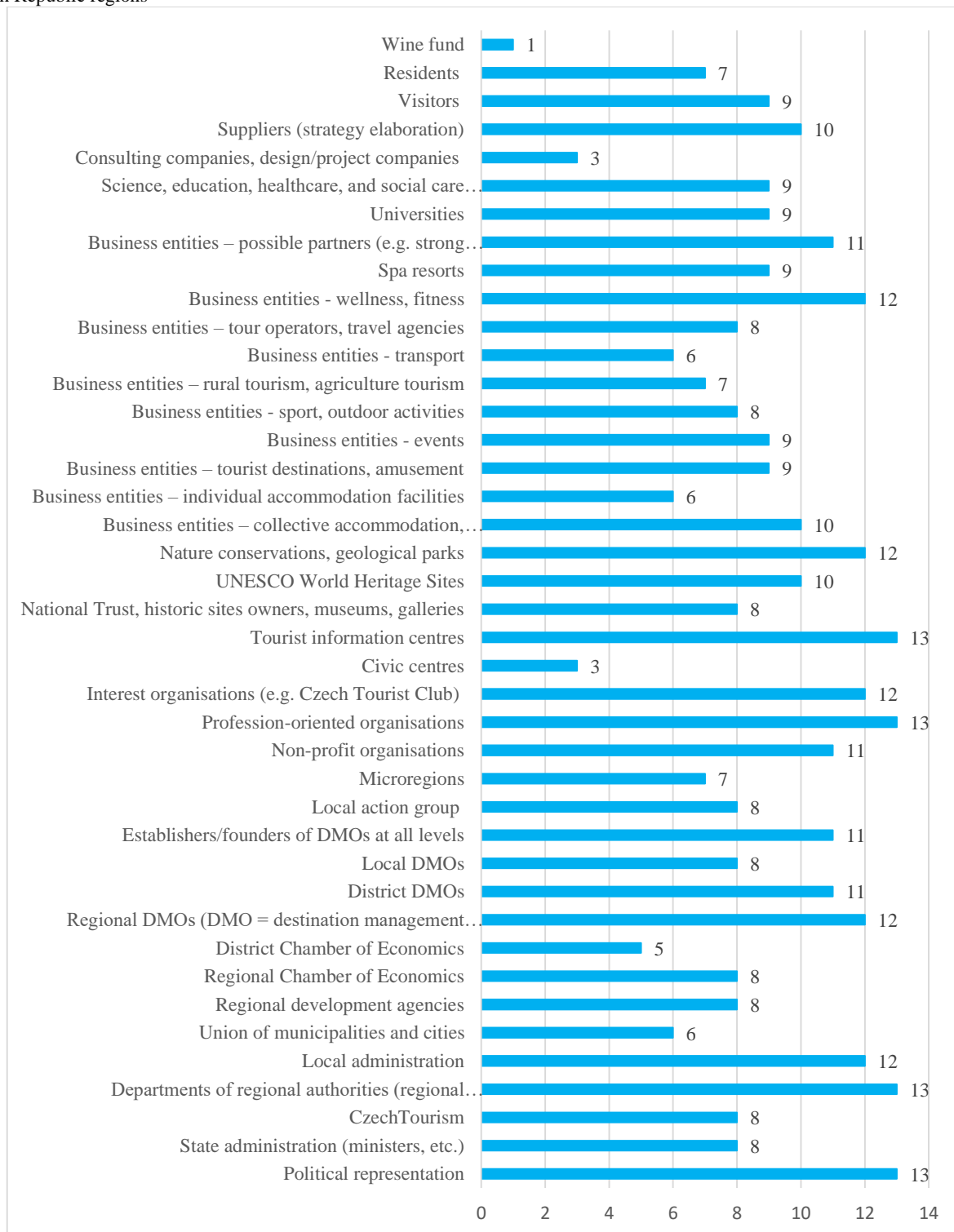
Source: Own processing

As a result of the evaluation part of the questionnaire which was realised on the Likert scale (1 – minimum, 5 – maximum), it was found out that in the case of the degree of involvement in cooperation on the strategy, the best-rated entities (arithmetic average of the obtained rating) were the affected departments of regional authorities, regional and local DMOs, non-profit organisations, UNESCO World Heritage Sites, etc. In the case of evaluating the importance of stakeholders for the success of the strategy, the best-rated entities were the regional DMOs, political representation or local administration (municipalities). In the last evaluation of the degree of involvement of stakeholders in cooperation in fulfilling the priorities of the strategy, the best-rated entity was a regional DMO again. This was followed by a regional DMO and other affected departments of the regional authority. An overview of the top ten stakeholders is presented in

Table 1 which shows that the best-rated stakeholder is a regional DMO. This is followed by a territorial DMO, affected departments of local authorities, local administration (municipalities), UNESCO World Heritage Sites, etc. Business entities are not, with one exception, perceived as the most important stakeholders, even though these entities trade the tourism offer. The preference given to public institutions or other entities established by them in the evaluation may arise from the fact that public entities are highly involved or they significantly support the development of tourism in regions and perceive it as one of the ways of the regional development. Another related issue can be seen in the fact that considerable financial resources are spent from public sources for the support and development of tourism (Group of Authors, 2019).

Table 1 An overview of the top ten stakeholders

Evaluation of the degree of stakeholders' involvement in cooperation on the strategy		Evaluation of the importance of stakeholders for the success of the strategy		Evaluation of the degree of the stakeholders' involvement in cooperation on fulfilling the strategy priorities	
Stakeholder	Rating average	Regional DMOs	Rating average	Stakeholder	Rating average
Regional DMOs	4.67	Regional DMOs	4.50	Regional DMOs	4.67
Territorial DMOs	4.42	Political representation	4.38	Territorial DMOs	4.25
Departments of regional authorities (regional development, culture, agriculture, environment, transport, economy)	4.17	Local administration (municipalities, cities)	4.38	Departments of regional authorities (regional development, culture, agriculture, environment, transport, economy)	4.08
UNESCO World Heritage Sites	4.11	Territorial DMOs	4.30	Self-governing units (municipalities, cities)	3.85
Suppliers – elaborators of strategic documents	4.11	Visitors	4.20	Political representation	3.77
Visitors	4.11	Departments of regional authorities (regional development, culture, agriculture, environment, transport, economy)	4.17	Business entities – tourist destinations, amusement	3.77
Non-profit organisations	4.00	Establishers/founders of DMOs at all levels	4.08	Establishers/founders of DMOs at all levels	3.67
Business entities – possible partners (e.g. strong companies operating in the region)	4.00	UNESCO World Heritage Sites	4.00	Local DMOs	3.63
Establishers/founders of DMOs at all levels	3.92	Suppliers – elaborators of strategy documents	4.00	Union of municipalities and cities	3.50

Source: Own processing

4 Conclusions

The analysis of the data shows that the officials employed by the regional authorities who are responsible for the tourism administration or strategic planning pursue stakeholder management or stakeholder approach in the process of strategic planning in the field of tourism. The executive officials, as well as the political representation of the region, are aware of the importance of communication and cooperation with relevant groups of stakeholders, both in the process of formulation and in the process of implementation of strategic documents in the field of tourism. However, it is not possible to determine with absolute certainty whether this procedure is implemented as a result of erudition in the stakeholder management or in the light of principles of public service – service for citizens.

Cooperation and partnership provide the destination with a very significant benefit in the form of competitive advantage (Gajdošík & Šmardová, 2016), and also support sustainable development of tourism (Částek & Cenek, 2017). It is desirable to address the development of stakeholder theory and application of stakeholder management in the field of tourism as *"sustainable development of destination is significantly facilitated by the involvement of all relevant stakeholders, including the local community. Cooperation with stakeholders is essential for the effective development of tourism since it has the capacity to achieve common goals among all stakeholders. Still, it also presents wide-ranging challenges for the administration of destinations"* (Towner, 2018).

Based on these findings, a number of questions related to follow-up research arises. One of the directions is, for example, the area of cooperation and its barriers or, conversely, motivating stakeholders to cooperate.

References

Act No. 128/2000 Coll., on Municipalities (Establishment of Municipalities). Statute Book of the Czech Republic, part 38/2000. [cit. 2020-09-28].

Aqueveque, C. & Bianchi C. (2017) Tourism Destination Competitiveness of Chile: A Stakeholder Perspective, *Tourism Planning & Development*, 14:4, 447-466. doi: 10.1080/21568316.2016.1272482

Baggio, R., Scott, N., & Cooper, C. (2010). Network science. *Annals of Tourism Research*, *37*(3), 802–827. doi: 10.1016/j.annals.2010.02.008

Bourgon, J. (2007). Responsive, responsible and respected government: Towards a New Public Administration theory. *International Review of Administrative Sciences*, *73*(1), 7–26. doi: 10.1177/0020852307075686

McCartney, G. (2013). *Introduction to tourism management: An Asian perspective*.

Částek, O., & Cenek, M. (2017). A Relationship between Stakeholder Management and Business Performance in the Czech Republic. *Managing Global Transitions*, 167–207. doi: 10.26493/1854-6935.15.187-207

Dredge, D. (2006). Policy networks and the local organisation of tourism. *Tourism Management*, *27*(2), 269–280. doi: 10.1016/j.tourman.2004.10.003

De Vaus, D. A. (2002). *Surveys in social research* (5. ed). Allen & Unwin.

Evropská komise. (2007). *Sdělení Komise: Agenda pro udržitelný a konkurenceschopný evropský cestovní ruch.* Cited from: z https://eur-lex.europa.eu/legal-content/CS/TXT/?uri=CELEX:52007DC0621 [cit. 2020-9-20].

Evropská komise. (2011). Obnovená strategie EU pro sociální odpovědnost podniků na období 2011-2014. Cited from: https://ec.europa.eu/transparency/regdoc/rep/1/2011/CS/1-2011-681-CS-F1-1.Pdf [cit. 2020-9-20].

Franke, A. (2012). *Zmírňování regionálních disparit prostřednictvím rozvoje cestovního ruchu*. Wolters Kluwer Česká republika.

Freeman, R. E. (1984). Strategic management: A stakeholder approach. Pitman.

Freeman, R. E. & McVea, J. (2001). A Stakeholder Approach to Strategic Management. *SSRN Electronic Journal*. doi: 10.2139/ssrn.263511

Gajdošík, T., & Šmardová, Ľ. (2016). Kooperácia zainteresovaných subjektov v mestských cieľových miestach cestovného ruchu. *XIX. mezinárodní kolokvium o regionálních vědách. Sborník příspěvků.*, 984–991. doi: 10.5817/CZ.MUNI.P210-8273-2016-127

Goeldner, C. R., & Ritchie, J. R. B. (2012). *Tourism: Principles, practices, philosophies* (12th ed). Wiley.

Hruška, L., Foldynová, I., Proske, P., Dědič, L., & et al. (2017). *Strategie rozvoje cestovního ruchu v Kraji Vysočina na období 2017—2025*. PROCES - Centrum pro rozvoj obcí a regionů, s.r.o. Cited from: https://www.vysocinatourism.cz/images/stories/Cestovni-ruch/Strategie_CR_final.pdf [cit. 2020-9-24].

Jere Jakulin, T. (2017). Systems Approach to Tourism: A Methodology for Defining Complex Tourism System. *Organizacija*, *50*(3), 208–215. doi: 10.1515/orga-2017-0015

Group of authors (2019). Analýza vývoje cestovního ruchu v ČR: pro zpracování analytické části Koncepce státní politiky cestovního ruchu ČR 2021–2030. Brno: Masarykova univerzita.

Luštický, M., & Musil, M. (2019). Stakeholders influence on the competitiveness factors of tourism destination. *XXII. mezinárodní kolokvium o regionálních vědách, Velké Bílovice,* 470–476. doi: 10.5817/CZ.MUNI.P210-9268-2019-59

Mattyašovská, J., & Tučková, Z. (2019). Stakeholders from the perspective of strategic planning in tourism. In R. Rehák & P. Krnáčová (Eds.), *Proceedings of the International Scientific Conference for PhD. Students and Young Scientists Merkúr 2019* (pp. 194-203). Bratislava, Slovensko: University of Economics.

Musil, M., & Mattyašovská, J. (2020). Reflexe principů udržitelného rozvoje ve strategických dokumentech Českých DMOS. In I. Linderová & P. Scholz (Ed.), *Aktuální problémy cestovního ruchu „ Overtourism - riziko pro destinace"*, (pp. 127–137): Jihlava: College of Polytechnics.

Ritchie, J. R. B., & Crouch, G. I. (Ed.). (2003). *The competitive destination: A sustainable tourism perspective*. CABI. doi: 10.1079/9780851996646.0000

Simão, J. N., & Partidário, M. do R. (2012). How Does Tourism Planning Contribute to Sustainable Development? *Sustainable Development*, *20*(6), 372–385. doi: 10.1002/sd.495

Šimberová, I. (2010). Role stakeholderů v kreativní ekonomice. In J. Kloudová, *Kreativní ekonomika: [Trendy, výzvy, příležitosti]* (s. 67–90). Grada.

Towner, N. (2018). Surfing tourism and local stakeholder collaboration. *Journal of Ecotourism*, *17*(3), 268–286. doi: 10.1080/14724049.2018.1503503

WORLD TOURISM ORGANIZATION (1989). The Hague Declaration on Tourism. Hague, Netherlands: World Tourism Organization. ISSN 2221-6987.

Towards Understanding the Challenges of COVID-19 and Tourism Industry

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Abstract: Due to the novel coronavirus COVID-19, the world is facing severe challenges as the devastations of the first wave were massive and predictions are havoc for the second wave with less medical capabilities for growing number patients. In light of such an adverse state of affairs, the study puts effort to highlight and assess the impacts of COVID-19 with particular reference to the tourism industry by using secondary data from literature and different international organizations. The comparison of the previous century epidemic/pandemic with the present century epidemic/pandemic is to understand the spread of COVID-19 better. Then study highlights the observed and projected impacts of COVID-19. The concluding part also discusses the future implications of COVID-19 to the tourism industry for grabbing the attention of relevant stakeholders, policy-makers and governments to tackle the issue better.

1 Introduction

The worldwide pandemic novel coronavirus COVID-19 began from the city of Wuhan, China, with the officially first reported case to the country office of WHO on 31 December 2019 (Gössling et al., 2020). Then, the virus spread in China, and during the first week of January 2020, 41 patients with positive reports of COVID-19 were admitted to the hospitals of China (Huang et al., 2020). Initially, most political leaders all around the world highly disregarded and took no notice. Although due to the lockdown of Wuhan, the total number of cases in China stabilized around 80,000 (ECDC, 2020), yet early carelessness transmitted the virus to all continents through air transport. Globally, the number of confirmed COVID-19 cases doubled in due course of time mainly the result of super-spreading events, such as the ski destination Ischgl in Austria (Johns Hopkins, 2020; Anderson et al., 2020). Then there was an acceleration in the infections at an exponential rate around the globe (ECDC, 2020). As there was no vaccine and most countries responded through non-pharmaceutical interventions (NPI), such as lockdown, social distancing, closure of the school, universities, and businesses, postponing concerts, sports events and cultural festivals (Gössling et al., 2020). These strategies were somewhat successful and helped to flatten the curve of rising COVID-19 cases. As a result, most governments showed leniency in the restrictions and opened up businesses with conditional permission to travel on the fulfillment of standard operating procedures (SOPs). However, careless travel during summer months and non-responsible behavior by tourists ignited the rate of infections. In September 2020, the world entered the second phase of the COVID-19 pandemic.

In light of this the purpose of this study is to provide an assessment and overview of the current crises related to novel Coronavirus COVID-19 with some implications and recommendations for the tourism industry. In order to achieve these objectives, the secondary data from literature and different organizations has been used. According to the statistics of the European Center for disease prevention and control (ECDC), until 21 September 2020, 31091469 cases of COVID-10 have been reported with 961352 deaths. At the continent level, 1408440 cases have been reported from Africa, 9420535 cases from Asia, 15704633 cases from America, 4524724 cases from Europe, and 32441 cases from Oceania. Whilst 33950 deaths were reported from Africa, 175992 deaths from America, 217942 deaths from Europe and 921 deaths from Oceania.

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Table 1: Total Number of COVID-19 Cases

| Continent	No. of COVID-19 Cases	Deaths
Africa	1408440	33950
Asia	9420535	175992
America	15704633	532540
Europe	4524724	217942
Oceania	32441	921

Source: ECDC, 2020.

In Figure 2, the piechart depicts the percentages of the total number of COVID-19 cases for each continent. In light fo this, exactly 50 percent of the COVID-19 cases are in the continent of America, 30 percent are in Asia, subsequently 15 percent in Europe, whilst percentage is least with only 5 percent. The total number of cases in Oceania is only 32442, due to the minimal number as compared to other continents, the piechart did not capture visibly. Similarly, the percentage of deaths is highest in the continent of America, subsequently Europe 23 percentage, Asia 18 percent, and Africa only 4 percent. It is worthwhile to mention here that although the percentage of cases in Asia is more, yet the rate of deaths is less as compared with Europe, which might be due to the higher immunity of Asian people.

Figure 1: Percentage of Total Number of cases
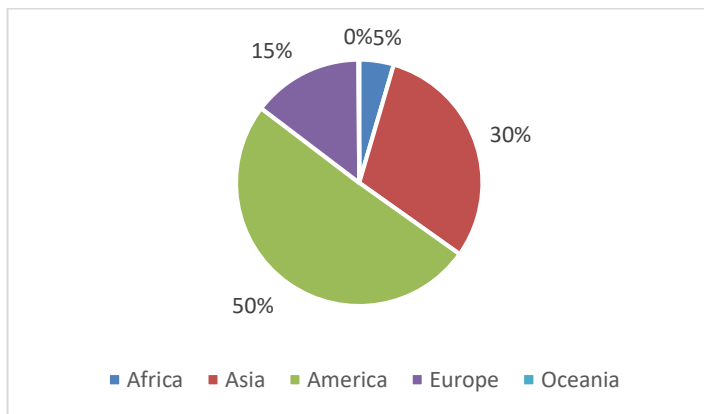
Source: ECDC, 2020.

Figure 2: Percentage of Deaths
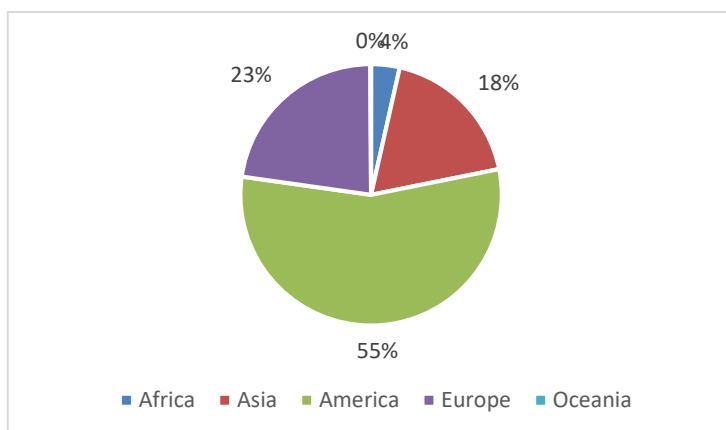
Source: ECDC, 2020.

In this vein, the lockdown of economies and travel restrictions at local, regional, and international levels put quite significant impacts on all the sectors of the economies, especially hit hard the tourism systems due to the limited international travel and a standstill-like situation of everyday life. The crisis rapidly slowed down international air travel due to the travel bans, closure of borders, and quarantine regimes. Such an unprecedented situation impacted all segments of life with enormous impacts on the tourism industry. Such consequences are so severe due to the direct link of tourism with traveling, movement and social interactions. Further, the sad state of affairs could be envisaged based on the contribution

of tourism to the global GDP (gross domestic product) and global employment (330 million jobs) that was quite impressive, i.e., 10.3 percent of global GDP and 10 percent employment is from tourism industry (WTTC, 2019). Hence, such support and strong contribution stop in pandemics, and better understanding are necessary to formulate strategies and policies for the recovery of the economies in general and the tourism industry in particular.

The hospitality value chain is badly affected by countries due to the exponential growth of viral infections of novel coronavirus COVID-19. The immediate impact was felt due to the closure of accommodations, shutting down of attractions with the resulting implications for catering and laundry services linked with the suddenly vanished demand. All the restaurants also had to close initially and later switched to take away, and delivery options also faced significant reductions in their sales. Most of the international airlines had to ground their flights and ended up in lay-offs and bankruptcies as British airline FlyBe declared bankruptcy on 05 March 2020 (Business Insider, 2020). In addition, numerous airlines such as Scandinavian Airlines, Singapore Airlines, Virgin Atlantic, and many tour operators requested recovery packages and tens of billions of state aid.

The change of affairs due to COVID-19 is quite unprecedented. Famous tourist attractions and destinations moved from over-tourism to no-tourism as depicted by travel bloggers and newspapers with a high trend on social media and tourism sites by before and after photographs (Conde Nast Traveller, 2020). Some are optimistic and have belives that the tourism sector will bounce back (CNN, 2020). Unfortunately, some over-optimistic perspectives proved wrong already (Forbes, 2020), and the most prevalent shreds of evidence depict the different and transformative tourism sector due to COVID-19. Such traces of evidence linked with loss of tourism revenue for a longer period and reduced level of employment.

In light of the facts as mentioned above, this paper sheds light on the impact of some previous pandemics on the tourism sector globally. Keeping in view the worldwide lockdown, closure of economies, and businesses; this paper also attempts to assess some of the impacts of COVID-19 on the tourism industry and projections of the damages to the tourism sector. Besides, the paper also considers the changes in society, economy, and tourism to highlight the critical research needs in the changing scenario of coronavirus COVID-19.

2 Previous Pandemics and Global Tourism

In the past two decades, the global tourism sector showed the impacts of pandemics and major crises. The three disruptive events include terrorist attacks of 9/11 in 2001, the SARS (severe acute respiratory syndrome) outbreak of 2003, the global economic crises of 2008/2009, and the MERS (middle east respiratory syndrome) outbreak of 2015 are worthwhile to mention. However, the tourism industry showed resilience towards such external shocks as SARS caused -0.4 percent, and global economic crises caused a -4.0 percent decline in international tourist arrivals (Figure 3). Therefore, it is much likely that there will be unprecedented recovery from the COVID-19.

Figure 3: International Tourist Arrivals (million)
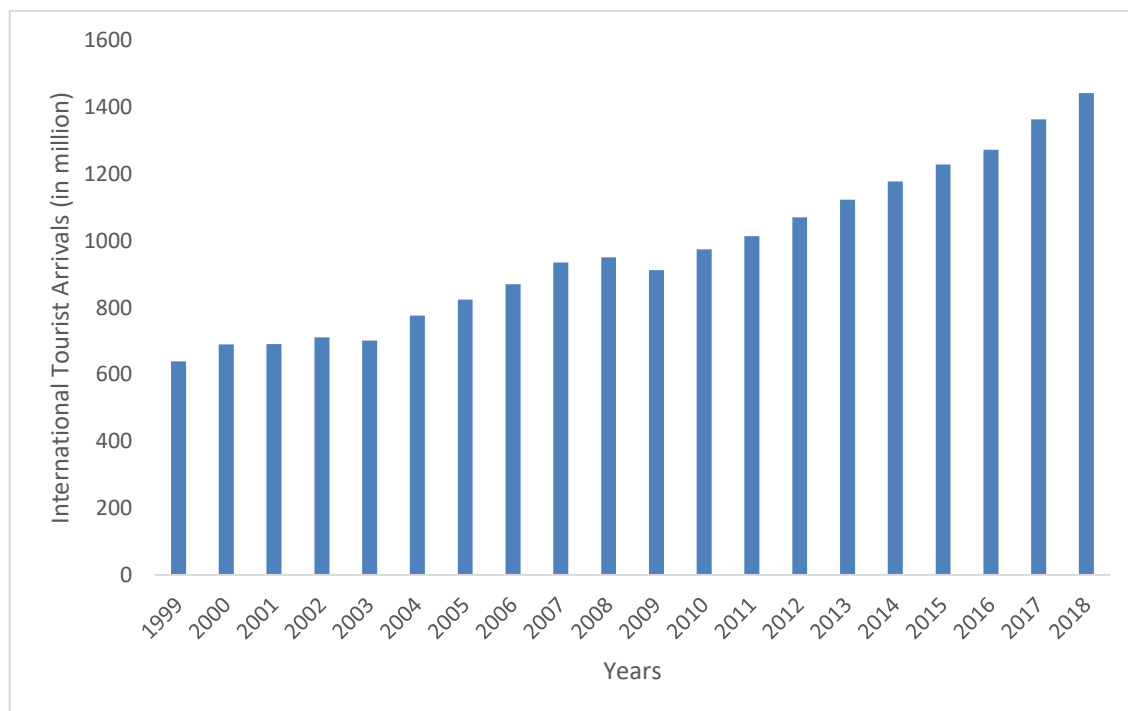
Source: World Bank, 2020.

The outbreak of pandemics and travel have important relationships due to global change and health security risks (Burkle, 2006). Tourism researchers considerably realized the impacts of global climate change, but the effects of pandemics are not explored well to highlight the related challenges and vulnerability (Gössling et al., 2020). Although the pandemic and crises hit the globe numerously yet the relationships between pandemics and tourism are less explored despite the warnings and threats to the tourism sector and society by tourism researchers (Gössling, 2002; Page & Yeoman, 2007; Scott & Gössling, 2015) and also by health researchers (Fauci & Morens, 2012; Bloom & Cadarette, 2019).

In the 21st century, the risks are higher for pandemics. Some studies linked these increasing threats to rising mobile world population, trends to urbanization, the concentration of masses, industrialized food, increased consumption of meat, and advancements in global transport networks (Labonte et al., 2011; Pongsiri et al., 2009). Studies depicted that outbreak of diseases including SARS, Marburg, Ebola, Zika, Hantavirus, and avian influenza are the results of anthropogenic impacts on biodiversity and ecosystems (Schmidt, 2016; Petersen et al., 2016; World Bank, 2012). Similarly, Wu et al. (2017) noted that the areas where wildlife, livestock, and cultural practices are in contact with wild disease reservoirs, the risks of infectious diseases are higher.

Due to the global changes, the rate of epidemics and pandemics is increasing. The twentieth century just experienced three pandemics, includes 'Spanish' influenza of 1918-19, then 'Asian' flu of 1957, and subsequently the 'Hong Kong' flu of 1968. However, in the 21st century, the world experienced five pandemics within a short span of 20 years. In this vein, SARS of 2002, Bird flu of 2009, MERS of 2012, and Ebola of 2013-14 were faced by the world, mainly linked to the changing global factors (Greger, 2007; Coker et al., 2011; Wu et al., 2017).

The research on pandemics truly realized the central importance of travel as disease surveillance (Khan et al., 2009; Hon, 2013). Given this, travel is considered an important factor to spread the disease across countries and continents with major economic consequences due to NPIs (Nicolaides et al., 2019). Historically, special attention has been given to understand the impacts of the world worst pandemic of 1918-1919 (the Spanish flu) and link with the recent pandemics to cope with the potential effects (Garrett, 2008; Holtenius & Gillman, 2014). That's why, Baldwin and Weder di Mauro (2020) suggests, "The harsh reality is that we have no 21st century tools to fight COVID-19. There is no vaccine or treatment. All we have is the methods that were used to control epidemics in the early 20th century. Those, as we shall see, tend to be very economically disruptive".

Despite the massive importance, the assessment of such pandemics to evaluate economic impacts are limited, and most studies carried out at a national level (Fan et al., 2018; Prager et al., 2017; Keogh-Brown et al., 2010). The most cited report of McKibbin and Sidorenko (2006) predicted that almost 12.6 percent of global GDP reduced due to the Spanish flu. A moderate to severe influenza results in 720,000 deaths and a global income loss of 0.6 percent (Fan et al., 2018). A pandemic similar to Hong Kong flu reduces global GDP by approximately US\$ 2.4 trillion, and an epidemic identical to Spanish flu would reduce global GDP more than US\$ 9 trillion (McKibbin & Fernando, 2020). However, all such scenarios only provide rough estimates.

3 COVID-19 Pandemic and Tourism

The previous epidemics/pandemics in the last 40 years had different implications as the COVID-19. Although the novel coronavirus COVID-19 does not kill at the massive level yet difficult to contain because people start to spread the virus without even having symptoms of COVID-19 (Rothe et al., 2020; Bai et al., 2020). Hence, in the travel and tourism industry, the patients cause to transmit COVID-19 to other people even before they realize and put themselves in isolation. That's why the spread of COVID-19 and the increase of infections were so rapid across countries and continents at an exponential rate (ECDC, 2020).

UNWTO (United Nations World Tourism Organization, 2020) data shows that the economic cost of COVID-19 will be three times more than that of the global crisis of 2009. The number of tourists has fallen up to 98 percent in May 2020 as compared to the same time in the year 2019. The world tourism barometer of UNWTO estimated that there is a 56 percent year-on-year drop in tourist arrivals between the period of January to May of 2020 that leads to a reduction of 300 million tourists and a financial loss of US\$ 320 billion in the international tourism receipts. The UNWTO Secretary-General Zurab Pololikashvili opined to restart tourism gradually and cautiously, and the current situation puts dual responsibility on governments, to look after public health and protect jobs and businesses. According to the World Economic Forum (2020), the global tourism industry could set back by 20 years due to COVID-19 with the projection of the loss of 120 million jobs and \$1 trillion economic damage.

Airlines

Travel restrictions and worldwide lockdown also slowed down the global tourism significantly with international flights dropped almost half, whilst commercial flights shrunk by 41 percent during the last two weeks of March 2020 as compared to the previous year (FlightRadar24, 2020). Some airlines followed restricted seating plans while maintaining a safe

distance, condition of wearing full-body disposable protective gear for cabin crew, and necessary face covering of passengers, and crucial COVID-19 test such as Air New Zealand, Qatar Airways, and Emirates are the examples (Air New Zealand, 2020; Qatar Airways, 2020, Bloomberg, 2020). However, the travelers also feel unsafe on the other side, like the weekly survey of destination analysts about Americans traveling for business and leisure, report 53 percent Americans feel unsafe during their flight (Destination Analysts, 2020).

The revenues of airlines will also fall drastically. According to the estimates of the International Air Transport Association (IATA, 2020), there will be -38% lower revenues based on revenue passenger kilometers (RPK), lead to US$252 billion loss of revenues. Due to such a devastating financial situation, many airlines received state aid, such as Scandinavian Airlines, Virgin, Singapore Airlines, and a tour operator in Germany received more than US$15 billion in state aid (Reuters, 2020). Likewise, airports are also facing a severe financial crisis, as Airports Council International (2020) projected a loss of US$ 76.6 billion in the year 2020.

Accommodation

The novel coronavirus COVID-19 also impacted the accommodation sector badly. Globally, the number of guests during late March 2020 declined by more than 50 percent (Gössling et al., 2020). In this vein, Italy, Greece, and Germany were the hardest hit countries due to a large number of cases and deaths per day. However, some countries like Sweden, New Zealand, and Seychelles were considered safer with a relatively large number of visitors.

According to the estimates for hotel occupancy, the declining rates were quite significant with even more than 50 percent of occupancy reduction rates in March 2020, and even the worst 96 percent reduction for Italy, as Figure 4 shows the case of Italy, China, U.K., USA, and Singapore (Statista, 2020). It is still a big issue for accommodation businesses to make the guests feel safer and provide hygienically clean and disinfected rooms to arriving guests (Gössling et al., 2020).

Figure 4: Hotel Occupancy rate changes for the week of 21 March 2020
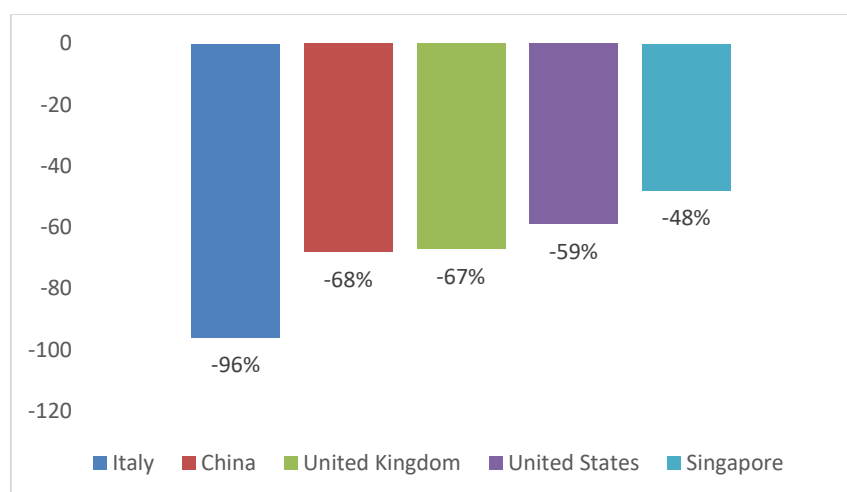
Source: World Bank, 2020.

Restaurants and Cruises

In most countries, the closure of restaurants and food services also got impacted severely due to their small profit margins. Staff members working in the gastronomy segment, a subsector of the hospitality sector, were declined largely by the end of March 2020 (NHO Reiseliv, 2020). A leading consultancy, McKinsey and Company (2020) estimated that 13.4 million jobs in the restaurant industry are vulnerable. A lower staff was also required due to the takeaway mode as an operational alternative. According to the QSR Maganize (2020), the U.S. restaurant industry faced a loss of $120 billion in the three months of March 2020 to May 2020, and by the end of 2020, the loss is expected up to $240 billion. Whilst, the global loss estimated by industry research firm Technomic (2020) is more than US$600 billion.

Cruises as a tourism sub-sector are unlikely to be in operation before the COVID-19 vaccine is found. The recovery of the cruises as a sector looks much more difficult (Gössling et al., 2020), due to the fact explained by Moriarty et al. (2020), "Cruise ships are often settings for outbreaks of infectious diseases because of their closed environment, contact between travelers from many countries, and crew transfers between ships". Hence, there is much uncertainty related to the severity of such impacts and the normalization of the situation.

4 Future implications and Conclusion

Until now (4th November 2020), the number of COVID-19 cases reached up to the highest level of 47.59 million, surpassing the 1215892 deaths (ECDC, 2020). World Economic Forum (2020) estimated the worldwide financial loss of up to $15.8 trillion due to COVID-19 and havoc levels of unemployment around the globe. Given such a hostile state of affairs, the implications of COVID-19 and future pandemics are quite relevant and worthwhile to consider based on the global economic impacts in general and on the tourism sector in particular.

The tourism industry contributes significantly to the global income and employment. Whilst during the times of epidemics/pandemics, tourism also causes the spread of the pandemic and exacerbates the situation. Firstly, as discussed in the former part of the study, the food production patterns came up as a major reason for the outbreak of pandemics such as the outbreak of SARS, MERS, and the COVID-19. Therefore, the law against industrialized food production should be strict and be monitored vigorously to stop the animal disease outbreak. The human interference with the wildlife is also a cause of virus outbreaks, and this should be minimized as the shreds of evidence of deforestation and wilderness habitats are there (Lade et al., 2020; Barlow et al., 2016) and leads to climate change which enhances the risk of virus outbreaks. Hence, tourism contributes to greenhouse gas emissions and increases the risk directly as well as indirectly.

The global volume growth model should be reconsidered due to the clear links of over-tourism towards climate change and the spreading of pandemics. The relevant stakeholders such as UNWTO (United Nations-World Tourism Organization), CLIA (Cruise Lines International Association), ICAO (International Civil Aviation Organization), and WTTC (World Travel and Tourism Association), IATA (International Air Transport Association), as well as aircraft manufacturers, could be involved in formulating a new strategy and tourism model involving less travel and responsible behavior acceptable to all stakeholders. Further, the positive aspects linked to COVID-19 could also be seen. During the less demand for air travel, airlines stopped to use the inefficient aircraft (Simple Flying, 2020). The use of video conferences, work from home, and distance learning are the practices of valuable benefits.

These positive changes may bring a broader level of changes with an orientation towards SDGs (Sustainable Development Goals). In light of this, the demand from travel businesses continues to cancel the carbon pricing. Moreover, historically low oil prices might lead to price-driven competition. Such changes also impact the behavior of consumer based on the influence of economic well-being, changes in costs, health risks, and capacities for consumption based on pandemic restrictions (Lee & Chen). However, the survey carried out by McKinsey & Company (2020) in China, Spain, Italy, the U.K. and the USA suggested that consumers are more optimistic during the start and end of the pandemic.

The purpose of this study was to provide an assessment and overview of the current crises related to the novel Coronavirus COVID-19. Based on the facts and figures, previous literature, and the currently going on the second wave of COVID-19, the tourism businesses should not return to normal until the reconsideration and transformation happen to be more compatible with SDGs. It lights of the discussed facts, it is needed to do modifications towards more resilient destinations. The impacts should be seen for the future to less travel, videoconferencing options, climate change and reconsider the SDGs rigorously. There is a need to learn collectively and reform tourism trajectory for the sustainability of tourism.

Acknowledgment

References

Air New Zealand. (2020). COVID-19 FAQs. Available at: from https://www.airnewzealand.co.nz/covid19-faqs [Online] Retrieved on: 16 July, 2020.

Airports Council International. (2020). The impact of COVID-19 on the airport business. Available at: https://aci.aero/wp-content/uploads/2020/03/200401-COVID19-Economic-Impact-Bulletin-FINAL-1.pdf [Online] Retrieved on: 17 May, 2020.

Anderson, R. M., Heesterbeek, H., Klinkenberg, D., & Hollingsworth, T. D. (2020). How will country-based mitigation measures influence the course of the COVID-19 epidemic?. *The Lancet*, *395*(10228), 931-934.

Bai, Y., Yao, L., Wei, T., Tian, F., Jin, D. Y., Chen, L., & Wang, M. (2020). Presumed asymptomatic carrier transmission of COVID-19. *Jama*, *323*(14), 1406-1407. https://doi.org/10.1001/jama.2020.2565

Baldwin, R., & Weder di Mauro, B. (2020). Introduction. In R. Baldwin & B. Weder di Mauro (Eds.), Economics in the time of COVID-19(pp. 1–30). CEPR Press.

Barlow, J., Lennox, G. D., Ferreira, J., Berenguer, E., Lees, A. C., Mac Nally, R., ... & Parry, L. (2016). Anthropogenic disturbance in tropical forests can double biodiversity loss from deforestation. *Nature*, *535*(7610), 144-147. https://doi.org/10.1038/nature18326

Bloom, D. E., & Cadarette, D. (2019). Infectious disease threats in the 21st Century: Strengthening the global response. Frontiers in Immunology, *10*, 549. https://doi.org/10.3389/fimmu.2019.00549

Bloomberg (2020). Emirates plans vacant seats between passengers to stop virus. Available at: https://www.bloomberg.com/news/articles/2020-04-21/emirates-plans-vacant-seats-between-passengers-to-stop-virus [Online]. Retrieved on: 25 September, 2020.

Burkle Jr, F. M. (2006). Globalization and disasters: issues of public health, state capacity and political action. *Journal of International Affairs*, *59*(6), 241-265.

Business Insider. (2020). U.K. airline Flybe declares bankruptcy as coronavirus dooms the already struggling carrier. Available at: https://www.businessinsider.com/uk-airline-flybe-declares-bankruptcy-flights-grounded-2020-3?r=DE&IR=T [Online]. Retrieved on: 21 September, 2020.

CNN. (2020). What will travel look like after coronavirus? Available at: https://edition.cnn.com/travel/article/coronavirus-travel-industry-changes/index.html [Online]. Retrieved on: 20 May, 2020.

Coker, R. J., Hunter, B. M., Rudge, J. W., Liverani, M., & Hanvoravongchai, P. (2011). Emerging infectious diseases in southeast Asia: regional challenges to control. *The Lancet*, *377*(9765), 599-609. https://doi.org/10.1016/S0140-6736(10)62004-1

Conde Nast Traveller. (2020). Before and after: How coronavirus has emptied tourist attractions around the world. August 31, 2020, fromAvailable at: https://www.cntravellerme.com/before-and-after-photos-tourist-attractions-during-coronavirus [Online]. Retrieved on: 20 May, 2020.

Destination Analysts (2020). Available at: https://www.destinationanalysts.com/insights-updates/ [Online]. Retrieved on: 20 May, 2020.

European Centre for Disease Prevention and Control (ECDC). (2020). COVID-19 Situation update worldwide. Available at: https://www.ecdc.europa.eu/en/geographical-distribution-2019-ncov-cases [Online]. Retrieved on: 4 November, 2020.

Fan, V. Y., Jamison, D. T., & Summers, L. H. (2018). Pandemic risk: how large are the expected losses?. *Bulletin of the World Health Organization*, *96*(2), 129. https://doi.org/10.2471/BLT.17.199588

Fauci, A. S., & Morens, D. M. (2012). The perpetual challenge of infectious diseases. *New England Journal of Medicine*, *366*(5), 454-461. https://doi.org/10.1056/NEJMra1108296

FlightRadar24 (2020). Charting the decline in air traffic caused by COVID-19. Available at: https://www.flightradar24.com/blog/charting-the-decline-in-air-traffic-caused-by-covid-19/ [Online]. Retrieved on: 20 May, 2020.

Forbes. (2020). What will travel be like after the coronavirus? Available at: https://www.forbes.com/sites/christopherelliott/2020/03/18/what-will-travel-be-like-after-the-coronavirus/#1faf01433329 [Online]. Retrieved on: 20 May, 2020.

Garrett, T. A. (2008). Pandemic economics: The 1918 influenza and its modern-day implications. *Federal Reserve Bank of St. Louis Review*, *90*(March/April 2008). https://doi.org/10.20955/r.90.74-94

Gössling, S. (2002). Global environmental consequences of tourism. *Global environmental change*, *12*(4), 283-302. https://doi.org/10.1016/S0959-3780(02)00044-4

Gössling, S., Scott, D., & Hall, C. M. (2020). Pandemics, tourism and global change: a rapid assessment of COVID-19. *Journal of Sustainable Tourism*, 1-20.

Greger, M. (2007). The human/animal interface: emergence and resurgence of zoonotic infectious diseases. *Critical reviews in microbiology*, *33*(4), 243-299. https://doi.org/10.1080/10408410701647594

Holtenius, J., & Gillman, A. (2014). The Spanish flu in Uppsala, clinical and epidemiological impact of the influenza pandemic 1918–1919 on a Swedish county. *Infection ecology & epidemiology*, *4*(1), 21528. https://doi.org/10.3402/iee.v4.21528

Hon, K. L. (2013). Severe respiratory syndromes: travel history matters. *Travel medicine and infectious disease*, *11*(5), 285-287. https://doi.org/10.1016/j.tmaid.2013.06.005

Hopkins, J. (2020). Coronavirus COVID-19 global cases by Johns Hopkins CSSE. Available at: https://www.arcgis.com/apps/opsdashboard/index.html [Online]. Retrieved on: 25 May, 2020.

Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., & Cheng, Z. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The lancet*, *395*(10223), 497-506.

Keogh-Brown, M. R., Smith, R. D., Edmunds, J. W., & Beutels, P. (2010). The macroeconomic impact of pandemic influenza: estimates from models of the United Kingdom, France, Belgium and The Netherlands. *The European Journal of Health Economics*, *11*(6), 543-554. https://doi.org/10.1007/s10198-009-0210-1

Khan, K., Arino, J., Hu, W., Raposo, P., Sears, J., Calderon, F., Heidebrecht, C., Macdonald, M., Liauw, J., Chan, A., & Gardam, M. (2009). Spread of a novel influenza A (H1N1) virus via global airline transportation. *New England journal of medicine*, *361*(2), 212-214. https://doi.org/10.1056/NEJMc0904559

Labonté, R., Mohindra, K., & Schrecker, T. (2011). The growing impact of globalization for health and public health practice. *Annual review of public health*, *32*, 263-283. https://doi.org/10.1146/annurev-publhealth-031210-101225

Lade, S. J., Steffen, W., De Vries, W., Carpenter, S. R., Donges, J. F., Gerten, D., Hoff, H., Newbold, T., Richardson, K., & Rockström, J. (2020). Human impacts on planetary boundaries amplified by Earth system interactions. *Nature Sustainability*, *3*(2), 119-128. https://doi.org/10.1038/s41893-019-0454-4

Lee, C. C., & Chen, C. J. (2011). The reaction of elderly Asian tourists to avian influenza and SARS. *Tourism Management*, *32*(6), 1421-1422. https://doi.org/10.1016/j.tourman.2010.12.009

McKibbin, W. J., & Fernando, R. (2020). The global macroeconomic impacts of COVID-19: Seven scenarios.

McKibbin, W. J., & Sidorenko, A. (2006). *Global macroeconomic consequences of pandemic influenza* (p. 79). Sydney, Australia: Lowy Institute for International Policy.

McKinsey and Company. (2020a). Global surveys of consumer sentiment during the coronavirus crisis. Available at: https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/global-surveys-of-consumer-sentiment-during-the-coronavirus-crisis [Online]. Retrieved on: 14 August, 2020.

NHO Reiseliv. (2020). Korona-Analyse for reiselivet. Available on:, https://www.nhoreiseliv.no/tall-og-fakta/reiselivets-status-korona/ [Online]. Retrieved on: 01 April, 2020.

Nicolaides, C., Avraam, D., Cueto-Felgueroso, L., González, M. C., & Juanes, R. (2020). Hand-hygiene mitigation strategies against global disease spreading through the air transportation network. *Risk Analysis*, *40*(4), 723-740. https://doi.org/10.1111/risa.13438

Page, S., & Yeoman, I. (2007). How VisitScotland prepared for a flu pandemic. *Journal of Business Continuity & Emergency Planning*, *1*(2), 167-182.

Petersen, E., Wilson, M. E., Touch, S., McCloskey, B., Mwaba, P., Bates, M., Dar, O., Mattes, F., Kidd, M., Ippolito, G., Azhar, E. I., & Zumla, A. (2016). Rapid spread of Zika virus in the Americas–implications for public health preparedness for mass gatherings at the 2016 Brazil Olympic Games. *International Journal of Infectious Diseases*, *44*, 11–15. https://doi.org/10.1016/j.ijid.2016.02.001

Pongsiri, M. J., Roman, J., Ezenwa, V. O., Goldberg, T. L., Koren, H. S., Newbold, S. C., Ostfeld, R. S., Pattanayak, S. K., & Salkeld, D. J. (2009). Biodiversity loss affects global disease ecology. *Bioscience*, *59*(11), 945-954. https://doi.org/10.1525/bio.2009.59.11.6

Prager, F., Wei, D., & Rose, A. (2017). Total economic consequences of an influenza outbreak in the United States. *Risk Analysis*, *37*(1), 4-19. https://doi.org/10.1111/risa.12625

Qatar Airways (2020). Available at: https://www.qatarairways.com/en/press-releases/2020/may/qatar-airways-to-introduce-temporary-additional-safety-measures-.html [Online]. Retrieved on: 24 September, 2020.

QSR Magazine (2020). Available at: https://www.qsrmagazine.com/fast-food/restaurant-industry-has-already-lost-120-billion [Online]. Retrieved on: 24 September, 2020.

Reuters. (2020). U.S. Senate approves big rescue for struggling aviation sector. Available at: https://www.reuters.com/article/us-health-coronavirus-usa-bill/u-s-senate-approves-big-rescue-for-struggling-aviation-sector-idUSKBN21C24T [Online]. Retrieved on: 24 September, 2020.

Rothe, C., Schunk, M., Sothmann, P., Bretzel, G., Froeschl, G., Wallrauch, C., Zimmer, T., Thiel, V., Janke, C., Guggemos, W., Seilmaier, M., Drosten, C., Vollmar, P., Zwirglmaier, K., Zange, S. Wolfel, R., & Hoelscher, M. (2020). Transmission of 2019-nCoV infection from an asymptomatic contact in Germany. *New England Journal of Medicine*, *382*(10), 970-971. https://doi.org/10.1056/NEJMc2001468

Schmidt, C.W. (2016). Zika in the United States: How are we preparing? *Environmental Health Perspectives*,*124*(9),A157–A165. https://doi.org/10.1289/ehp.124-A157

Scott, D., & Gössling, S. (2015). What could the next 40 years hold for global tourism?. *Tourism Recreation Research*, *40*(3), 269-285. https://doi.org/10.1080/02508281.2015.1075739

Simple Flying. (2020). United could follow American with early 757 & 767 retirement. Available at: https://simpleflying.com/united-757-767-early-retirement/ [Online]. Retrieved on: 07 April, 2020.

Technomic (2020). Available at: https://www.seafoodsource.com/news/premium/foodservice-retail/global-restaurant-losses-due-to-covid-19-mount [Online]. Retrieved on: 07 September, 2020.

UNWTO (2020). Impact of COVID-19 on global tourism made clear as UNWTO counts the cost of standstill. Available at: https://www.unwto.org/news/impact-of-covid-19-on-global-tourism-made-clear-as-unwto-counts-the-cost-of-standstill#:~:text=The%20enormous%20toll%20of%20COVID,the%202009%20Global%20Ec nomic%20Crisis.&text=The%20Barometer%20also%20shows%20a,arrivals%20between%20January%20and%20May. [Online]. Retrieved on: 07 September, 2020.

World Economic Forum (2020). COVID-19 could set the global tourism industry back 20 years. Available at: https://www.weforum.org/agenda/2020/09/pandemic-covid19-tourism-sector-tourism/ [Online]. Retrieved on: 25 September, 2020.

World Economic Forum (2020). Available at: https://www.weforum.org/agenda/2020/08/pandemic-fight-costs-500x-more-than-preventing-one-futurity/ [Online]. Retrieved on: 25 September, 2020.

World Travel and Tourism Council (2019). Economic Impact Report, 2019. Available at: https://wttc.org/Research/Economic-Impact Retrieved on: 25 September, 2020.

Wu, T., Perrings, C., Kinzig, A., Collins, J. P., Minteer, B. A., & Daszak, P. (2017). Economic growth, urbanization, globalization, and the risks of emerging infectious diseases in China: a review. *Ambio*, *46*(1), 18-29. https://doi.org/10.1007/s13280-016-0809-2

The Updated View of Business Cycles Causes and Impacts

Circular economics, Industry 4.0 and population aging

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Abstract: At the time of the beginning of the era of Industry 4.0 accompanied by the aging of the population, it is necessary to create a strategy of sustainable development in the context of social and environmental goals. Various forms of integration of these goals can be found in the world, also, for example, in the context of the Millennium Development Goals announced by the UN. The circular economy makes a significant contribution to their fulfillment, especially with regard to environmental sustainability. In connection with the prognostic outlook for the aging of the population, it represents a potential, for example, for the employment of people with disabilities. The interest in connecting the circular and social economies lies in the effort to ensure the employment of people, especially before retirement age, people with difficulties in adapting to innovations in digital technologies, robotics and artificial intelligence. In fulfilling these objectives, it is appropriate to apply the principle of subsidiarity, which means assigning a decision-making position to the regions.

Key words: circular economy, population aging, depreciation of human capital
JEL Classification: A12, B41, E00, H11

1 Introduction

There are various forms in the world that connect economic activities with social and environmental goals. In essence, they respond in an innovative way to the needs of the public good and represent a source of stable economic growth. Therefore, an extremely current trend in waste management is the introduction and promotion of the so-called "circular economy", the aim of which is the maximum return of secondary raw materials and energy back to the production and consumption cycle and the conversion of waste into "resources". It is a concept of increasing the efficiency of production, which respects the protection of the environment and the quality of human life. The introduction of the principles of circular economics cannot be at the expense of the quality of the final products and thus the profitability of the company. Therefore, in addition to the circular economy, the social economy is growing in importance. It is characterized by various forms of social entrepreneurship and, in essence, represents a modern concept in addressing some of the social and economic issues facing the countries of the developed world at the beginning of the 21st century.

Also with the advent of Industry 4.0 technologies on the one hand and the accompanying demographic aging of the population on the other, an acceleration of the importance of the circular and social economy can be expected. In particular, it will be more difficult for some social groups to access the labor market, who will not be able to adapt to these technologies due to innovation (digitization, robotics, automation pro) due to their specific disabilities (low qualifications, disabilities…). In this context, there are challenges for both the circular and social economy. The circular economy will focus on the ecological transformation of fully physically and morally amortized technological equipment into future "resources" - production factors. This can clearly contribute to a significant reduction in the possible adverse social and environmental impacts that accompany structural changes in the economy as a result of the introduction of new technologies. Therefore, there is a growing focus on the integration of the circular economy in the field of employment of disadvantaged groups in the labor market and countries where the mechanisms of functioning of economies have not yet been adopted by legislation or otherwise, begin to create conditions for their functioning within macroeconomic and

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microeconomic economic policy. The same is true in the Czech Republic, where social entrepreneurship (as a social economy) and the circular economy have enjoyed unprecedented interest in the last few years.

2 Data and methodology

During the 20th century, the issue of aging took on a whole new dimension, as it began to transcend from the individual level to the society-wide level, ie to the demographic level (Duernecker & Vega-Redondo, 2018). On the example of the Czech Republic, demographic aging is monitored within the article by measuring the shares of age groups in the total population, on the basis of indices, ie comparative numbers (age index, load indices of the productive component) and the average age or median age. The share of the three main age groups in the population is most often monitored, which are defined according to the expected economic activity of the majority of persons of a given age. It is therefore a pre-productive component of the population, which is usually stereotypically defined by the ages 0-14 (resp. 0-19 years). The productive component of the population consists of persons aged 15-64 (resp. 20-64 years) and the age group of post-productive persons aged 65 and over (age group 65+). Based on the age categories divided in this way, the aging process of the population is interpreted by means of indicators in the form of average age and age index (number of persons aged 65 + per 100 children aged 0-14) of addiction index I. (number of children aged 0-14) per 100 persons aged 15-64), addiction index II. (number of persons aged 65 and over per 100 persons aged 15-64), and the economic burden index (number of children aged 0-19 and number of persons aged 65+ per 100 persons aged 20-59). The most commonly used characteristic in an international comparison is the proportion of people aged 65 and over in a given population.

Environmental aspects can also be monitored by a number of indicators, among which, for example, the number and structure of business entities operating in the waste management sector can be used. The economic, environmental and social context can also be seen in the creation of added value in this sector and not in the increase in power consumption itself.

With regard to the specifics of the orientation of research on the issue of sustainable development, which monitors the importance of the interconnectedness of the circular economy in the context of population aging, requires processing preferences for analysis, comparison, synthesis, observation and generalization on the one hand and interdisciplinary approach of social and human sciences on issues (economics, demography, sociology, theory of economic and social policy, gerontology) on the other hand.

3 Research results

3.1 Dimensions of human values as a basic philosophy to the issue

Human existence has been brave and risky in all epochs to date. From the very beginning of civilization, all the risks of human existence were first entwined in the biological dispositions of man and later in his socialization, as evidenced by human ethology and the results of anthropogenetic, sociogenetic and psychogenetic research on the processes of civilization and culture. In connection with the ecological question, the problem arises of the possibility of the failure of the emancipation of man and society towards nature, which announces its ubiquity. This is determined by the size of human demands and is primarily determined by the scale of values, or what people consider to be their legitimate needs, to which they are determined to devote their interest, money, efforts. The scale of values is determined by the social, cultural and civilizational climate. In connection with sustainability, we talk about post-material values (Inglehart, 1990), which include the appreciation of the importance of a healthy environment and the value of nature, including its intrinsic value. Post-material values are probably applied only after the "material" needs are met, which include not only food, housing and the like, but also a sense of security and other "less material" needs. No upbringing, education, enlightenment, persuasion, or good examples will make a true and effective protector of nature or the environment a hungry peasant or a person living in relative poverty or insecurity in the midst of a rich society. Sustainability certainly cannot be achieved without people recognizing the crucial importance of conserving natural resources and life-giving planetary systems without accepting biodiversity as their value. Among the important values that they recognize and truly follow, they must include the quality of the environment in which they live, other (even distant) people and other living organisms. Today's Earth is primarily the human world. It is becoming increasingly important that humans are part of nature (although, of course, we do not cease to be biological organisms like other species of plants and animals), nature is becoming part of the human world.

Industrial society has produced both wealth and risk, and is therefore the bearer of the adjective "risky." According to U. Beck, this society represents a new phase of industrialism, where the dimension of consequences and danger conflicts with institutionalized criteria and calculation experience, from evaluation they conflict with risk measures, because nuclear, ecological, genetic and chemical hazards are no longer neither temporally nor locally nor socially demarcable

(Beck, 2011). As a result, institutions fall into a bizarre conflict; on the one hand, they guarantee security (and in the case of disasters, near-catastrophes, etc., they must always make new promises), on the other hand, they legalize practices that, secretly or openly catastrophic, re-establish and consolidate a carefree situation. In a high-risk society, risks and dangers are externalized, individualized, downplayed and morally pacified. They are set aside outside authorities and institutions at the expense of individuals, nature itself and future generations. This process leads to contradiction and conflict of institutions. Institutionalized worldview, modernization, and the advancement of technology lead to a breakup of the world of institutions with the natural world of people, with the "society of individuals."

3.2 Innovation of the applied circular economy to the interest groups of the population as a tool for reducing the risks of ecological and social risks

Ecology is a religion without a deity in the context of humanistic interpretation. By analogy, humanism must necessarily be environmentally friendly, trying to find a future for the planet where people will not cut a branch beneath them. However, today, perhaps more than ever, it is necessary to move away from the threat of environmental risks, because people who are willing to listen and act accordingly have long done so, but to present a more viable positive project for the future (Beck, 2011). The concept of eco-innovation seems to be the opposite of the concept of a high-risk company, but it follows thematically and logically and in many ways clarifies the extensive discussion initiated around a high-risk company. In particular, some more radical conclusions drawn from the diagnosis of a high-risk company, in particular the thesis that modernization processes are the cause of the ecological crisis, are relativized and rejected.

Table 1 Waste management in the Czech Republic, 2018 (in tons)

Waste management	
Of which: **Total Utilization**	19 691 221
Of which: **Use as a fuel or other means to generate energy**	1 137 694
Backfilling	6 367 737
waste recovery (except energy recovery)	12 185 790
Of which: **Recycling**	10 133 987
Composting	542 091
total removal	4 676 857
Of which**: Landfilling**	4 581 536
combustion on land	94 136

Source: Czech Statistical Office 2018

From the economic-environmental point of view, between 2008 and 2017, there was an increase in value added in the waste management sector (specifically in Waste collection, treatment and disposal activities; materials recovery) by almost one tenth.

Ecological modernization has been used in recent years as a continuation of the developmental and structural process of change in modern society. It cannot be overlooked that both productive and destructive forces have increased in the process of modernization, just as it cannot be overlooked that, along with the problems, the possibilities for solving them have also increased. As far as waste and waste management are concerned, the current situation in the Czech Republic is shown in Table 1. The dynamics of modern society lie not only in the permanent emergence of problems, conflicts and crises, but also in their permanent overcoming and solution. At the same time, this society is able to make corrections on its own, has the ability to own a large capacity for readaptation to the changes it causes, and this growing capacity is part of the modernization process (Prittwitz, 1990 & Huber, 1993).

In the spirit of the above philosophy, the concepts of circular economics have been developing since the 1980s. In essence, it is an economy built from social systems of production - consumption maximizing the produced service from the linear flow of material and energy permeability between nature, society and (again) nature. A successful circular economy contributes to all major aspects of sustainable development (ecological, economic and social).

3.3 Economic, social, historical aspects of the aging of the Czech population

The aging of the population intensified already in the interwar period, when the large increase in the birth rate was stopped by the economic crisis in the 1930s (Pavelka, 2017). During the Second World War, the birth rate increased due to the German population living in the border and population policy in 1940. In the 1950s, bottom-up aging took place, involving

not only the number of people of reproductive age, but also other factors. , in particular the reduction of infant and child mortality. At the beginning of the 1960s, there was a smaller increase in the birth rate due to promises to extend maternity leave and the fact that the years of World War II entered the reproductive age. The increase in population was mainly due to the fact that strong vintages from the 1950s found themselves at a fertile age. It is therefore not surprising that people born in 1973–1976 are the largest group in the current population of the Czech Republic. After the events of 1989, accompanied by the transformation of the economy, there were many other opportunities for self-realization. This brought a great change not only in the political and economic spheres, but also in the birth rate. Fewer children began to be born and there was a second demographic transition, which was accompanied by individualism, emancipation of women, etc. The facts of demographic indicators of the population development of Czechoslovak and Czech society (interest years) from the 70s - 90s of the last century are illustrated in the table below:

Table 2 Comparison of important demographic indicators of the 70s - 90s of the 20th century

Demographic indicator	1974	1990	1999
The value of the total fertility of a child per woman	2.43	1.89	1.13
Number of live births	194 215	130 564	89 471
Gross birth rate (%)	19.4	12.6	8.7

Source: Czech Statistical Office 2017 and own processing

The current situation and the expected development of the aging of the Czech population

At the beginning of 2018, the Czech Republic had almost 6.9 million inhabitants aged 15 to 64, which was half a million less than in 2009. At that time, their number was the highest since the end of World War II. According to documents from the Czech Statistical Office, a further reduction in the population at this age can be expected. According to the results of its demographic projection, the largest numerical reduction in the population of the Czech Republic aged 15 to 64 should occur between 2035 and 2045, by 4.5% (Novotná & Volek, 2014). In 2055, 53.7% of the population of the Czech Republic should belong to this age category. The focus of the population in the economically active age, which represents strong years born in the 1970s, will gradually shift to a higher age due to the aging of individual generations and thus naturally change the age structure of the population. From 2022, the focus of the population will be the age group 45-49, from 2027 the age group 50-54, etc. In 2037, the position of the numerically strongest age group should be 60-64 years, ie people of pre-retirement age, and by the middle of the century this maintain position (Novotná & Volek, 2014).

From the above facts, it is almost certain that a fundamental problem will occur after 2035. During this period, the strong years of the aforementioned 1970s will begin to retire. If we want to deal with the effects of the expected demographic development on the economy of the Czech Republic, it is necessary to take into account the longer-term dynamics of the age structure of the population, including their relevant predictions (Abraham & Laczo, 2018). These facts are evident from the following Table 3, 4 with demonstrated milestones from 2000 to 2065 at five-year and ten-year (Table 3 with 4) time intervals.

Table 3 Development of the composition of the population of the Czech Republic by age groups in the years 2000 - 2065 (selected years in%)

Age	2000	2010	2015	2020	2025	2035	2045	2055	2065
0 – 14	16.4	14.2	15.1	15.6	14.9	13.0	13.3	13.9	13.2
15 – 64	59.8	70.6	67.2	64.3	63.4	62.5	57.1	53.7	54.6
65 +	13.8	15.2	17.7	20.1	21.7	24.5	29.6	32.4	32.2

Source: Czech Statistical Office 2018 and own processing

Tabulka 4 Charakteristiky věkové skladby a indexy zatížení produktivní složky obyvatelstva ČR mezi lety 2000-2065, vybrané roky (v %)

Demographic indicator	2000	2010	2015	2020	2025	2035	2045	2055	2065
Average age	38.8	40.6	41.6	42.7	43.9	46.3	47.5	48.3	49.0
Age index	83.1	107.0	117.1	128.7	145.6	187.8	222.5	232.7	2436
Dependency index I.	23.9	20.2	22.5	24.2	23.5	20.8	23.4	25.9	24.2
Dependency index II..	19.8	21.6	26.3	31.2	34.2	39.1	52.0	60.2	58.9
Economic burden index	59.3	54.6	59.0	66.9	72.0	74.0	89.7	103.3	100.8

Source: Czech Statistical Office 2018 and own processing

3.4 Fiscal impacts of population aging

The expected decline in the working age population (by about 40% by the end of 2100) will be clearly reflected in the state budget tax revenues (Abraham & Laczo, 2018). Primarily, these will be declining contributions from lower taxpayers of the productive group, whose income will be subject to taxation. Secondly, lower corporate income tax payments cannot be ruled out, where labor shortages are very likely (Dugast & Foucault, 2018) to be reflected in lower prosperity and corporate profits, and subsequently in indirect taxes (value added tax, excise duty). .). On the other hand, higher demands can be expected for non-insurance social benefits for the post-productive population group - seniors (state social support and assistance benefits - mobility allowance, housing allowance, care allowance), as the proportion of post-productive population will increase significantly (Šetek, 2015, Ogg , J., & Rašticová, M., 2020), as well as in the social insurance system, a significant decrease in funds in the health insurance system can be expected and thus also the risk of deficits (Šetek & Petrách 2016).

3.5 Human capital in the context of population aging and Technology 4.0

It is generally believed that there is an exchange between aging and productivity. The productivity of a worker first increases with age, only to gradually decrease from a certain age limit (usually sometimes between 45 and 55 years of age). However, some claims state that the relationship between age and productivity is complex and ambiguous. Many empirical studies suggest that the performance of older employees may not necessarily be better or worse than that of younger employees. It is probably influenced by other factors, such as motivation, experience, work intensity or self-confidence (Muffels, 1997). Other research suggests that productivity increases up to a certain age, which is primarily dependent on the extent and quality of investment in human capital (Muffels, 1997). This approach does not deny that there is a negative correlation between age and performance. He says that this relationship is not as close as is generally assumed and can be influenced to some extent. As a result, companies that devote more time and effort to developing their (not only) older employees push the age limit of their declining performance to older age through longer "mental youth" and thus achieve higher productivity compared to a situation where did not do. However, a supportive human resources policy cannot be expected from all employers in the economy, and therefore the negative effects of labor aging on productivity cannot be underestimated or expected in any way (Lössbroek et al., 2019, Axelrad, H., 2020; Durand et al., 2020, Blomé et al., 2020).

In essence, human capital, understood as a different equipment of human resources (according to biological and psychological typology of personality, health status, education, qualifications), is able to bring income from employment through wages and salaries in productive age, or through transfers in post-productive - senior age. (Biskup & Voříšek, 2005). The size of the gap between the area of investment in human capital and the differences in its distribution is measured by the human capital index, which consists of a total of 46 indicators. Half of them are the result for the breakdown of indicators by age groups into primary, secondary and tertiary education. Within the indicators for the labor market, these are the participation rate in the labor force, as well as the unemployment rate and the underemployment rate.

As with material capital, we can also talk about the depreciation of human capital, that is, the loss of the value of human creative ability (Loužek, 2014). Forms of this depreciation are also physical and moral. Imaginary, the depreciation of human capital is expressed by the rate of depreciation, which results in a certain right to a certain degree (aspect of time of employment in a certain field, permanent loss of working abilities). Physical ones are accompanied mainly by natural (aging ...) and pathological (illness, disability…) social events. While moral, they are a manifestation of the inability of some social groups (especially low-skilled professions) to adapt to innovation tendencies resulting from scientific and technological development. This will also be one of the social and economic problems of Society 4.0, where the

application of technologies of Industry 4.0 (digitization, robotics, automation) can be seen as fundamental changes in all sectors of the economy and also in all areas of life.

3.6 Applied integration of the circular social economy to the social interest groups of the population

The consequence of the innovations of Industry 4.0 is the obvious disappearance of many existing professions and job positions, at the same time completely new job opportunities will be created and a mass renewal of technological equipment will take place. It is obvious that not all individuals will find employment as a result of these changes. People who will not be able to adapt to these technological changes will be particularly at risk (vulnerable). Here, a group of people with "special vulnerabilities" in the labor market will emerge, such as people with lower qualifications, before retirement (60+), with disabilities.

For the above reasons, it is necessary to create a concept of economic and social policy to reduce the aforementioned adverse effects, where the main priority is to employ the above-mentioned particularly vulnerable people in the labor market. In addition, the employment of senior pensioners can contribute to reducing the burden on public resources. In this way, enormous expenditures on social benefits can be avoided and at the same time adequate revenues from public resources (tax and insurance premiums) can be ensured. The applied circular economy in combination with the social economy can clearly contribute to the fulfillment of these macroeconomic goals to the social interest groups of the population. It is in this mix of economies that some basic processes and activities within the circular economy would be ensured (eg dismantling and recycling of discarded technological equipment as a result of accelerated depreciation), when work does not require higher qualification skills and work commitment. The interconnectedness of the circular and social economy is thus an important factor in respecting the principles of sustainable development and social responsibility.

In the world, one can encounter various forms of integration of social and environmental goals within a given microeconomic entity on the example of a municipality, city and region. In the context of the microeconomic belonging of the circular and social economy of territorial units, an innovative response to its ecological and social needs can be ensured.

4 Conclusion

The labor market will be confronted with an aging workforce and new practices in the production of products and the provision of services, reflecting oncoming demographic trends and technological changes. Due to their specifics, the older workforce is a vulnerable group in the labor market, and long-term unemployment in the pre-pension age is often addressed by early retirement. It is known that the aging of the workforce results in declining productivity, flexibility and creativity. The result can be lower economic performance, structural unemployment and a slower rate of innovation. However, the relationship between aging and productivity, flexibility and creativity can be influenced. These consequences, which manifest themselves in old age, can be prevented in particular by lifelong learning and investment in human capital, which is also assumed by Industry 4.0. However, it is quite certain that not all individuals, especially those with lower qualifications, will be able to adapt to this trend. In this context, the circular economy is a space for the employment of these people of interest, because the tools of the circular economy are in integration with the social economy. Despite all the economic, reorganization and financial problems, the focal point is man. He manages the whole process, he is aware of it and the end result is for himself. Thanks to the quality of his life, economic synergy as part of national wealth also derives from the synergistic effect. This is also evidenced by the theory of endogenous growth according to R. R. Lucas and P. Romero (Wawrosz & Valenčik 2014).

References

Abraham, A. & Laczo, S. (2018). Efficient Risk Sharing with Limited Commitment and Storage. *Review of Economic Studies.* Volume: 85. Issue: 3. pp. 1389-1424.

Axelrad, H. (2020). Perception versus Official Data: Employers' Knowledge about the Aging Workforce. *Journal of Aging & Social Policy*, 1-23.

Beck, U. (2011). *Riziková společnost*, Praha, Slon.

Biskup, J., & Voříšek, V. (2005). *Pension insurance.* 1st edition. Praha: Eurolex, Bohemia.

Blomé, M. W., Borell, J., Håkansson, C., & Nilsson, K. (2020). Attitudes toward elderly workers and perceptions of integrated age management practices. *International Journal of Occupational Safety and Ergonomics*, 26(1), 112-120.

Duernecker, G. & Vega-Redondo, F. (2018). Social Networks and the Process of Globalization. *Review of Economic Studies*. Volume: 85. Issue: 3. pp. 1716-1751.

Durand, M. J., Coutu, M. F., Tremblay, D., Sylvain, C., Gouin, M. M., Bilodeau, K., ... & Coté, D. (2020). Insights into the Sustainable Return to Work of Aging Workers with a Work Disability: An Interpretative Description Study. *Journal of occupational rehabilitation*.

Huber, J. (1993). „Ökologische Modernisierung." *Kölner Zeitschrift für Soziologie und Sozialpsychologie* Nr. 2: 288-304.

Inglehart, R. (1990). *Culture Shift in Advanced Industrial Society.* Princeton, NJ: Princeton University Press.

Loužek, M. (2014). *Pension reform.* Praha: Karolinum

Lössbroek, J., Lancee, B., Van der Lippe, T., & Schippers, J. (2019). Understanding old-age adaptation policies in Europe: The influence of profit, principles and pressures. *Ageing and Society*, *39*(5), 924-950.

Muffels, R. J. A. (1997): Stárnutí a flexibilizace. Hrozba nebo výzva pro sociální stát? In: Rabušic, L.: Česká společnost a senioři. Sociální, ekonomické a politické aspekty demografického stárnutí české společnosti.1. vyd., Brno, Masarykova univerzita.

Novotná, M., & Volek, T. (2014). *Labour as a factor of production in the context of gross value added growth in sector A. Scientia Agriculturae Bohenica (SAB).* Czech University of Life Sciences Prague. (2), 129-135.

Ogg, J., & Rašticová, M. (2020). Introduction: Key Issues and Policies for Extending Working Life. In *Extended Working Life Policies* (pp. 3-27). Springer, Cham.

Pavelka, T. (2017), Long-term unemployment in the Czech Republic and the effect of distraints. *11th International Days of Statistics and Economics.* Praha. Czech republic. pp. 1153-1162.

Prittwitz, V. (1990). *Das Katastrophenparadox.* Opladen: Leske u. Budrich.

Šetek, J. (2015). New Features in Respect of the Economy and Security in the early 21st Century. *The International Scientific Conference INPROFORUM.* České Budějovice. Czech republic. pp. 14–19.

Šetek, J. & Petrách F. (2016) Human capital in the context of the economic dimension of crime in the transformation of the economy. *10th International Days of Statistics and Economics.* Praha. Czech republic. pp. 1777-1786.

Wawrosz, P.; & Valenčik, R. (2014). *How to Describe Affinities in Redistribution Systems.* 18th International Conference CURRENT Trends in Public Sector Research. 212 – 220.

Czech Statistical Office. Population statistics 2017, 2018.

Czech Statistical Office. Waste management 2018.

The influence of the economic cycle on forming business subjects

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Abstract: This paper deals with an influence of the economic cycle on forming business subjects in the Czech Republic in comparison with the Visegrad Group regarding newly established subjects. The number of the newly established subjects may be, in some countries, influenced by the crisis year of 2009 (when there were more businesses established than in the period of the stable economic growth), primarily in the Czech Republic Slovakia, and Poland. Regarding the Czech Republic, the number of established and non-functional entities were analysed in detail. The conducted correlation analysis revealed a rather weak negative linear dependence of the real GDP to the ratio of the birth and death of businesses. This paper presents significant differences concerning the net increase of the number of entrepreneurs (natural persons) to companies (corporate bodies). The economic growth or decline has an expected impact on natural persons. Regarding the industry sectors in the Czech Republic, we may conclude that the bound between the economic growth or decline and the percentage of self-employed persons is the most significant in the Wholesale and Retail Sector – sector G (a higher increase in the period of recession) and in sector C - Manufacturing (a higher increase in the period of the stable growth).

1 Introduction

Formation and cessation of business entities is influenced by external economic influences, i.e. especially by the real business cycle. The factors influencing the number of formed and defunct economic entities in times of an economic growth are different from those that are at work in cooling economy and subsequent recession. An economic cycle correlates positively with the entrepreneurial process. During an economic downturn, the propensity to start new companies declines. Government authorities should design policies to counterbalance this trend, since entrepreneurship creates new and, at times, durable jobs (González-Pernía et al., 2018).

The main objective of this paper is to point out the context of real business cycle with birth or death of business entities including from the point of view of economic sectors. First, we determined the standing of the Czech Republic regarding the rate of net business population growth relative to states of Visegrad Group and Germany. The second part is devoted to detailed monitoring of the process of formation and cessation of economic entities (natural or corporate bodies) in the Czech Republic in connection with the real economic cycle. The third part is focused on the development in self-employment in the Czech Republic from the point of view of economic sectors in the time period of 12 years. The last part summarises the obtained outcomes.

This paper comes out from the assumption that the cyclic changes of the macroeconomic factors (economic cycle, unemployment) may influence the number of newly established companies (Koellinger & Roy Thurik, 2012; Parker, 2009). Based on the relevant literature, we may assume two versions of influence, a procyclical or anticyclical, which means that also the final effect on creating of companies is ambiguous (Bernanke & Gertler, 1989; Francois & Lloyd-Ellis, 2003; Hopenhayn, 1992; Konon et al., 2018). In the period, when GDP increases, companies invest and they have optimistic assumptions about demand and the total future. In accordance with this explanation, fewer individuals may hesitate to start running a business during recessions, when the future expectations of the future development are uncertain and investment are perceived as more risky (Fritsch & Kritikos, 2016; Rampini, 2004). Similarly, Barlevy (2007) thinks that entrepreneurs may invest significantly during a positive economic development which causes an acceleration, other business opportunities and consequently another growth of GDP.

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The previous pieces of research deal mainly with absolute numbers of established and defunct business subjects, other aspects such as the innovative potential or the ability of long-term completion are not often taken into account (Koellinger & Roy Thurik, 2012). This is proved also by another piece of research which also claims that not only the quantity of newly established companies matters but also on their quality (innovative potential, long-term survival on the market, creation of new work positions). This is fulfilled mainly by new technological companies, as they implement new innovations, support transfer of technologies, accelerate development in their economic sector which causes a growth of GDP (Ejermo & Xiao, 2014; Fritsch & Mueller, 2004; Storey & Tether, 1998).

Some works present research investigating mutual dependence of the real economic cycle and the number of new companies. This dependence may differ in particular business areas (Audretsch, 1995). The reason may be, for example, the given area is too small, capital demands, demand development, availability and costs of sources (Parker, 2018). Another significant difference aspect is the size and the age of the given company (Dunne & Hughes, 1994; Evans, 1987; Fort et al., 2013; Hall, 1986), which is also confirmed by Evans (1987), Hall (1986), Dunne (1994) and Ejermo et al. (2014). Konon et al. (2018) analyse whether start-up rates in different industries systematically change with business cycle variables and suggest that high GDP growth might not be germane for start-ups. Business formation (innovative and non-innovative) may have a stabilizing effect on the economy. Other authors found out that influential are also the quality of labour, technologies, science and research in the given sector (Ejermo & Xiao, 2014). Some authors focus more on individual features of the founders (Colombo et al., 2004; Colombo & Grilli, 2005).

A recent study by Santos et al. (2017) discussing the impact of economic crisis on business activity in Europe shows that before the crisis (i.e. in 2008), lower-income Southern European countries (i.e. Spain, Portugal and Greece) had higher level of entrepreneurial activity than their northern counterparts (i.e. Sweden, Norway and Finland). However, after 2008, this trend reversed. The northern regions were more willing to start businesses during recession that Southern Europe. Vegetti and Adăscăliței (2017) explain this phenomenon by arguing that decrease in entrepreneurial activity was more marked in those European countries that had less access to financing (i.e. particularly Southern EU countries). Therefore, the recession did not have a significant negative impact on business decisions in those EU regions where prospective entrepreneurs could rely on better lending conditions and higher consumer demand (i.e. in higher-income regions like northern countries).

2 Methods

The main objective of this paper is to point out the context of real business cycle with birth or death of business entities including from the point of view of economic sectors. First, we determined the standing of The Czech Republic regarding the rate of net business population growth relative to states of Visegrad Group and Germany. Indicator Net business population growth is growth rate between t and t-1 of the population of active enterprises. Active enterprises are enterprises that have employment and/or turnover in the period from 1st January to 31st December in a given year (*Eurostat-OECD Manual on Business Demography Statistics - OECD*, 2007).

Using the indicator Gross Domestic Product - GDP (year-on-year volume indices), which eliminates the influence of the price development, the authors observed the real economic cycle of the Czech Republic. At the same time, the process of formation and cessation of economic entities (natural persons or corporate bodies) within the years of 2007 – 2018 was analysed in detail. We have created an indicator Share of births and deaths of business. The data were obtained from the public database of the Czech Statistical Office. We used the correlation matrix of these economic indicators at the significance level of 0.05, which allows to determine the tightness and direction of dependence of the investigated factors (Montgomery & Runger, 2011).

$$k = \begin{pmatrix} r_{ii} & r_{ij} \\ r_{ji} & r_{jj} \end{pmatrix}$$

Where *k* is the correlation matrix in which the rows and columns represents gradually variables from the first to the *n*-th one (GDP - year-on-year volume indices, Share of births and deaths of business). The intersection of the *i*-th row and the *j*-th column represent the correlation coefficient r_{ij} of the *i*-th and *j*-th variable. The correlation matrix is a square matrix where its diagonal consists only of ones, as $r_{ii} = 1$.

The third part is focused on the development in self-employment in the Czech Republic from the point of view of economic sectors in the time period of 12 years (2007-2018) in relation to the real business cycle. We studied the year-on-year self-employment growth rate and also the structure of self-employment classified by the most represented sectors. The data were obtained from the public database of the Czech Statistical Office.

3 Research Results

3.1 Position of the Czech Republic within the Visegrad Group

First, the authors investigated if there is a comparable development of enterprises in the Czech Republic as in the surrounding states, more precisely in the states of the Visegrad Group and in Germany which had been chosen due to the close connection of both economies. Even though the period of worldwide economic crisis in 2009 affected all of the observed states, it is possible to observed a different development regarding the net business population growth (see Table 1).

Table 1 Net business population growth - percentage

GEO/TIME	2009	2010	2011	2012	2013	2014	2015	2016	2017
Czech Republic	11.10	3.86	2.08	-0.24	-1.92	5.52	0.42	1.12	-0.12
Germany	-1.18	0.73	0.91	0.41	-0.85	-5.17	-0.81	0.18	0.03
Hungary	-2.78	0.71	-0.97	-5.94	-1.68	1.19	1.74	0.83	3.82
Poland	4.11	2.45	1.36	0.31	1.27	0.50	1.71	-2.16	3.38
Slovakia	4.90	3.08	12.78	-4.16	-1.35	9.82	1.92	1.73	5.99

Source: (*Eurostat - Data Explorer*, 2020)

In the Czech Republic, there is the highest increase of new business entities (11.1 %), the situation is similar in Poland and Slovakia, while there is a decrease of these entities in Germany and Hungary. The reason may be a different sectors of the economic structure, when some sectors may be affected more by the recession and the consequent higher unemployment could cause an establishment of more business entities. The further decline of the real GDP in 2012 means a slight decline of the net business population growth in the Czech Republic which is similar to the situation in Hungary and Slovakia. The growth of the real of GDP since 2014, has been bringing also a growth of the net business population in all countries of the Visegrad Group but not in Germany.

3.2 Real Business Cycle and Process of Formation of Economic Entities

Figure 1 illustrates the course of the real business cycle in the Czech Republic. It is obvious that there was the greatest downturn of GDP (-4.7%), another decline can be identified in years 2012-2013. Since 2014, there has been an increase of the real GDP, which was slowing down in the last observed years (2018 -2019).

Figure 1: GDP in the Czech Republic (year-on-year volume indices) - percentage
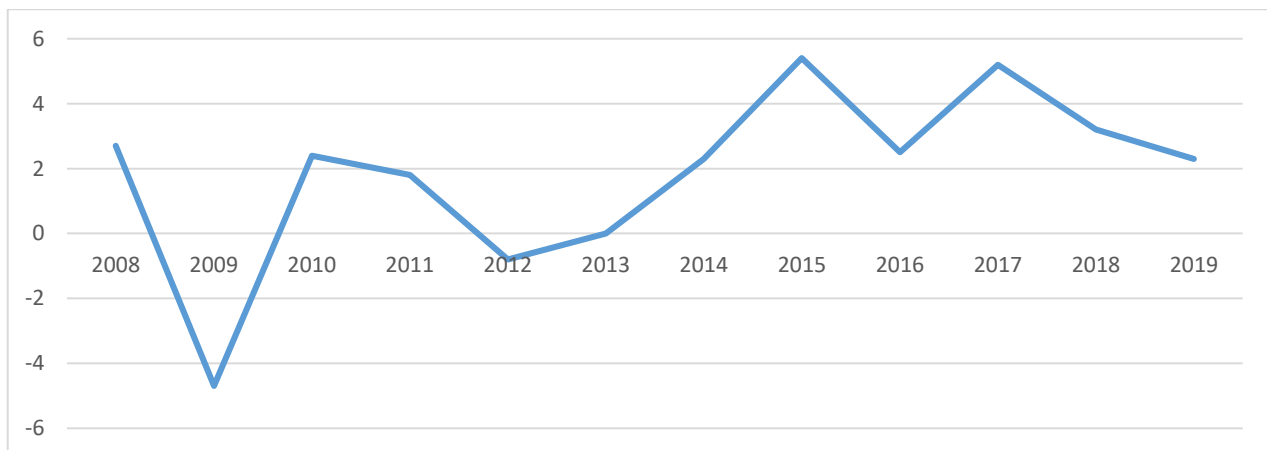
Relation of the process of formation or cessation of economic entities to real business cycle is better illustrated by Figure 2, which gives the ratio of formed entities to defunct entities. i.e. shows how many entities were formed for every defunct one in 2007-2018 and that separately for both natural persons and corporate bodies.

Figure 2 Share of births and deaths of business 2007-2018
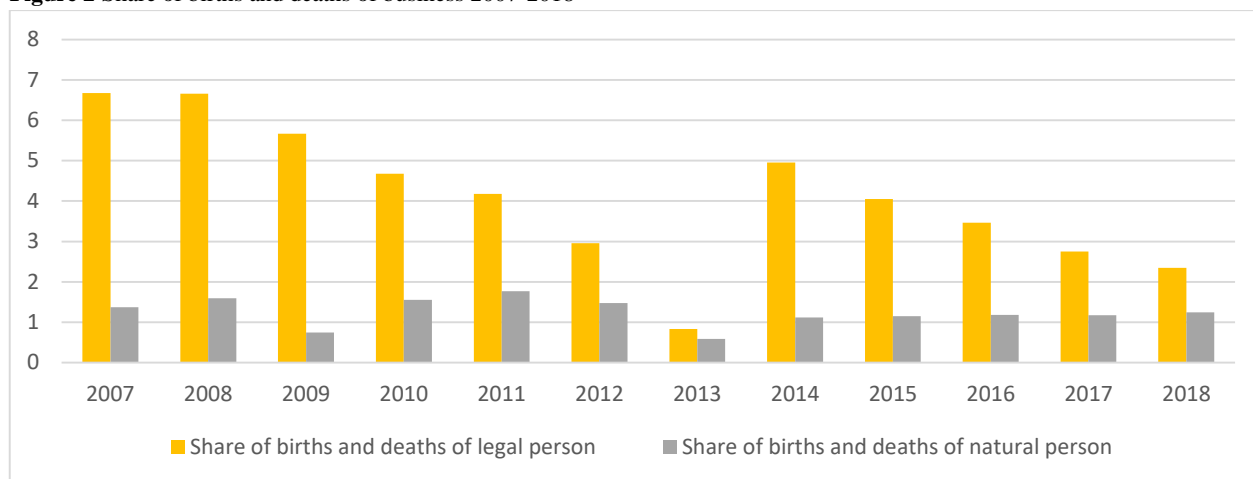
Source: Own findings based on the data of Czech Statistical Office

It is apparent (Figure 2) that the economic crisis year of 2009 (GDP year-on-year volume index - decrease about 4.8%) (*Database of National Accounts*, 2020) had the largest impact on natural persons as the net increase of these entrepreneurs was negative. i.e. the index is less than 1. The crisis year did not have a significant impact on the ratio of formed entities to defunct entities in case of corporate bodies. There was even more considerable slump in 2013 (another GDP decrease of 0.5%) (*Database of National Accounts*, 2020), but this time not only in case of natural persons, but also corporate bodies. From 2014 the monitored index went never below 1. i.e. the yearly increase in formed entities exceeded the number of defunct entities. Nevertheless. even during the period of stable growth. i.e. 2014-2018 the number of defunct entities grew slightly year to year. The following correlation matrix indicates the tightness of the dependence of the investigated quantities (see Table 2).

Table 2 The correlation matrix of chosen economic indicators

|	GDP (year-on-year volume indices)	Share of births and deaths of business
GDP (year-on-year volume indices)	1.000	-0.569
Share of births and deaths of business	-0.569	1.000

Source: Own findings

It was proved that there is rather weak negative dependence, the lower is the growth of GDP, the higher is the share of births and deaths of business.

3.3 Real business cycle and development of self-employment classified by sectors

Further we focused on development of self-employment classified by sectors (Figure 3) in the period of 2007-2017.

Figure 3 Self-employed (full time equivalent jobs) development by major industries in the Czech Republic
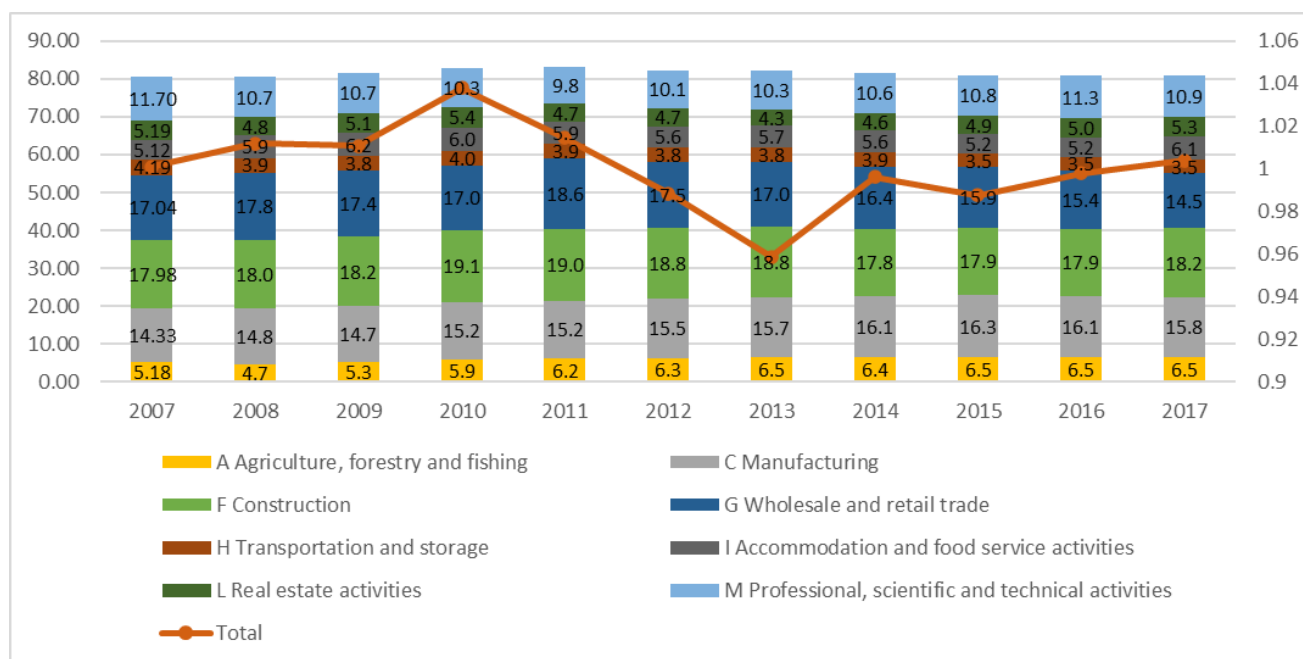
Source: Own findings based on the data of Czech Statistical Office

Figure 3 makes it evident that development of self-employment is related to real business cycle only in some industries. Times of economic crisis (2009, 2010) see yearly increase in number of self-employed (3.8 % more in 2010 as opposed to 2009). In times of economic growth i.e. from 2014 the year-on-year growth is just below index 1, which means the number of self-employed is almost stable.

As for classification of self-employment in the Czech Republic by industries (Figure 3 contains selected industries in which the percentage of self-employed exceeded 5%). The largest percentage of self-employed can be found in sectors G, F and C. In the wholesale and retail trade sector (G). The percentage increased (approx. 17% - 18%) during economic recession, during stable economic growth. i.e. from 2014 this percentage decreased (in 2017 it was already 14.5%) in the Construction sector (F). The percentage of self-employed remained approx. 18 % through the whole period under discussion in the Manufacturing sector (C). The percentage of self-employed increased during stable economic growth (from approx. 14.7% to approx. 16%). The percentage of self-employed is also significant in sector M (approx. 10%) in agriculture (A). The percentage increased slightly (it was 6.5% in 2017). Percentage of self-employed over 5% threshold was recorded also in sector I (Accommodation and food service activities).

4 Conclusions

This paper focuses on the influence of the real business cycle on the formation of business entities, ie the number of self-employed.

Our analysis has revealed the standing of the Czech Republic within Visegrad Group regarding both the number of newly formed entities. The number of formed entities in some countries may had been influenced by the crisis year 2009 (when more entities were being formed than in times of stable economic growth), especially in the Czech Republic, Slovakia and Poland.

In case of the Czech Republic, the number of formed and de-funct entities has been analysed in more detail. It was proved that there is rather weak negative dependence, the lower is the growth of GDP, the higher is the share of births and deaths of business. We have demonstrated that there are significant differences regarding net increase in the number of businesses of natural, as opposed to legal, persons. Economic growth or decline has, as expected, larger impact on natural persons. From 2014 onward (a period of stable economic growth), the number of newly formed entities of natural persons had been stable; there had been a concurrent decrease in net increase of corporate bodies.

With regard to different industries in the Czech Republic, we might conclude that the link between economic growth or decline and percentage of the self-employed is most significant in the sector of Wholesale and Retail Trade - G (this percentage is higher during recession than in a period of stable growth) and in sector C – Manufacturing (in which the

percentage of the self-employed is, on the contrary, higher in a period of stable growth). We must, however, take into consideration that the percentage of the self-employed may be influenced by many other factors.

References

Audretsch, D. B. (1995). Innovation, growth and survival. *International Journal of Industrial Organization*, *13*(4), 441–457. https://doi.org/10.1016/0167-7187(95)00499-8

Barlevy, G. (2007). On the Cyclicality of Research and Development. *American Economic Review*, *97*(4), 1131–1164. https://doi.org/10.1257/aer.97.4.1131

Bernanke, B., & Gertler, M. (1989). Agency Costs, Net Worth, and Business Fluctuations. *The American Economic Review*, *79*(1), 14–31. JSTOR.

Colombo, M. G., Delmastro, M., & Grilli, L. (2004). Entrepreneurs' human capital and the start-up size of new technology-based firms. *International Journal of Industrial Organization*, *22*(8–9), 1183–1211. https://doi.org/10.1016/j.ijindorg.2004.06.006

Colombo, M. G., & Grilli, L. (2005). Founders' human capital and the growth of new technology-based firms: A competence-based view. *Research Policy*, *34*(6), 795–816. https://doi.org/10.1016/j.respol.2005.03.010

Congregado, E., Golpe, A. A., & Parker, S. C. (2012). The dynamics of entrepreneurship: Hysteresis, business cycles and government policy. *Empirical Economics*, *43*(3), 1239–1261. https://doi.org/10.1007/s00181-011-0516-6

Database of National Accounts. (2020, únor 21). ČSÚ. http://apl.czso.cz/pll/rocenka/rocenka.presmsocas

Dunne, P., & Hughes, A. (1994). Age, Size, Growth and Survival: UK Companies in the 1980s. *The Journal of Industrial Economics*, *42*(2), 115–140. JSTOR. https://doi.org/10.2307/2950485

Ejermo, O., & Xiao, J. (2014). Entrepreneurship and survival over the business cycle: How do new technology-based firms differ? *Small Business Economics*, *43*(2), 411–426. https://doi.org/10.1007/s11187-014-9543-y

Eurostat—Data Explorer. (2020). https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=bd_9bd_sz_cl_r2&lang=en

Eurostat-OECD Manual on Business Demography Statistics—OECD. (2007). https://www.oecd.org/sdd/business-stats/eurostat-oecdmanualonbusinessdemographystatistics.htm

Evans, D. S. (1987). The Relationship Between Firm Growth, Size, and Age: Estimates for 100 Manufacturing Industries. *The Journal of Industrial Economics*, *35*(4), 567–581. JSTOR. https://doi.org/10.2307/2098588

Fort, T. C., Haltiwanger, J., Jarmin, R. S., & Miranda, J. (2013). How Firms Respond to Business Cycles: The Role of Firm Age and Firm Size. *IMF Economic Review*, *61*(3), 520–559. JSTOR.

Francois, P., & Lloyd-Ellis, H. (2003). Animal Spirits Through Creative Destruction. *American Economic Review*, *93*(3), 530–550. https://doi.org/10.1257/000282803322156972

Fritsch, M., & Kritikos, A. S. (2016). *Entrepreneurship and the Business Cycle*. 5.

Fritsch, M., & Mueller, P. (2004). Effects of New Business Formation on Regional Development over Time. *Regional Studies*, *38*(8), 961–975. https://doi.org/10.1080/0034340042000280965

González-Pernía, J. L., Guerrero, M., Jung, A., & Peña-Legazkue. (2018). Economic recession shake-out and entrepreneurship: Evidence from Spain. *BRQ Business Research Quarterly*, *21*(3), 153–167. https://doi.org/10.1016/j.brq.2018.06.001

Hall, B. H. (1986). The relationship between firm size and firm growth in the u.s. Manufacturing center. *National Bureau of Economic Research*, 59.

Hopenhayn, H. A. (1992). Entry, Exit, and firm Dynamics in Long Run Equilibrium. *Econometrica*, *60*(5), 1127. https://doi.org/10.2307/2951541

Koellinger, P. D., & Roy Thurik, A. (2012). Entrepreneurship and the Business Cycle. *Review of Economics and Statistics*, *94*(4), 1143–1156. https://doi.org/10.1162/REST_a_00224

Konon, A., Fritsch, M., & Kritikos, A. S. (2018). Business cycles and start-ups across industries: An empirical analysis of German regions. *Journal of Business Venturing*, *33*(6), 742–761. https://doi.org/10.1016/j.jbusvent.2018.04.006

Montgomery, D. C., & Runger, G. C. (2011). *Applied statistics and probability for engineers* (5th ed). Wiley.

Parker, S. C. (2009). Why do small firms produce the entrepreneurs? *The Journal of Socio-Economics*, *38*(3), 484–494. https://doi.org/10.1016/j.socec.2008.07.013

Parker, S. C. (2018). *The economics of entrepreneurship* (Second edition). Cambridge University Press.

Rampini, A. A. (2004). Entrepreneurial activity, risk, and the business cycle. *Journal of Monetary Economics*, *51*(3), 555–573. https://doi.org/10.1016/j.jmoneco.2003.06.003

Santos, S. C., Caetano, A., Spagnoli, P., Costa, S. F., & Neumeyer, X. (2017). Predictors of entrepreneurial activity before and during the European economic crisis. *International Entrepreneurship and Management Journal*, *13*(4), 1263–1288. https://doi.org/10.1007/s11365-017-0453-8

Storey, D. J., & Tether, B. S. (1998). New technology-based firms in the European union: An introduction. *Research Policy*, *26*(9), 933–946. https://doi.org/10.1016/S0048-7333(97)00052-8

Thurik, A. R., Carree, M. A., van Stel, A., & Audretsch, D. B. (2008). Does self-employment reduce unemployment? *Journal of Business Venturing*, *23*(6), 673–686. https://doi.org/10.1016/j.jbusvent.2008.01.007

Vegetti, F., & Adăscăliței, D. (2017). The impact of the economic crisis on latent and early entrepreneurship in Europe. *International Entrepreneurship and Management Journal*, *13*(4), 1289–1314. https://doi.org/10.1007/s11365-017-0456-

Capital labour ratio in agriculture in the context of business cycle in V4 countries

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Abstract: Capital initially plays a very important role not only in the industry but also in agriculture. Agricultural enterprises are striving to increase the efficiency of labour used by growing capital intensity. The aim of the paper is to assess the dynamics of capital-labour ratio in agriculture in the context of cyclical development of economies of V4 countries. The share of value added in agriculture in the economy of V4 countries has been declining for a long time, with the exception of Slovakia. The impact of the real economic cycle on value added in agriculture was not significant. Using ANOVA analysis, it was found that the growth of capital intensity in the V4 countries is very similar and does not differ significantly. The differences in the development of capital intensity in agriculture were found at different stages of the business cycle. The reason is the different response of wages and investments. The wages growth significantly outweighs the growth of investments in fixed assets in agriculture in the expansion phase of the business cycle especially in the Czech Republic and Slovakia.

1 Introduction

Agriculture plays an important role in the economies of European countries. The efficiency of this sector is to some extent influenced by investments in new technologies and their efficient use by agricultural enterprises. The basic indicator in evaluating the use of investments is capital intensity. The economic cycle, which affects a number of economic indicators, can also play an important role in the development of this indicator. Other factors include historical developments, where the new EU member states in particular are trying to catch up with the old member states through technological sophistication. The article focuses on the new EU member states, specifically the V4. The aim of the article is to assess the dynamics of C-L.ratio in agriculture in the context of the cyclical development of the economies of the V4 countries (Czech Republic (Czechia), Slovakia, Poland, Hungary).

The business cycle describes the cyclical development of the economy, which is influenced by external or internal factors. The business cycle has an impact on many branches and sectors (Dusek, 2016). We used in this paper the theory of the real economic cycle. The Real Business Cycle theory says that permanent productivity (or technological) shocks are the dominant source of economic fluctuations, while alternative models underline the role of innovations associated with nominal variables to explain the cyclical variation in the real variables (Calcagnini 1995).

A study by Da-Roch and Diego Restuccia (2006) analysed the role of agriculture in aggregate business cycles in countries. Research has found that there are significant differences in the link between business cycle fluctuations and agricultural output when related to the share of agriculture in the economy. This share is small in the countries of Central and Eastern Europe. On the other hand, the importance of the economic cycle for agriculture was confirmed by a study by Ball et al., (2014), which confirmed the influence of the economic cycle on the rate of convergence of agricultural productivity in EU countries. The study found that the rate of convergence was greater during periods of contraction in economic activity than during periods of expansion. A study by Czyzewski and Majchrzak (2017) confirmed the influence of the business cycle on total factor productivity on large farms on Polish farms. Some studies, for example, also deal with the cyclical development of agriculture in individual countries (Jędruchniewicz, 2018).

The term capital intensity is often replaced by the term capital-labor ratio (c.l. ratio). The dynamics and size of capital intensity depend on the type of industry (Berends, Romme, (2001), Mura, L., & Kljucnikov, A. (2018)). The labour market, which is developing dynamically with the countries of Central and Eastern Europe, is closely linked to capital

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intensity (Pavelka & Loster, 2016, Šetek & Petrách, 2016). From the point of view of the labour market, it is also necessary to assess the efficiency of labour (Kiselyova, 2020) at given resources with the help of labour productivity. Labour productivity in all enterprises measures the efficiency of the use of labour in the enterprises with a given technology and capital.

2 Methods

The paper deals with the use of C-L ratio dynamics in agriculture in the context of cyclical development of economies of V4 countries. The first step was to determine the representation of agriculture in the monitored countries, through the share of Gross Value Added (GVA). Subsequently, the real business cycle of national economies and the agricultural sector was compared. Chain linked volumes of Gross Value Added found in the Eurostat database were used. The study uses data of V4 countries during the period of 2004 through 2018. The capital labour ratio, which is an indicator of capital intensity, was determined in the form of an index, namely I cl ratio = (I Gross fixed capital formation (Chain linked volumes)) / (I Compensation of employees (deflated)).

Price index (implicit deflator), percentage change on previous period, when Compensation of employees was recalculated to Previous year prices, were used to deflate the Compensation of employees indicator. Furthermore, the relationships between the indicators in Current prices and Previous year prices were used and Chain linked volumes (Iq) were constructed.

$$I\ q_{2018} = \frac{\sum q_{18} p_{17}}{\sum q_{17} p_{17}} = \frac{Compensation\ of\ employees_{2018\ price\ 2017}}{Compensation\ of\ employees_{2017\ price\ 2017}} \tag{1}$$

$$= \frac{Compensation\ of\ employees\ (Previous\ year\ prices)}{Compensation\ of\ employees\ (Current\ prices)} \tag{2}$$

The C-L ratio index was thus found in the years 2005-2018 for all V4 countries, including average growth rates for partial intervals (geometric average). Using a one-dimensional ANOVA, it was analysed whether the growth rates of the C-L ratio differ statistically significantly within the individual V4 countries. The observations can be described by linear statistical model:

$$Y_{ij} = \mu + \tau_i + \epsilon_{ij} \tag{3}$$

Where Y_{ij} is a random variable denoting thy (ij)th observation, μ is parameter common to all treatments called the overall mean, τ_i is a parameter associated with the ith treatment called ith treatment effect, and ϵ_{ij} is a random error component (Montgomery, Runger 2007).

When testing hypothesis H that the factor $\mu_i = \mu + \tau_i X$, ie the mean of the i-th of country V4, does not affect the character Y - growth rate C-L ratio, we actually test the hypothesis that the distributions of the variable Y have the same mean values τ_i for different countries.

$$H_0: \tau_1 = \tau_2 = \cdots = \tau_4 = 0 \tag{4}$$

$$H_1: \tau_i \neq 0\ for\ at\ least\ one\ i. \tag{5}$$

3 Research results

The first part of the analysis focused on the importance of agriculture in the economy of individual states. It was found out how agriculture contributes to the economy of individual states through the creation of gross value added. Table 1 shows that the share of value added in agriculture varies not only by country but also by year. In the Czech Republic, this share is slightly decreasing (especially in the last monitored years), in 2018 it is even the lowest of all monitored countries (2.15%).

Table 1 Share of Agriculture on total gross value added

GEO/TIME	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Czechia	2.67	2.53	2.38	2.31	2.12	1.94	1.7	2.2	2.5	2.64	2.67	2.46	2.32	2.29	2.15
Hungary	5.1	4.33	4.08	4.06	4.04	3.61	3.61	4.73	4.65	4.65	4.68	4.53	4.64	4.49	4.21
Poland	3.69	3.3	3.05	3.44	2.9	2.79	2.92	3.22	3.01	3.24	2.95	2.48	2.7	3.13	2.41
Slovakia	1.88	1.83	2.06	2.56	2.81	2.3	1.84	2.4	2.5	3.02	3.58	2.92	2.99	2.67	2.65

Source: Eurostat, own processing

Graphs 1-4 illustrate the development of the business cycle in the all economy of the monitored countries and this development only in the agricultural sector. The development of the real business cycle for the whole economy is similar in the following countries: Czechia, Slovakia and Hungary. In Poland, during the economic crisis (2009), there was no negative decline of the GVA in Poland economy.

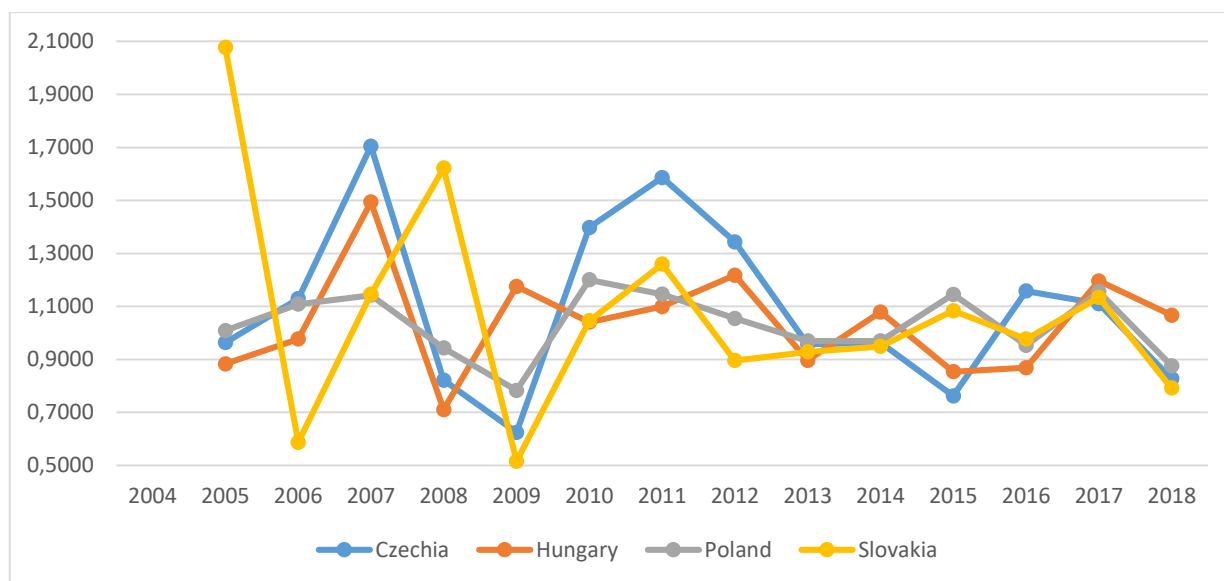**Figure 1-4** Development of business cycle total economy and agriculture
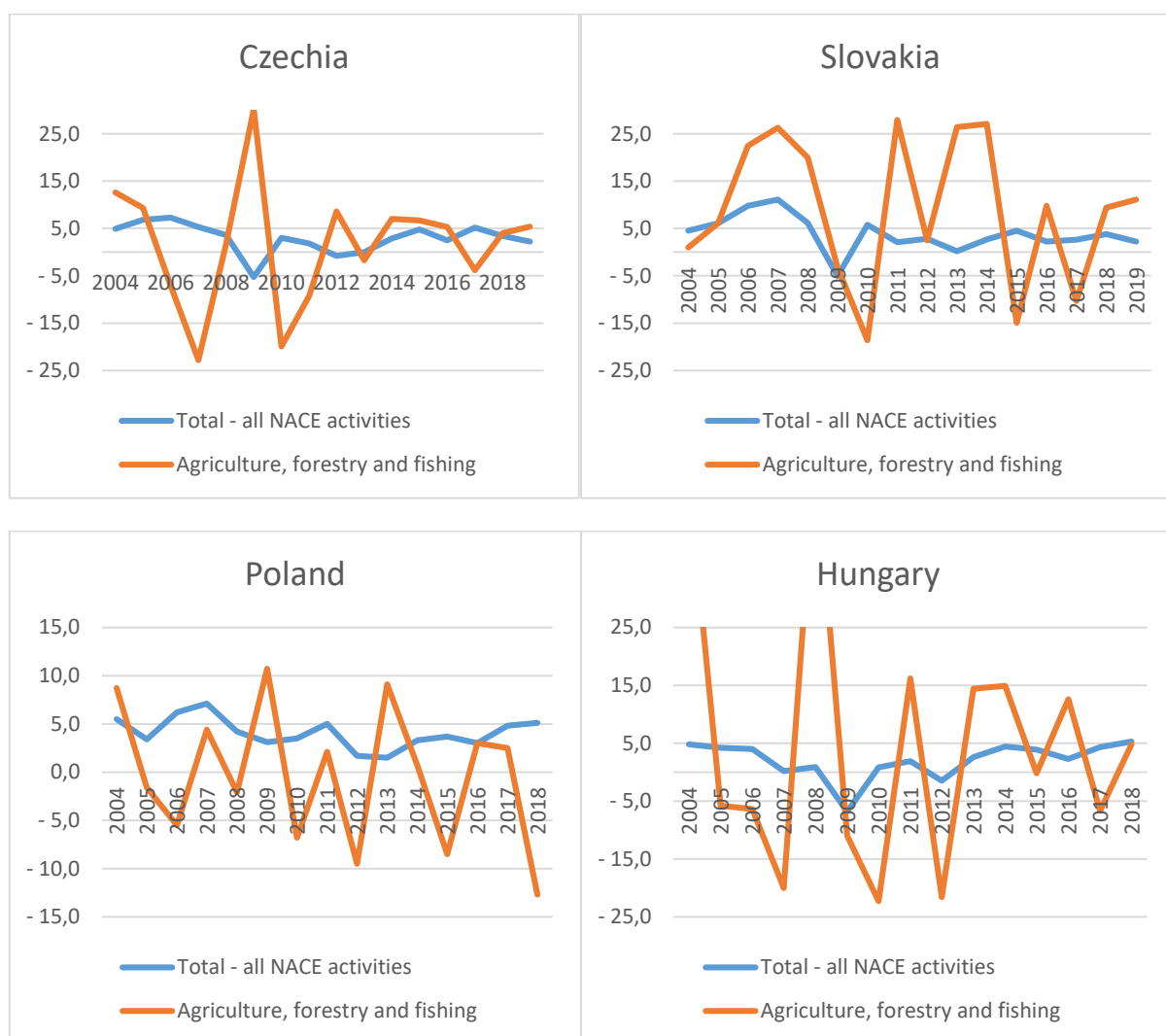
Source: Eurostat and own processing

There are large fluctuations in gross value added in agriculture (the largest can be seen in Hungary), which are due to many other factors such as the specific focus of agriculture in the monitored countries, weather fluctuations (unfavourable development in 2010, weather in Europe in 2013) and, last but not least, the EU subsidy policy (CAP). The share of value added in agriculture in the total economy of the states has been declining for a long time, with the exception of Slovakia. The effect of the real economic cycle on agricultural production has not been recorded. The development of the shares of GVA agriculture varies not only by country but also by year. In the Czech Republic, this share is slightly decreasing (especially in the last monitored years).

The development of capital intensity in Agriculture in the V4 countries is illustrated in Figure 5 by means of the C-L ratio indicator. This indicator is determined as real, ie the development of the price level is eliminated.

Figure 5 C-L ratio – Agriculture (index)

The year 2009 is marked by a decline in the C-L ratio in all countries except Hungary. Hungary recorded a very successful year in 2008 (increase in GVA - index volume by almost 55%). In 2010-2012, the ratio of fixed assets to 1 Euro Compensation of employees in the Czech Republic increased significantly compared to other V4 countries, which is to some extent affected by the year-on-year decline in Compensation of employees. In 2018, all countries except Hungary achieve about the same decline, which can again be attributed to the increase in wages.

Table 2 shows the average growth rates at each interval, which roughly correspond to the phases of the business cycle. In the years of stable growth (2004-2008), there was a year-on-year increase in the C-L ratio in all countries except Hungary. In the phase of GVA decline, which can be described as the period 2008-2013, the C-L ratio is rising again, except for Slovakia (a decrease of about 10.8%). This is followed by a period of growth (2013-2018), when it is evident in which countries average wages before fixed capital are growing faster year-on-year on average (Czechia and Slovakia).

Table 2 Average growth rates of C-L ratio in period of business cycle

Country	period 2004-2008	period 2008-2013	period 2013-2018
Czechia	1.1108	1.1224	0.9515
Hungary	0.978	1.0798	1.0039
Poland	1.0475	1.0193	1.0138
Slovakia	1.227	0.8921	0.9795

The ANOVA analysis (Figure 6) was used to determine whether there is a statistically significant difference in the growth of the C-L ratio in the monitored countries.

Figure 6 ANOVA analysis of countries – index C- L ratio.

F(3, 52)=,15741, p=,92444
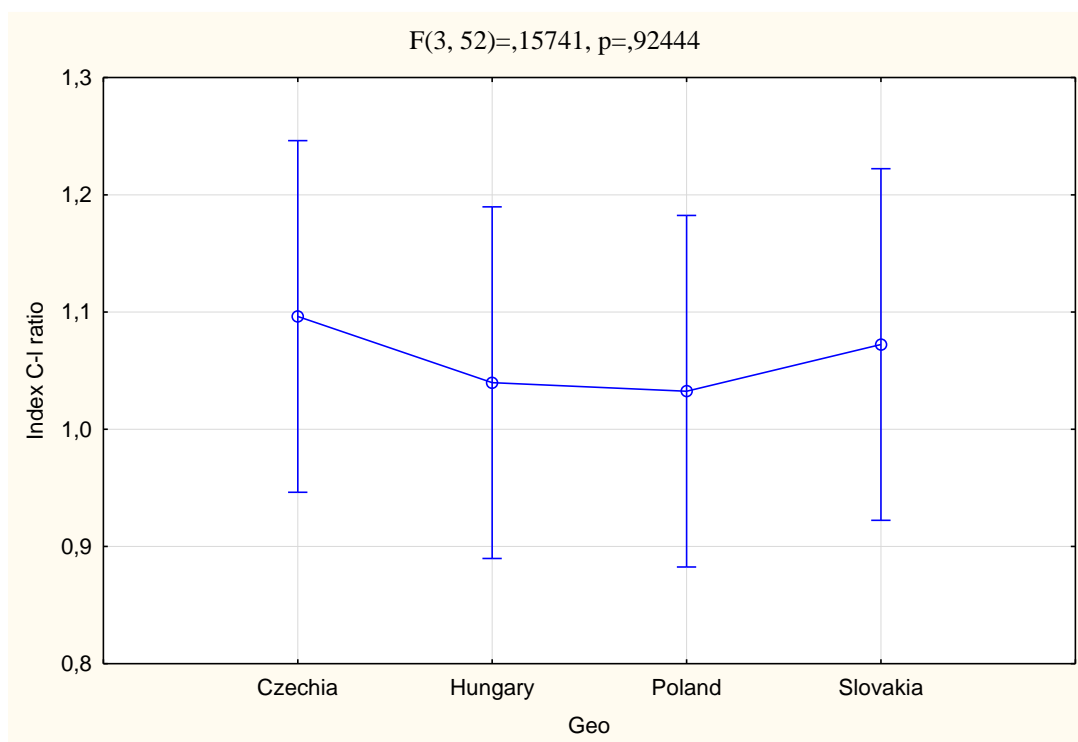
Source: Own processing

The interval bars indicate 0. 95 confidence intervals.

Using ANOVA analysis, it was found that the growth of capital intensity in these countries is very similar and does not differ significantly. Differences were found in the development of the business cycle and capital intensity, where this difference was due to a different response of wages and investments. Especially in the Czech Republic and Slovakia, wage growth significantly outweighs growth in investment in long-term farm assets. The influence of the country within the V4 on the C - L ratio was not proved (the effect of the factor is insignificant, $p > 0.05$).

4 Conclusions

Capital as a factor of production is also important in agriculture. Agricultural enterprises that want to be in a good economic situation must be a good size of C-L ratio. At the same time, it is necessary to point out that a significant factor influencing the economy of individual industries is the business cycle. The aim of the paper was to assess whether the capital intensity in agriculture is influenced by the economic cycle of individual V4 countries' economies. The impact of the real economic cycle on value added in agriculture was not significant. Lososova et al. (2020) point out that the EU agricultural policy (subsidy) can be an important factor influencing investments of agricultural enterprises. Using ANOVA analysis, it was found that the growth of capital intensity in the V4 countries is very similar and does not differ significantly. The differences in the development of capital intensity in agriculture were found at different stages of the business cycle. The reason is the different response of wages and investments. The wages growth significantly outweighs the growth of investments in fixed assets in agriculture in the expansion phase of the business cycle especially in the Czech Republic and Slovakia. Future research will focus on capital efficiency in relation to labour productivity in agriculture.

References

Ball, V. E., San-Juan-Mesonada, C., & Ulloa, C. A. (2014). State productivity growth in agriculture: catching-up and the business cycle. *Journal of Productivity Analysis*, 42(3), 327-338. https://doi.org/10.1007/s11123-013-0352-0

Berends, P. A. J., & Romme, A. G. L. (2001). Cyclicality of capital-intensive industries: A system dynamics simulation study of the paper industry. *Omega*, 29(6), 543–552. https://doi.org/10.1016/S0305-0483 (01)00043-3

Calcagnini, G. (1995). Common trends and common cycles in international labor productivity. *Economics Letters*, 48 (1), 179-184.

Czyzewski, B., & Majchrzak, A. (2017). Economic size of farms and adjustments of the total factor productivity to the business cycle in Polish agriculture. *Agricultural Economics*, 63(2), 93-102. https://doi.org/10.17221/240/2015-AGRICECON

Da-Rocha, J. M., & Restuccia, D. (2006). The role of agriculture in aggregate business cycles. *Review of Economic Dynamics*, 9(3), 455–482. https://doi.org/10.1016/j.red.2005.12.002

Dusek, J. (2016). Availability of Basic Goods and Services in Towns and Municipalities of The South Bohemian Region. In Klimova, V and Zitek, V (Ed.), 19TH International Colloquium On Regional Sciences (pp. 546–555). Masarykova Univ. https://doi.org/10.5817/CZ.MUNI.P210-8273-2016-70

Jędruchniewicz, A. (2018). Cyclical fluctuations in the production of Polish agriculture (No. 289209). Institute of Agricultural and Food Economics-National Research Institute (IAFE-NRI).

Kiselyova, E. (2020). Labor compliance as an instrument of labor relations control. Central European Journal of Labour Law and Personnel Management, 3 (1), 21-32. doi: 10.33382/cejllpm.2020.04.02

Lososová, J., Zdeněk, R., & Svoboda, J. (2020). Tangible fixed assets in Czech small and middle-sized farms. *Eastern Journal of European Studies*, 11(1), 236–251.

Montgomery, D. C., & Runger, G. C. (c2007). Applied statistics and probability for engineers (4th ed). Wiley.

Mura, L., & Kljucnikov, A. (2018). Small Businesses In Rural Tourism And Agrotourism: Study From Slovakia. Economics & sociology, 11(3), 286–300. https://doi.org/10.14254/2071-789X.2018/11-3/17

Tsoulfidis, L., & Paitaridis, D. (2019). Capital intensity, unproductive activities and the Great Recession in the US economy. Cambridge Journal of Economics, 43(3), 623–647. https://doi.org/10.1093/cje/bey051

Pavelka, T., & Loster, T. (2016). The Development of Unemployment in the European Union's Labour Market Due to the Recent Economic Crisis, Using Cluster Analysis. In Bilgin, MH and Danis, H and Demir, E and Can, U (Ed.), Business Challenges In The Changing Economic Landscape, VOL. 1 (s. 323–337). https://doi.org/10.1007/978-3-319-22596-8_23

Šetek, J., & Petrách, F. (2016). Human capital in the context of the economic dimension of crime in the transformation of the economy. 10th International Days of Statistics and Economics. Praha. Czech Republic. pp. 1777-1786.