16th Annual International Conference on Economics and Business

CHALLENGES IN THE CARPATHIAN BASIN

conference volume

SAPIENTIA HUNGARIAN UNIVERSITY OF TRANSYLVANIA

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CONTENTS

FOREWORD **8**

AGRICULTURE AND RURAL ECONOMICS SECTION **11**

FÖLDI KATA, PÉNZES IBOLYA RÓZSA: RESEARCH OF ONLINE FOOD SHOPPING HABITS IN HUNGARY 12

ELEK SÁNDOR, GYÖRGY OTTILIA, ILLYÉS LÁSZLÓ, PÉTER EMŐKE KATALIN: *FAMILY* FARMS IN HARGHITA COUNTY 25

GYÖRGY OTTILIA: LABOUR MARKET IMPLICATIONS OF THE TRANSITION TO A CIRCULAR ECONOMY 36

PÉTER EMŐKE KATALIN: THE SITUATION OF MEMBERS OF COMMONAGES IN THE KÉZDIVÁSÁRHELY AREA 45

CAPITAL MARKET, CORPORATE FINANCE AND FINANCIAL ANALYSIS SECTION **57**

SZABOLCS GRÉBEL, TAMÁS PESUTH: REFLECTIONS ON THE RELATIONSHIP BETWEEN GEOPOLITICS AND CAPITAL MARKETS – THE EFFECTS OF THE RUSSIA-UKRAINE CONFLICT 58

BAREITH TIBOR[1,*] AND FERTŐ IMRE[2,3]: THE IMPACT OF MACROECONOMIC FACTORS ON FOOD PRICE INFLATION: THE CASE OF HUNGARY 75

LÁSZLÓ MÁTYÁS[1], EMŐKE-KATALIN PÉTER[2]: LINEAR AND PARABOLIC REGRESSION METHODS FOR THE STUDY OF A FUEL PRICE AND AN EXCHANGE RATE IN 2022 86

CSEH BALÁZS, VARGA JÓZSEF: "FIQH AL-MUAMALAT". ECONOMIC AND FINANCIAL PERSPECTIVE OF THE RULES OF ISLAMIC BANKING TRANSACTIONS 94

KATALIN PLÁNTEK, TIBOR BAREITH AND ANETT PARÁDI-DOLGOS: THE RESULTS OF THE FINANCIAL AWARENESS SURVEY OF THE HUNGARIAN POPULATION 101

BÍRÓ BÍBORKA ESZTER, BÍRÓ BORÓKA JÚLIA: AGRICULTURE AND FOOD INDUSTRY IN THE TIME OF CRISIS. THE FINANCIAL ANALYSIS OF BUNGE LTD. 115

ANITA TANGL, BERNADETT BRINGYE, ISTVAN VAJNA: LEAN TOOLS IN CORPORATE INVESTMENT DECISIONS 128

SZENTESI IBOLYA: NEW WAYS OF SHOWING AND ANALYSING CHANGES IN INCOME AND ASSETS THROUGH THE ADOPTION OF INTERNATIONAL ACCOUNTING STANDARDS 141

MANAGEMENT SECTION **148**

TÍMEA ANTAL: FIRST STEPS - COMPLIANCE AND ARTIFICIAL INTELLIGENCE . 149

TÍMEA ANTAL: PLAN-DO-CHECK-ACT IN THE CONTEXT OF COMPLIANCE 157

ÁGNES CSISZÁRIK-KOCSIR: EXPLORING USER SATISFACTION IN ARCHITECTURAL MEGAPROJECTS OF GLOBAL SIGNIFICANCE 167

GERGELY ORSOLYA, KÁDÁR BEÁTA: WHAT DOESN'T KILL YOU, MAKES YOU STRONGER? THE SITUATION OF FEMALE ENTREPRENEURS AFTER A LONG CRISIS PERIOD FROM ROMANIA ACCORDING TO A DESK RESEARCH AND EXPERT INTERVIEWS 176

BARBARA VARGA PAULIKNÉ, PÉTER TAKÁCS, MAGDOLNA LÁCZAY: COMMUNITY OF PRACTICE AS THE APPEARANCE OF COMPETITION IN HUNGARY 184

JÁNOS VARGA, ÁGNES CSISZÁRIK-KOCSIR, MÓNIKA GARAI-FODOR, BÍBORKA ESZTER BÍRÓ, BORÓKA JÚLIA BÍRÓ, KINGA KATALIN SZÉKELY: THE PANDEMIC'S PRESSURE TO CHANGE THE LIVES OF HUNGARIAN AND ROMANIAN BUSINESSES 197

ÁGNES CSISZÁRIK-KOCSIR, JÁNOS VARGA, MÓNIKA GARAI-FODOR, KATARZYNA SZYMCZYK: THE IMPACT OF THE PANDEMIC ON POLISH AND HUNGARIAN BUSINESSES 204

PANKOTAY FRUZSINA MAGDA, KOLOSZÁR LÁSZLÓ: SUSTAINABLE HOTEL PROCESSES: OPTIMISATION OPPORTUNITIES TO AVOID WASTES THROUGH A LEAN APPROACH 211

ZOLTÁN ANDRÁS DÁNIEL, TAMÁS MOLNÁR: CHARACTERISTICS OF ENVIRONMENTALLY CONSCIOUS SMES IN HUNGARY, WITH A FOCUS ON GENERATIONAL DIFFERENCES 222

ÁGNES CSISZÁRIK-KOCSIR – OSZKÁR DOBOS: THE PLACE AND ROLE OF RESEARCH, DEVELOPMENT AND INNOVATION PROJECTS IN THE LIFE OF SMES FROM THE PERSPECTIVE OF DIGITALISATION AND PROJECT THINKING 233

MARKETING AND TURISM SECTION 242

BEÁTA KÁDÁR, KRISZTINA PECZE, REGINA ZSUZSÁNNA REICHER, MELINDA MAJLÁTH: PLACE MARKETING AS A RESEARCH TOPIC - SECONDARY RESEARCH RESULTS ON INTERNATIONAL PUBLICATIONS 243

RÓBERT BAGDI, ANITA MONDOK: SZEGED AND ITS REGION DESTINATION: PAST AND PRESENT. RECOVERY FROM THE CORONAVIRUS EPIDEMIC BASED ON STATISTICAL DATA 254

MÁRTA KÓRÓDI, ORSOLYA SAVELLA, RÓBERTNÉ BAKOS: ANALYSIS OF THE CHARACTERISTICS OF TYPES OF TOURISTS BASED ON THEIR EXPERIENCE BEHAVIOR 266

MÁRTA KÓRÓDI: SPECIFIC FEATURES OF THE SERVICE PROFILE OF QUALIFIED MEDICAL SPA HOTELS IN HUNGARY 277

KATA FÖLDI, ÉVA PÓLYA, IBOLYA RÓZSA PÉNZES: FIGHT FOR CUSTOMERS CORRELATIONS OF TRADE ORGANIZATIONS AND SALES PROMOTION ON THE HUNGARIAN FMCG MARKET 287

KATA FÖLDI: QUALITATIVE RESEARCH ON FOOD SHOPPING BEHAVIOR FROM THE POINT OF VIEW OF TODAY'S RETAILERS 295

BORÓKA-JÚLIA BÍRÓ, BÍBORKA-ESZTER BÍRÓ: POST-COVID EVOLUTION OF AN ONLINE FOOD DELIVERY SYSTEM IN ROMANIA 306

BUSINESS INFORMATICS AND OPERATIONAL RESEARCH SECTION 317

PIROSKA BIRÓ, TAMÁS KÁDEK: TASK ANNOTATION CAPABILITIES OF THE PROGCONT SYSTEM IN PRACTICE 318

SZILÁRD MADARAS, NORBERT ÁGOSTON: A RULE-BASED EXPERT SYSTEM FOR FINANCIAL INVESTMENT DECISIONS IN ROMANIA 328

REGIONAL DISPARITIES AND TERRITORIAL PROBLEMS SECTION 339

GYULAI TAMÁS, BALOGH ÉVA: TERRITORIAL INNOVATION DEVELOPMENT BY SMART URBAN ACTIONS 340

PATRÍCIA FANNI PORKOLÁB, ZOLTÁN ANDRÁS DÁNIEL: RECULTIVATED BROWNFIELDS - (MORE) POSITIVE DEMOGRAPHICS 351

FRUZSINA BOZSOKI, DR. MARIANN SZABÓ: REDEVELOPMENT OF THE HISTORICAL PUBLIC SLAUGHTERHOUSE IN BUDAPEST – RESIDENTS' PERCEPTIONS BASED ON AN ONLINE SURVEY 365

DÁVID NAGY: DEVELOPMENT OPPORTUNITIES FOR DANUBE FREIGHT SHIPPING AND THE EVALUATION OF THE RESULTS OF THE STRATEGY FOR THE DANUBE REGION 379

BAJOR TIBOR: EXPECTED IMPACT OF THE TRANSFORMATION OF THE RAILWAY SYSTEM IN UKRAINE ON CENTRAL EUROPE 390

ANDRÁS NÁHLIK, FRUZSINA MAGDA PANKOTAY, NIKOLETTA NÉMETH: THE WAY OF SELECTIVE WASTE FROM MOTIVATION TO PREPARATION FOR PROCESSING 402

FITTY VALDI ARIE: PANEL ESTIMATING EXPORTS AND IMPORTS OF THE AUTOMOTIVE INDUSTRY ON ECONOMIC GROWTH: EVIDENCE OF AUSTRIA, HUNGARY AND ROMANIA 417

VIRÁGH ATTILA, KASSAY JÁNOS: TODAY'S GLOBALISATION CHALLENGES IN THE LIGHT OF THE EROI INDICATOR 426

FOREWORD

It is with great pleasure and enthusiasm that I present this volume of the proceedings for the 16th International Conference on Economics and Business, themed "Challenges in the Carpathian Basin." This conference serves as a significant platform for scholars, researchers, practitioners, and policymakers to exchange knowledge, ideas, and experiences related to the dynamic economic landscape of the Carpathian Basin.

The Carpathian Basin, with its rich historical, cultural, and economic significance, has always been a region of great interest and exploration. This conference, organized by Sapientia Hungarian University of Transylvania, brings together experts and visionaries from diverse fields of economics and business to delve into the multifaceted challenges faced by the region and propose innovative solutions.

The papers included in this volume reflect the conference's wide-ranging discussions and provide a comprehensive overview of the key issues impacting the Carpathian Basin's economic and business environment. Scholars and practitioners from various countries have contributed their valuable insights, research findings, and perspectives, making this volume a valuable resource for academics, professionals, and policymakers seeking a deeper understanding of the region's complexities.

The papers cover a broad spectrum of topics, including economic development, entrepreneurship, innovation, finance, marketing, sustainability, and regional cooperation. Each contribution represents a unique viewpoint and approach to tackling the challenges encountered within the Carpathian Basin. The interdisciplinary nature of the conference and the variety of perspectives presented in this volume ensure a holistic understanding of the region's economic dynamics.

In the Management section, we had the opportunity to listen to engaging and thought-provoking presentations covering a wide range of topics. These included the relationship between compliance and AI, and the concept and responsibilities of compliance within a risk-based approach. One paper explored user satisfaction in globally significant architectural megaprojects. We also discussed the situation of women entrepreneurs in Romania after a prolonged period of crisis. Another paper considered whether the benefits of collaborative working can only be demonstrated through responses to professional challenges that reshape strategic and operational structures. Finally, we came across an article discussing the impact of the pandemic on Hungarian and Romanian businesses.

The second Management section covered a wide range of areas. These included the impact of the Covid-19 pandemic on organisations in the case of Hungarian and Polish SMEs, the sustainable lean approach to waste management in Hungarian hotel processes and the environmental approach of the Hungarian SME sector based on a survey-based analysis.

The Marketing and Tourism section had seven presentations, six of which are included in this volume. Földi's paper deals with the opinion of food retail store managers regarding changes in customer behaviour (shopping habits and store choice) during the Covid-19 period; which factors of the advantages of shopping in FMCG market webshops can be offset by buying food in traditional stores. Bíró and Bíró analyse the post-pandemic evolution of a local online food marketplace system present in a town from Romania, located in the middle of the country. Földi, Pénzes and Pólya had an incursion into the FMCG market of Hungary, exploring the impact of changes focusing on market competition; they note that the number and activity of chain stores operating in Hungary has stabilised, which has shifted the direction of research to explore the relationship between trade organisation and marketing, improving competitive advantages and management efficiency. Kádár, Pecze, Reicher and Majláth proposed a systematic review of recent literature analysing the place, role and results of studies on marketing, including the area and position of municipalities and place marketing, in two well-known publication databases, Clarivate's Web of Science and Elsevier's Scopus, as a primary source. In another study, Kóródi analyses the specific characteristics of tourists from spa hotels in Hungary: The results of the evaluation forms of the research based on the observational method analysing the offer of the forty qualified spa hotels operating in Hungary provide an opportunity for this categorisation. Bagdy and Mondok present in their study the recovery of tourism after the Covid pandemic in the Szeged region, Hungary. Kóródi, Savella and Bakos aim to present the experience attitude that plays a role in the travel decision, which is shaped by the experience promises of service providers. Experience concepts have a significant influence on the motivations to travel and also on the travel behaviour of tourists. The study, which analyses the methods of experience management, attempts to assess experience attitudes by analysing more than six hundred elements.

The regional science sections covered several topics. Innovative urban development was the focus of this session. One of the topics will focus on European cities participating in the Smart Cities Challenge. The other interesting topic is the development and future of brownfield investment and the impact of brownfield land use. In the other section, the speakers and presentations in this section were extremely diverse and varied. The presentation on upgrading the Ukrainian railway network to European standards, which also touched on geopolitical issues, resonated well with the presentation on refugees in Ukraine. The economic and geo-economic interests of the Central European region were also addressed in a presentation on Danube navigation, focusing on river transport, but also on energy and nature conservation. The presentation on the development of Budapest compared public utility with profitability, and the study and presentation on selective waste collection and community behaviour in Sopron were also of public interest. An interesting speaker, a PhD student from an Asian country, analysed the Hungarian, Romanian and Austrian car industries and their impact on the economy. Finally, the focus was on energy sources and resources, the economic and social aspects of energy returns.

The agro-economic section focuses mainly on small-scale production, which is the best way to meet the principles of sustainable development. Because of the problem of higher prices due to lower efficiency, such products are overshadowed by large-scale production for the most price-sensitive consumers. Sustainability principles also play an important role in the lifestyles and food choices of consumers who wish to preserve local and traditional values.

The finance and capital markets section covers a wide range of topics. Articles in the financial section looked at the impact of the current Russian-Ukrainian conflict on capital markets and energy commodities, as well as the performance of agri-food companies. Another group of articles focused on financial awareness and practices around the world to avoid the current challenges.

Although there were many interesting presentations, two articles will be published in the section of Business Informatics and Operations Research. The first is about the ProgCont system, which helps to evaluate practical programming tasks by automatically compiling and running source code and checking the output of the programme. The system's database allows deeper correlations to be explored. The results of their study will provide teachers with important feedback on which tasks students are struggling with, and be incorporated into future teaching of the subject, which could improve student performance. The second describes the functioning of an expert system that acts as an investment advisor for Romanian investment funds. The CLIPS language programme contains 53 rules and uses only open-ended investment funds.

***

As we navigate an increasingly interconnected and rapidly changing global economy, the importance of conferences like this cannot be overstated. They provide an opportunity for researchers and practitioners to collaborate, exchange ideas, and explore potential solutions to the economic challenges faced by the Carpathian Basin. The insights shared within these pages have the potential to shape policies, guide business strategies, and inspire further research in pursuit of sustainable economic growth and development.

I would like to extend my deepest appreciation to the conference organizers for their dedication, tireless efforts, and commitment to fostering an environment of intellectual discourse and knowledge sharing. Their vision and passion have made this conference a resounding success, bringing together a community of scholars and professionals dedicated to advancing the understanding and development the national economies, and the international relations as well.

Finally, I would like to express my gratitude to all the authors who have contributed to this volume. Your research, expertise, and dedication to the field of economics and business have made this collection of papers an invaluable resource. I am confident that your work will inspire further exploration and collaboration, and I hope that this volume will serve as a catalyst for ongoing dialogue and progress in the Carpathian Basin and beyond.

Dr. Nagy Benedek

Head of the Business Sciences Department

FÖLDI KATA, PÉNZES IBOLYA RÓZSA: RESEARCH OF ONLINE FOOD SHOPPING HABITS IN HUNGARY

ABSTRACT

By the end of the nineties, according to extremely optimistic forecasts, shopping would have taken place mainly on the Internet within a short period of time, but the forecasts were too optimistic. The spectacular growth effect of the Covid-19 epidemic is widely known. The epidemic did indeed cause a clear jump, but the growth of e-commerce, contrary to the widespread misconception, did not accelerate spectacularly, and its continuous spread is taking place at a balanced, linear pace when examined globally.

According to Fehér (2015), in the standard process of online shopping, the search for information means browsing, the evaluation of alternatives means a machine comparison, and the purchase is a click (Eszes 2011, Weinberg 2001). Online options are increasingly integrated into basic consumer decisions and most often supplement or replace the traditional shopping process (Bányai–Novák, 2011; Fehér et al, 2014).

According to Fehér (2015), most people in Hungary already thought before covid-19 that online grocery shopping would be one of the most booming forms of shopping in the near future, in case that businesses are able to maintain and communicate lower and more favorable towards consumers.

As the aim of our research, we sought the answer to

- which of the factors, that trigger the choice and preference of FMCG online stores, compensate for the personal food customer experience that develops in traditional stores

Our hypothesis is that:

- some of the customers only temporarily used the webshops of the FMCG market chains as a special extension of sales, a modern tool, while another part of them took advantage of multi-channel sales and a hybrid customer behavior became permanent.

Keywords: online food shopping, adventages and disadventages of online food shoopping, online shoppers, Hungary, Covid-19 epidemic

1. INTRODUCTION

Being forced to stay at home due to the rampage of the coronavirus has changed the food shopping habits of customers. In the first wave of the epidemic, panicky parties began in stores as well as an increased interest in online grocery shopping. Online grocery shopping is a general trend that has spread to Hungary as well, further intensifying this pandemic situation.

The topic has an extremely rich literature, and within the framework of this study we have made highlights due to limitations of scope. Accordingly, we examined the factors that determine online shopping for food, as well as the advantages and disadvantages of shopping through online stores and Hungarian online customer segments.

2. MATERIAL AND METHODS

In the literature research, using Hungarian and foreign authors as sources, we evaluated the factors influencing online shopping, especially the advantages and disadvantages of grocery shopping and Hungarian online customer segments. During the secondary research, we examined the role and importance of the FMCG sector in addition to the growth rate of global and Hungarian online retail.

As part of primary research, we conducted an online questionnaire during the coronavirus period, when online food shopping increased significantly. In order to research the changed online food shopping habits, we conducted quantitative research during the coronavirus epidemic. The main objective of our research is to find out which of the factors that trigger the selection and preference of FMCG online stores are those that compensate for the personal food shopping experience that develops in traditional stores.

3. RESULTS AND DISCUSSION

3.1. Literature resarch

The topic has an extremely rich literature, within the framework of this study we have made highlights due to the limitations of the scope. Accordingly, we examined the factors that determine online shopping for food, as well as the advantages and disadvantages of shopping through online stores and Hungarian online customer segments.

3.1.1. Factors influencing online shopping

The most important variables determining the online customer decision are the product features, trust in the online store, experiences and opinions related to the goods, the price of the product and customer evaluations from reliable sources (Mican - Sitar-Taut, 2020).
According to Ben et al. (2015), compared to the traditional store environment, online shopping environment offers many challenges and opportunities to find different goods.
Several Hungarian researchers (Fehér et al. 2014) pointed out that the online customer decision model does not differ significantly from the classical model (Kotler - Keller, 2006), and the main steps of the two processes taking place in different spaces are actually similar. Szakály (2013) analyzed some sources of food-related information and proved the importance of the Internet interface as a factor influencing the purchase.
The perception of online grocery shopping has been examined by several researchers, highlighting concerns related to perishable foods (Galante et al., 2013; Toomey and Wysocki, 2009). Buying food online is significantly different from general online shopping, in terms of the frequency of the purchase, the product's warranty period and the variability of the product selection (Mortimer et al., 2015).
At the same time, Fehér (2015) suggested that even before Covid-19, the lower price characteristics of online shopping could become a factor that generates intensive shopping in the case of food as well.

3.1.1. Advantages and disadvantages of online food shopping

The authors, we examined, pointed out that e-commerce benefits positively influence customers' attitudes towards online shopping and increase the likelihood of online shopping (Chang, 2011; Clemes et al., 2014; Elwalda et al., 2016; Jiang et al, 2013). At the same time, the obstacles and disadvantages of online shopping were revealed (Karpińska-Krakowiak, 2014), as well as its risks (Zeng, 2012).
The authors highlighted unlimited "opening time" (Jepsen 2007), convenient shopping and time saving (Hsu et al., 2017) and significantly higher amount of information (Szakály 2017) as advantages. According to Bányai and Novák (2011), functional benefits are more decisive for online shoppers than the search for experience.
Among the disadvantages, according to the authors, the high delivery cost and the difficulty of judging the quality of goods can be highlighted (Eszes, 2011, Novák-Bányai, 2011, Katawetawaraks et al., 2011), as well as safety, physical limitations, lack of social contact and dissatisfaction (Novák-Bányai, 2011, Katawetawaraks et al. 2011).

According to the authors Molnár et al (2022: 67-68), the attitude towards online food shopping differs to a certain extent from country to country and culture to culture. Factors related to the increase in customer interest are convenience, the possibility of home delivery, security, the availability of online stores 24 hours a day, queuing, and the avoidance of personal contact during the epidemic.
Based on a comparative analysis of the literature by authors Piros-Fehér (2020), the advantages of online grocery shopping are: convenience, home delivery option, no shutter, virtual basket and no queuing at checkouts. Among the disadvantages, they mentioned the waiting time, delivery fees, unfulfilled orders, some products can be evaluated incorrectly, it is more impersonal compared to traditional shopping, and the special offers and promotions of traditional stores do not apply.
Kohli et al. (2020) authors' study shows that the pandemic has increased the demand for online grocery shopping. In recent years, researchers have found that while online shopping has seen growth in other product categories, this has not been noticeable in online grocery shopping. According to researchers, there were two main reasons for this: doubt about the quality of the product and the additional cost to be paid for delivery (PWC et al 2020).

Secondary resarch

3.2.1. Characteristics of online retailing

In the post-coronavirus era and amid the war crisis, online retail continued to grow. Statista reports that global retail sales in 2021 far exceeded market expectations. Trends have emerged that point towards innovation and cost reduction, highlighting higher profitability and brand awareness as goals. Calviño (2022) identified 7 trends for 2023 that will prevail in online retail. Of these, ECLEAR (2022) highlighted the six most important ones, which are as follows:
1. Omnichannel is becoming a standard in retail
2. Social commerce is growing
3. Artificial intelligence and machine learning are increasingly emphasized
4. Augmented reality: the latest trend in online retail
5. Visual search in e-commerce
6. Voice Commerce: Hey Google!

According to STATISTA (2018), among the world's most popular online shopping categories (10), food was in 7th place with a value of 28%. In 2019, most people bought food online in South Korea and China (Buchholz, 2020), while in Europe this was typical for one third of the Dutch, ahead of the United Kingdom (Raynor, 2020).
A global example is the growth of Amazon's grocery delivery business, which is estimated to triple by 2023 (PWC et al., 2020). According to E-marketer, in 2022 the share of online retail in global trade (excluding vehicle and fuel sales) will be 20.3%. According to forecasts, by 2025 its growth rate will decrease to 9.2% and its share will increase to 23.6%. (GKID, 2023)
In Hungary as well, customers show an increasing openness and willingness to buy goods online (Szabó, 2020). The demand for certain goods has increased significantly as a result of the epidemic, such as food. (Hungarian, 2020, GKI DIGITAL, 2020).
Authors Nagy – Keller (2017) considered it a special fact that fresh food was included in the top 10 list of online purchases in Hungary, which was very rare in other countries in 2017.
Research by Soós (2020) highlighted that 63% of online food buyers liked "home delivery" during the epidemic.
The outbreak of the coronavirus (COVID-19) and the growing popularity of online shopping have prompted many retailers to rethink their business models and adapt to the online world, making different product categories available for online shopping. In 2022, electronics and fashion were the leading segments in terms of e-commerce sales, with electronics products generating US$1.2 billion worth of revenue. Most online purchases were made in the categories of clothing, fashion and sports products, exceeding 14 million. (STATISTICS, 2023)

In Hungary, the share of online sales in commerce is 9.4% in 2022, the smallest per product group is 2.1%, but the share of the most dynamically growing FMCG product group has more than doubled compared to 2020. (GKID, 2023)
In 2022, 32,000 operating online stores were registered, the number of which increased by 4% compared to the previous year. Gross online retail turnover was HUF 1,320 billion, which, as a 9.8% growth result seems small compared to previous years (45.43% in 2020, 32.37% in 2021).
In the FMCG online trade sector on the Hungarian market, Tesco is the market leader, having started its online activities in 2013. Auchan, Spar and G'Roby can be mentioned as significant players. The vast majority (67%) of online shopping users (approx. 1.2 million people) tried Tesco's service, while 27% chose Auchan's Online Store (Piros-Fehér, 2020a)
As a result of the epidemic, retailers began to increase their online coverage. Online food trade, typically with regards to fresh products, is difficult to expand due to the specialties of the products, and this expansion involves a significant cost investment. Looking at the Hungarian e-commerce market, it can be seen that half of the traffic is generated in Budapest and the agglomeration, but this refers to the entire Internet traffic (GKID 2022).

3.2.3. Online shoppers

Based on the behavior of online customers, researchers separated several customer groups, which can be characterized by different socio-demographic features and motivations.
NRC research director Kurucz (2009) described the following online customer groups in his blog: hardcore, thorough, busy, convenient and thrifty. Out of these five groups, one could be considered a truly regular online customer group, the other four were more ad-hoc buying segments, the difference between which was mainly in the primary purpose of online shopping. Compared to the other segments, the "comfortable" group, with a higher average age, made up 22 percent of online customers. People belonging to this group sometimes choose online shopping for convenience, and this segment had the highest proportion of people buying food online.
According to Nagy - Keller (2017), several empirical researches have focused on the typology of online customers (Kau, A. K. et al. 2003, Pragarauskaité, J. - Dzemyda, G. 2012, Bang, J. et al. 2015, Prashar, S. et al . 2016, Jayashree, P.R. 2016). Kau et al. (2003) separated on-off, comparative, traditional, dual, lagging and information-seeking buyer groups. Bang, J. et al. (2015) authors divided daily Internet users into the segments of fluctuating users, everyday or thematic users, and those who visit many different internet sites and search for keywords.
In 2015, GKI Digital and Árukereső.hu's joint Online Retail Index research examined Hungarian online shopping habits and based on this determined six online shopping groups: routine, follow-up, beginner, occasional buyer, bargain hunter and adventurer. (MARKAMONITOR, 2015)
In 2019, the largest base of online customers in Hungary, with 700,000 people, were those who have purchased FMCG products online but have not yet purchased food online. With 440,000 people, the second group consisted of those who (also) ordered food via the Internet. The smallest group (almost a quarter of a million people) have already shopped online, but they still insisted on traditional shopping for fast-moving products (TRADE MAGAZIN, 2019).
In Hungary, a consumer segment consisting of nearly half a million people has emerged, who are happy to purchase food online. However, this range of consumers has expanded as a result of the coronavirus (ENET, 2020).

3.3. Primary research

As the aim of our research, we sought the answer to
- which of the factors that trigger the selection and preference of FMCG online stores, compensate for the personal food customer experience that develops in traditional stores
Based on our literature and secondary research, our hypothesis is that:

- a part of the customers only temporarily used the online stores of the FMCG market chains as a special extension of sales, a modern tool, while another part of them took advantage of multi-channel sales and a hybrid customer behavior became permanent.

3.3.1. The composition of the sample

During the primary research, the socio-demographic characteristics of the interviewees were measured according to nine criteria. 38.6 percent of the respondents were men, while 58.9 percent were women, 10 people did not answer the question. The sample can be considered representative in terms of gender, as it corresponds to the composition of the Hungarian population in purchasing food. The majority of people in the sample were 18-31 years old (34.1%), followed by the 31-40-year-old and 41-50-year-old groups (17.5%) with a share of 24.8%. 82.3% of the respondents declared themselves to be active earners, while the rest were dependent or inactive earners. Based on this, it can be concluded that the sample closely approximates the behavioral habits of the active population segment targeted by the chain stores.

The majority of respondents (36.4 %) live in households with 2 people, followed by households with 3 or 4 people in almost the same proportion (22-20 %). In 65.9 percent of households, there is no person under the age of 18, which is information consistent with the size of the households. In terms of education, the sample is overrepresented in the proportion of those with higher education (35.6%). 56.8 percent of respondents live in the Northern Great Plain region, while residents of the Southern Great Plain region, on the basis of which the sample can be considered representative.

3.3.2. The place and frequency of the purchase

- The research also covered the measurement of general shopping habits, which affected the types of stores and the frequency of shopping. Examined by business type, the following behavior is outlined.
- - Shopping in specialty stores is divided almost equally between infrequent and frequent customers, while 12.3 percent of respondents do not shop at all.
- - 28.5 percent of the respondents completely reject shopping in convenience stores, the customers who shop there are most likely to purchase once a month.
- - 52.8 percent of those surveyed shop at discount stores at least once or more times a week, but the proportion of those who visit 2-3 times a month is also relatively high. For chain stores that operate discount stores, this shows a certain demand.
- - In the supermarket category, the proportion of customers who shop at least once a week is 5.8 percentage points lower than in discount stores, while the proportion of shoppers who shop 2-3 times a month is higher.
- - In hypermarkets, a significant part of the sample (39.6 percent) rarely buys once a month, the proportion of frequent customers is lower.

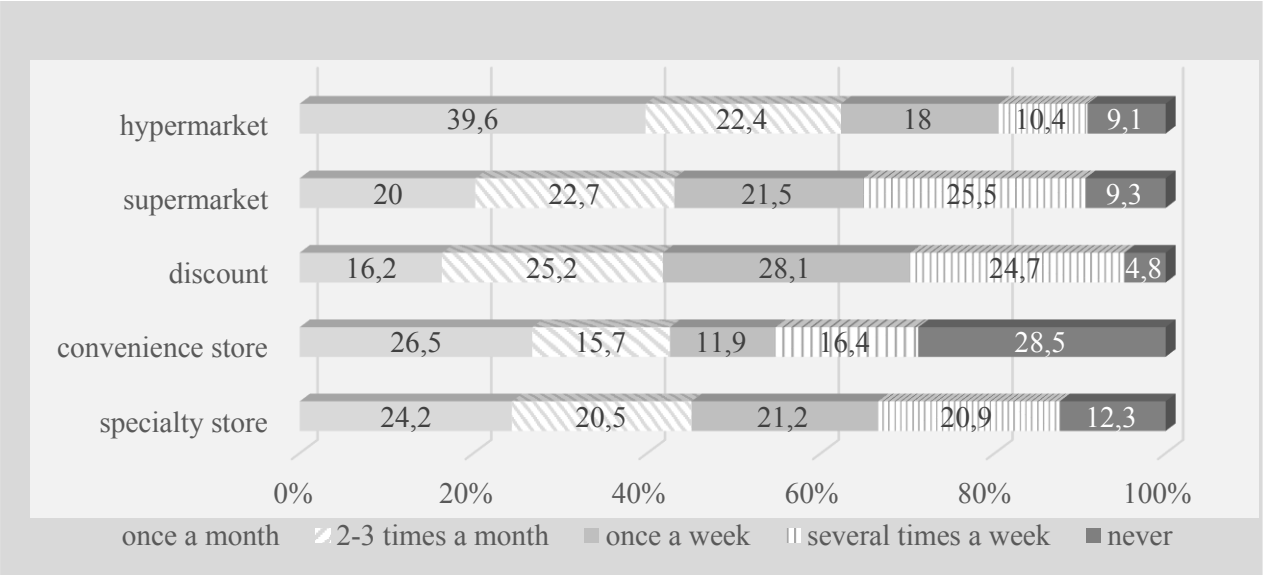

Figure 1. Frequency of purchase
Source: Own editing

Overall, it can be concluded that frequent purchases are similar to the national data for discount stores and supermarkets. In the course of the research, we examined the effect of key sociodemographic characteristics (gender, age, place of residence) on the frequency of purchases in the case of different types of stores.

When analyzed by gender, it can be concluded that women shop less frequently in hypermarkets than men. The share of women indicating a purchase once a month was 43.5%, while that of men was only 24.8%. At the same time, in supermarkets and discount stores, which have a smaller floor area and a narrower selection, the rate of shopping several times a week is almost 10 percentage points higher for women than for men.

When examined by age, there is a difference in the frequency of shopping in different types of stores in hypermarkets. Shopping at least once a week is most common among 41-51-year-olds (34%) and 18-41-year-olds (30%), but it is significantly lower among those under 18 (10%) and over 50 (22%). No significant difference can be shown between the regions, however, it should be noted that one or more purchases per week in convenience stores are more common among residents of smaller settlements. This is presumably also related to the settlement's supply of commercial units.

3.3.3. Online purchase

Among the respondents, the intention to buy online is relatively modest, the proportion of committed buyers is only 27.3%. The majority of those included in the sample, visit online stores primarily for the purpose of obtaining and comparing information. They only order goods when there is an exceptionally favorable purchase opportunity, otherwise they prefer personal shopping. This is consistent with the customer opinion evaluating the importance of the advantages and disadvantages of online shopping, where the importance of the risk factors compared to the advantages received the highest rating.

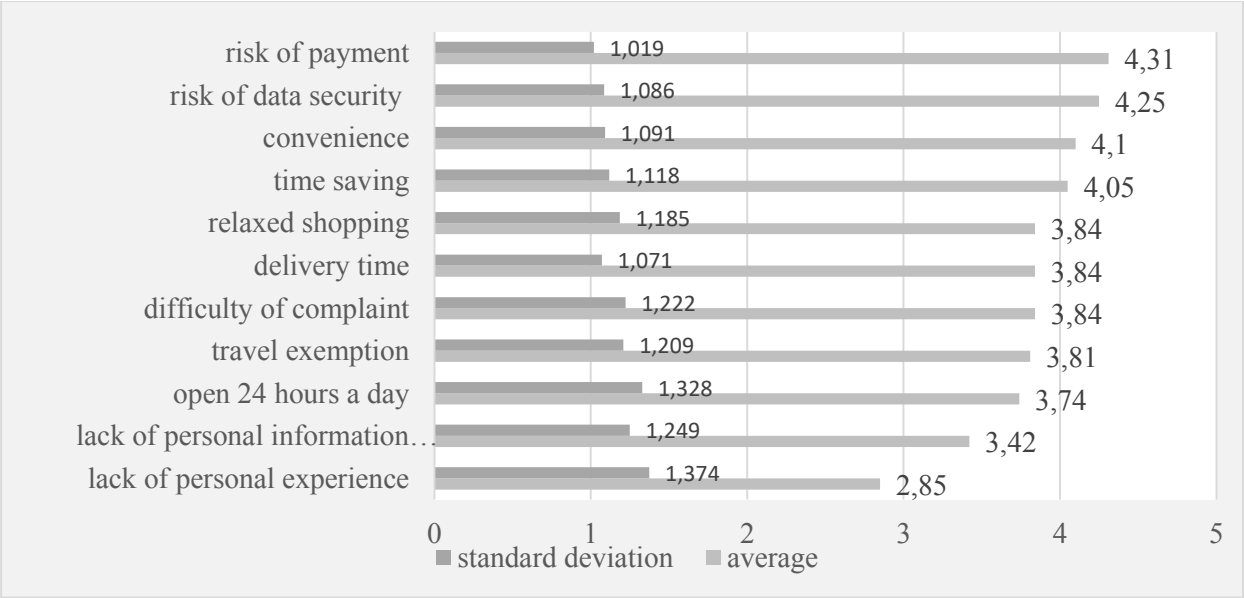

Figure 2. Importance of advantages and disadvantages of online shopping
Source: Own editing

- The respondents assessed the method of payment as the highest risk factor (4.31), followed by data security risk. The dispersion of responses was relatively low. These factors highlight the main problems of online shopping. In contrast, the importance of convenience (4.1) and relaxed shopping conditions (3.84), which can be classified as advantages of online shopping, is also low.
- Nine of the 11 criteria received a rating above 3.5, which shows that consumers consider most of the factors in the questionnaire when making an online purchase decision, but relatively low importance (below 3.5) is attributed to the lack of personal shopping experience and personal information.
- We analyzed the determination of the factors considered most important by the respondents (payment risk, data security risk, convenience) by sociodemographic characteristics. Although we could not detect a significant difference, we consider the following information to be indicative.
- - 83.2 percent of women consider the existing payment risk strongly/very important when shopping online, while only 74.2 percent of men think so. By age, online shopping was considered the most risky by those aged 41-60.
- - The perception of the data security risk differs between the sexes, 81.4 percent of women consider it strongly/very important, while only 72.1 percent of men marked it as such. A similar difference can be seen by age. The handling of personal data during online shopping is considered the most risky by 41-60-year-olds, whose perception decreases with increasing age.
- - Examining convenience as an influencing factor in online shopping, Figure 3 clearly shows the difference between the responses of people belonging to different age categories.

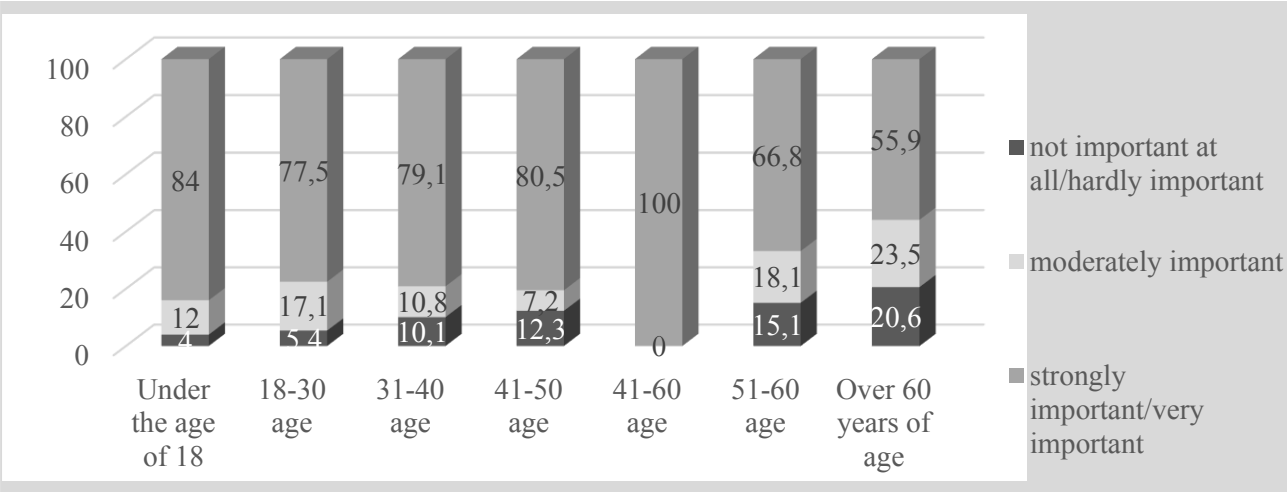

Figure 3. Importance of comfort of online shopping
Source: Own editing

- - Those between the ages of 18 and 50 chose a strong/very important assessment of comfort in almost the same proportion, which surprisingly decreases with age. This can presumably be attributed to the influence of shopping habits and other factors.

3.3.1. Food online shopping

Three quarters of respondents have not yet bought food online, the reason for which was not indicated. Online customers primarily purchase durable food from online stores.

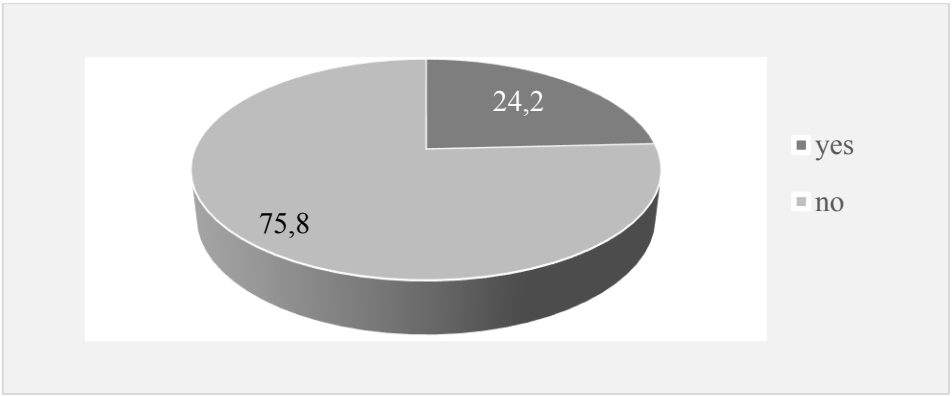

Figure 4. Food online shopping
Source: Own editing

During the survey, we also investigated the circumstances that lead consumers to shop online. 55.1 percent of the respondents mostly indicated illness or other obstacles (e.g. pandemic), 13.2 percent tied it to free delivery, while 17.2 percent would choose online shopping due to lack of time.

Their future intention to buy online is uncertain and they consider it within limits; the proportion of certain buyers was only 2.6%. A large number of uncertain customers only consider buying durable food. Measured on a scale of 1-5 regarding the offline purchase of food, the importance of shopping experience was 3.78, which indicates that for consumers it significantly influences the purchase decision.

Table 1. Choice factors of place decision

Factors	offline	online	both	don't know	don't answer
Freshness/quality of goods	*48.3*	*4.1*	*26.7*	*20.0*	*0.9*
Serving/service	*47.0*	*10.4*	*20.5*	*20.7*	*1.4*
Value/price ratio	30.3	12.9	35.8	20.5	0.5

Range of goods	30.1	15.2	32.6	20.4	1.7
Information about goods	25.8	17.9	31.6	23.8	0.9
Purchase time	28.1	25.0	26.8	19.7	0.4
Indication of prices	24.5	15.1	39.9	19.5	1.0
Special price discount	26.8	12.6	39.4	20.2	1.0
Presence of Hungarian goods	31.1	8.8	37.6	22.0	0.5
Purchasing everything in one place	27.2	20.2	30.5	20.7	1.4
Presence of premium products	25.8	12.1	38.2	22.7	1.2
Cash-saving payment method	24.5	14.4	39.9	20.4	0.8
Private labels	26.2	11.6	40.1	21.7	0.4

Source: Own editing

In order to better understand and identify this, we measured which channel is more favorable for customers based on various aspects. The data in Table 1 clearly show that for most of the factors influencing the purchase decision, a significant number of consumers selected both channels or could not choose between them.

In the case of foodstuff, two aspects are an exception to this. Regarding the freshness of goods and its related quality, the proportion of those who choose the offline channel is outstanding (48.3%). The recognition of service and traditional offline services is similarly high, which leads at 47 percent of consumers to prefer personal, in-store shopping.

4. CONCLUSION

Among the factors that trigger the selection and preference of FMCG online stores, the most frequently mentioned reason „comfort" in the literature research has been also indicated by the respondents of the quantitative research of our primary research. In the case of factors influencing channel choice, the proportion of those choosing offline shopping approximated that of those choosing online shopping from the point of view of factors influencing the time required for shopping and shopping everything in one place.

These factors may be the ones that can compensate for the personal food customer experience that develops in traditional stores.

Based on our primary research results, we verified our hypothesis: a part of customers only temporarily used online stores of the FMCG market chains as a special extension of sales, a modern tool, while another part of them took advantage of multi-channel sales, and a hybrid customer behavior became permanent.

REFERENCES

1. BANG, J. – CHO, Y. J. – SUN, M. K. (2015) Getting Business Insights through Clustering Online Behaviors, *Modelling and Simulation in Engineering*, Vol. 1, No. 4, 1-8. DOI: 10.1155/2015/914314
2. BÁNYAI Edit – NOVÁK Péter (szerk.) (2011): Online üzlet és marketing [Online business and marketing]. Akadémiai Kiadó, Budapest
3. BENN, Y. – WEBB, T. L. – CHANG, B. P. I. – REIDY, J. (2015): What information do consumers consider, and how do they look for it, when shopping for groceries online? *Appetite,* 89, 265–273.
4. BUCHHOLZ, K. (2020): Where the Most Groceries Are Bought Online. 2020. https://www. statista.com/chart/11945/where-the-most-groceries-are-bought-online/ (Letöltés dátuma: 2022.06.21.)
5. CALVIÑO, F. (2022) Top 7 trends for online retail on 2023 https://cross-border-magazine.com/online-retail-trends/ letöltési dátum: 2023. 04. 29.
6. CHANG, C. (2011): The Effect of the Number of Product Subcategories on Perceived Variety and Shopping Experience in an Online Store. Journal of Interactive Marketing. 2011. 25 (3) 159–168. DOI: https://doi. org/10.1016/j.intmar.2011.04.001
7. CLEMES, M. D. – GAN, C. – ZHANG, J. (2014): An Empirical Analysis of Online Shopping Adoption In Beijing, China. Journal of Retailing and Consumer Services. 21 (3) 364–375. DOI: https://doi. org/10.1016/j.jretconser.2013.08.003
8. E-CLEAR E-Commerce 2023: The 6 most relevant trends https://eclear.com/article/e-commerce-2023-the-6-most-relevant-trends/?gad=1&gclid=Cj0KCQjwgLOiBhC7ARIsAIeetVBNqN8w8YfWBJaDJgm5d_I6h4bKNuHOoOTO1oYrfesjvmNCjeHRJhAaAvruEALw_wcB letöltési dátum: 2023. 04. 29.
9. ELWALDA, A. – LÜ, K. – ALI, M. (2016): Perceived Derived Attributes of Online Customer Reviews. *Computers in Human Behavior.* 56 306–319. DOI: https://doi. org/10.1016/j.chb.2015.11.051
10. eNet: Új szintre léphet a hazai e-kereskedelem. 2020. [Domestic e-commerce can reach a new level. 2020] https://enet.hu/hirek/uj-szintre-lephet-a-hazai-e-kereskedelem/ (Letöltés dátuma: 2022.05.25.)
11. ESZES István (2011): Digitális gazdaság – Az e-kereskedelem marketinges szemmel. [Digital economy - E-commerce with a marketing eye] Nemzeti Tankönyvkiadó, Budapest
12. FEHÉR András (2015): The impact of the Internet on Hungarian food consumer's ways of seeking information from the aspect of health awareness. *Apstract – Applied Studies in Agribusiness and Commerce,*9 (3), 13–18.
13. FEHÉR András – SOÓS Mihály – SZAKÁLY Zoltán (2014): Az élelmiszer-fogyasztói magatartás vizsgálata online környezetben: Létezik-e hazánkban digitális élelmiszer-fogyasztó? [Examining food consumer behavior in an online environment: Are there digital food consumers in Hungary?] *Táplálkozásmarketing*, 1 (1–2), 29–38.
14. GALANTE, N. – LÓPEZ, E. G. – MONROE, S. (2013): The Future of Online Grocery in Europe. McKinsey & Company. 22–31.
15. Gki Digital (2020): A koronavírus nyertese?! – lendületben az e-kereskedelem. 2020. [The winner of the coronavirus?! - e-commerce is booming. 2020.] https://gkidigital.hu/2020/05/07/koronavirus/ (Letöltés dátuma: 2022.04.21.)
16. GKID (2021) Itt az e-TOPLISTA 2021 a GKID-től [Here is the e-TOPLISTA 2021 from GKID] https://trademagazin.hu/hu/etoplista2021-a-legnagyobb-forgalmu-online-kereskedok-rangsora/ letöltési dátum: 2022. 05. 05

17. GKID, (2022) Közel 70 millió vásárlás pörgette tavaly az online kiskereskedelmet [Nearly 70 million purchases drove online retail last year] https://gkidigital.hu/2022/03/24/70-millio-online-vasarlas/ Utolsó letöltés dátuma: 2022. 10.12.
18. GKID (2023) Madar Norbert: Digitális kereskedelmi körkép Törés vagy csak megtorpanás 2023. március 09. MTA Fogyasztás-gazdaságtan munkabizottság program MTA irodaházban [Digital trade map Break or just standstill March 9, 2023 MTA Consumer Economics working committee program at the MTA office building]
19. HSU, S.-H., LUAN, P.M, (2017), The Perception Risk of Online Shopping Impacted on the Consumer's Attitude and Purchase Intention in Hanoi, Vietnam, *Journal of Business & Economic Policy*, Volume 4, Number 4, December 2017, pp. 19-29.
20. JAYASHREE, P. R. (2016) A Study on Consumer Online Shopping Habits Using Cluster Anaysis, Imperial *Journal of Interdisciplinary Research,* Vol. 2, No. 11, 515-518. http://www.imperialjournals.com/index.php/IJIR/article/view/2567/2465
21. JEPSEN, A. L. (2007): Factors affecting consumer use of the Internet for information search. *Journal of Interactive Marketing,* 21 (3), 21–34.
22. JIANG, L. – YANG, Z. – JUN, M. (2013): Measuring Consumer Perceptions of Online Shopping Convenience. *Journal of Service Management*. 24 (2) 191–214. DOI: https://doi. org/10.1108/09564231311323962
23. KATAWETAWARAKS, Ch., WANG, Ch., L. (2011), Online Shopper Behavior: Influences of Online Shopping Decision, *Asian Journal of Business Research*, 1, 2, 66-74
24. KAU, A. K. – TAN, Y. E. – GHOSE, S. (2003) Typology of online shoppers, *Journal of Consumer Marketing*, 20, 2, 139-156. http://web.it.nctu.edu.tw/~etang/Tang_Publication/Typology.pdf
25. KOHLI, S. – FABIUS, V. – TIMELIN, B. – VERANEN, S. (2020) : How COVID-19 is Changing Consumer Behavior – Now and Forever. URL: https://b2bsolutionsllc.com/ wpcontent/uploads/2020/12/McKinsey- Company-how-covid-19-is-changing-consumerbehaviornow-and-forever.pdf (Let. ltés dátuma: 2022. 09.04.)
26. KOTLER, P. – KELLER, K. L. (2006): Marketingmenedzsment. [Marketing management] Akadémiai Kiadó, Budapest,
27. KURUCZ Imre (2009): Online vásárlói tipológia. IH2009 előadás. 2. rész. [Online customer typology. IH2009 lecture. Part 2.] https://onlime.blog.hu/2009/12/02/online_vasarloi_tipologia_ih2009_eloadas_2_resz Letöltés ideje: 2014. 03. 16.
28. MAGYAR Ádám (2020): Virágzik az online kereskedelem Magyarországon a koronavírus-járvány miatt [Online trade is booming in Hungary due to the coronavirus epidemic] https://hu.euronews. com/2020/04/01/viragzik-az-online-kereskedelem-magyarorszagon-a-koronavirus-jarvany-miatt (Letöltés dátuma: 2022.06.26.)
29. MARKAMONITOR Hogyan vásárolunk online [How we shop online] https://markamonitor.hu/2015/03/31/hogyan-vasarolunk-online letöltési dátum: 2023. 04. 29
30. MICAN, D. – SITAR-TAUT, D. A. (2020): Analysis of the Factors Impacting the Online Shopping Decision-Making Process. Studia Universitatis Babes-Bolyai Oeconomica. 65 (1) 54–66. DOI: https://doi. org/10.2478/subboec-2020-0004
31. MOLNÁR Anna – JÓZSA László – DERNÓCZY-POLYÁK Adrienn (2022) Az élelmiszer-vásárlási szokások változása a covid járvány alatt Szlovákiában és Magyarországon, helyzetkép Dél-Szlovákiában és Nyugat-Magyarországon. [Changes in food shopping habits during the covid epidemic in Slovakia and Hungary, situation in southern Slovakia and western Hungary] *Táplálkozásmarketing* 9, 1. 55-70..
32. MORTIMER, G. – HASAN, F. M. – ANDREWS, L. – MARTIN, J. (2015): Online Grocery Shopping: The Impact of Shopping Frequency on Perceived Risk. *The International Review of Retail, Distribution and Consumer Research.* 26 (2) 202–223. DOI: https://doi.org/10.1080/09593969.2015. 1130737

33. NAGY Katalin – KELLER Veronika (2017): 90 MÁSODPERC AVAGY AZ ONLINE VÁSÁRLÁS A JÖVŐ?! [90 SECONDS OR IS ONLINE SHOPPING THE FUTURE?!] https://kgk.sze.hu/images/dokumentumok/kautzkiadvany2017/Nagy_Keller_Kautz_2017.pdf letöltési dátum: 2023. 04. 29.
34. PIROS Edina – FEHÉR András (2020a): Az élelmiszer-vásárlói magatartás vizsgálata online környezetben – szakirodalmi áttekintés [Examining food purchasing behavior in an online environment - literature review] *Táplálkozásmarketing* 7, 1. 67-78.
35. PIROS Edina – FEHÉR András (2020b): Egyetemi hallgatók online élelmiszer-vásárlói magatartás vizsgálata a TAM-modell alapján [Examination of online food purchasing behavior of university students based on the TAM model] *Táplálkozásmarketing* 7, 2. 3-19.
36. PRAGARAUSKAITÉ, J. – DZEMYDA, G. (2012) Visual decisions in the analysis of customers online shopping behavior, *Nonlinear Analysis: Modelling and Control,* 17. 3. 355-368. https://www.mii.lt/na/issues/NA_1703/NA17308.pdf
37. PRASHAR, S. – VIJAY, T. S. – PARSAD, C. (2016) Segmenting online shoppers: A study of consumers'web portal selection motivations for e-shopping, *Asian Academy of Management Journal*, 21, 1, 27-46. http://web.usm.my/aamj/21012016/aamj21012016_2.pdf
38. PWC – PERGER, Júlia – PÉTERFI, Csaba – ARDELEAN, Anett (2020): Kényszerpihenő helyett túlórák, avagy kik a COVID-19 nyertesei. [Overtime instead of forced rest, or who are the winners of COVID-19.] URL: https://www.pwc. com/hu/hu/kiadvanyok/assets/pdf/ Kenyszerpiheno_helyett_tulorak_avagy_ kik_a_COVID-19_nyertesei.pdf (Letöltés dátuma: 2023.03.20.)
39. RAYNOR, D. B. (2020): Share of consumers who purchased food or groceries online in selected countries in Europe from 2006 to 2019. https://www.statista.com/ statistics/915391/e-commerce-purchase-rate-of-food-or-groceries-in-europe-by-country/ (Letöltés dátuma: 2022.06.22.)
40. SOÓS Gabriella (2020). Az élelmiszer-fogyasztói szokások változása a COVID-19 vírus megjelenéséhez kapcsolódóan Magyarországon. [Changes in food consumer habits related to the appearance of the COVID-19 virus in Hungary.] ELTE, EKE, Oeconomia, 54 (3), 15–27. https://doi.org/10.15170/MM.2020.54.03.02
41. Statista: E-commerce. 2020a https:// www.statista.com/outlook/243/100/ ecommerce/worldwide (Letöltés dátuma: 2020. 06. 28.)
42. STATISTA (2023) E-commerce in Hungary - Statistics & Facts https://www.statista.com/topics/6365/e-commerce-in-hungary/#topicOverview letöltési dátum: 2023. 04. 29.
43. SZABÓ Dániel (2020): Megváltoztak a magyarok vásárlási szokásai. [The shopping habits of Hungarians have changed.] https://www.napi.hu/ magyar_vallalatok/mastercard-online-vasarlas-fizetes.706423.html (Letöltés dátuma: 2022.06.21.)
44. SZAKÁLY Zoltán (2013): A funkcionális élelmiszerek marketingje és piacvezérelt fejlesztése. Zárótanulmány. GTK2 Munkacsoport. TÁMOP-4.2.2./B-10/1-2010-0019 számú „A Kaposvári Egyetem tudományos képzési tevékenységeinek és szakmai műhelyeinek fejlesztése" c. projekt. Kaposvár, Kaposvári Egyetem, GTK, Marketing és Kereskedelem Tanszék, [Marketing and market-driven development of functional foods. Final study. GTK2 Working Group. TÁMOP-4.2.2./B-10/1-2010-0019 "Development of scientific training activities and professional workshops of Kaposvár University" c. project. Kaposvár, University of Kaposvár, GTK, Department of Marketing and Commerce]
45. Szakály Zoltán (szerk) (2017): Élelmiszer-marketing [Food marketing] Budapest: Akadémiai kiadó ISBN: 9789634540618
46. Trade magazin (2019): Egyre többen intézik online a heti nagybevásárlást. 2019. [More and more people are doing their weekly shopping online. 2019] https://trademagazin.hu/hu/egyre-tobben-intezik-online-a-heti nagyb evasarlast/?fbclid=IwAR3sZRvXSA n 6 h u E Q e x 5 W A z 7 v u 9 q n Rmn U x U n - BLk5vQPaMLfHPnClzhkn8e0 (Letöltés dátuma: 2021.10.24.)

47. WEINBERG, B. D. (2001): Research in exploring the online consumer experience. Advances in Consumer Research, 28 (1), 227–232.
48. ZENG, L., FAVIER, M., HUANG, P., COAT, F., (2012), Chinese Consumer Perceived Risk and Risk Relievers in E-shopping for Clothing, *Journal of Electronic Commerce Research*, 13, 3, 255-274.

ELEK SÁNDOR, GYÖRGY OTTILIA, ILLYÉS LÁSZLÓ, PÉTER EMŐKE KATALIN: FAMILY FARMS IN HARGHITA COUNTY*

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Abstract

Importance of the agriculture and rural areas is much higher in the new EU member states than in the EU15. As in most of the new member states a dual argriculture has formed in Romania as well during the privatization process. Beside this, in the case of Romania this stucture has a significant regional diffences as well. The large farms are rather rare, the proportion of small farms is higher not only in number, but in the proportion of land use in mountain areas (including Hargita county).
This situation involve some question. Namely: what is the basic characteristic of different farms, the small farms can or not survive, what is the development plans of farmers for the next future? In order to answer these quetions we have used several data sources and different study methods. Beyond analyses of literature and official documets we used questionnaire.
Keywords: family farm,small farms,agriculture

1.Introduction

Our study consists of two main parts. In the first one, we analyse the most important characteristics of agriculture in Romania, and in particular in Szeklerland, on the basis of literature sources and official statistics. Our first aim was to present the current situation and the recent past. It was also necessary to analyse the recent past because the privatisation of agriculture in Romania has taken place in a specific way, different from other Central and Eastern European countries. The second part is based on our own questionnaire survey conducted in the summer of 2021. As a first step in processing the questionnaires, a database was compiled and then a correlation analysis based on distributions and cross-tabulations was carried out. We conclude our study with a brief summary and conclusions.

2.Agriculture in Romania and Szeklerland

Main characteristics of agriculture in Romania

In Central and Eastern European countries, the importance of agriculture is much higher than in the old EU Member States. The greater importance of agriculture is explained not only by the greater agropotential but also by the historical tradition. However, after the change of regime in 1989, the share and number of people employed in agriculture increased due to industrial cutbacks and the decollectivisation of agriculture (Pasti V, 1996, Benedek J, 2006). In Romania, decollectivisation was not a compensation but a re-reprivatisation. In other words, the original ownership structure was the starting point of the transformation, and the end result was the creation of a very large number of very small agricultural units. A very large proportion of these farms are subsistence farms. In the literature, this process has been termed 're-peasantisation'. This process was not planned but spontaneous. At least in the sense that this was not the aim of the new agricultural policy. However, in the very high

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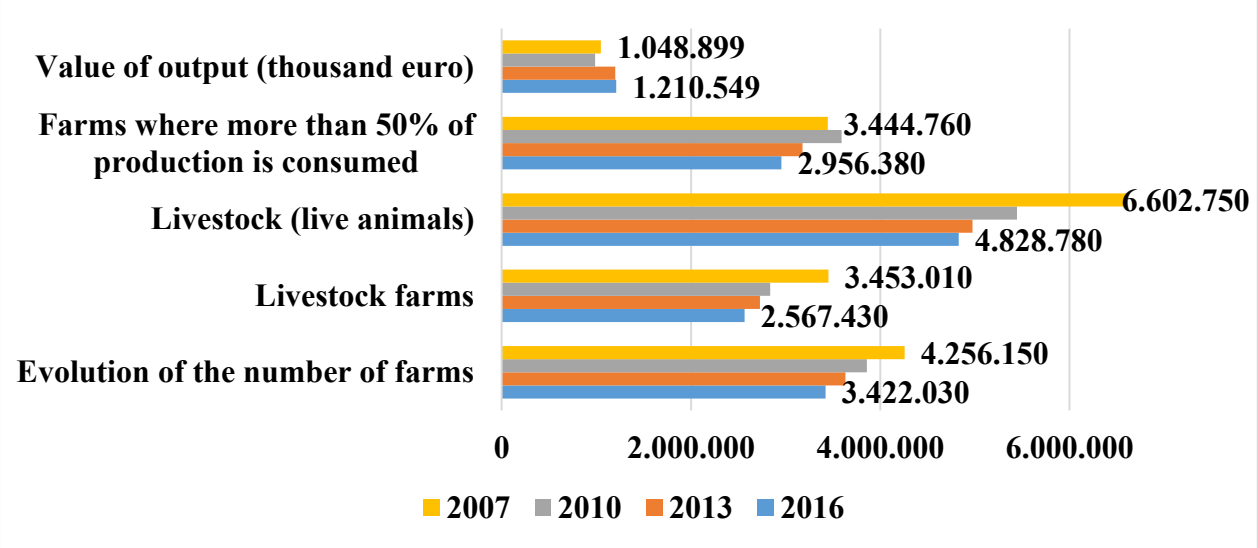
unemployment conditions of the 1990s, economic policy did not see it as a problem, but rather as a poverty-alleviating opportunity, an opportunity to prevent social explosion. As a result, Romania has the highest share of the agricultural population of all EU Member States, with a very high number of subsistence farms and a significant share of land use.
Nevertheless, Romania's agriculture has undergone structural changes in the 10 years since EU accession. Between 2007 and 2016, the number of farms decreased by 20%, from around 4.3 million to 3.4 million. At the same time, there was a significant decrease in the number of farms with livestock, which also meant a decrease in the number of livestock. Nevertheless, as the figure below shows, the value of agricultural output has increased.

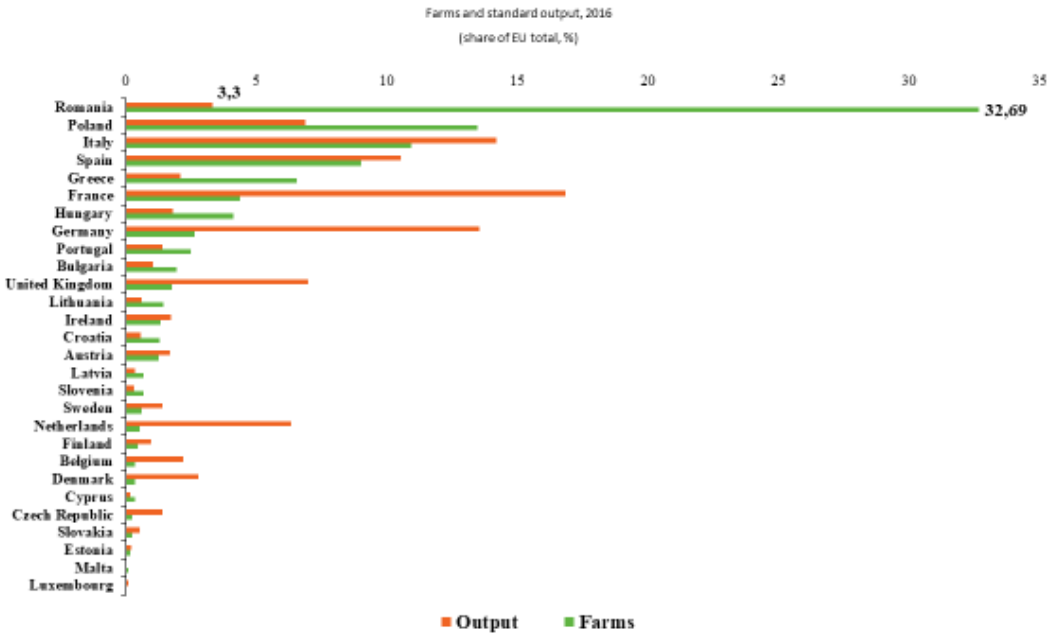
Figure 1. Agriculture in Romania 2007-16



Source: own editing based on EUROSTAT data

Following these changes, Romania's share in EU agricultural output and the number of farms, compared to the other Member States, is as follows.

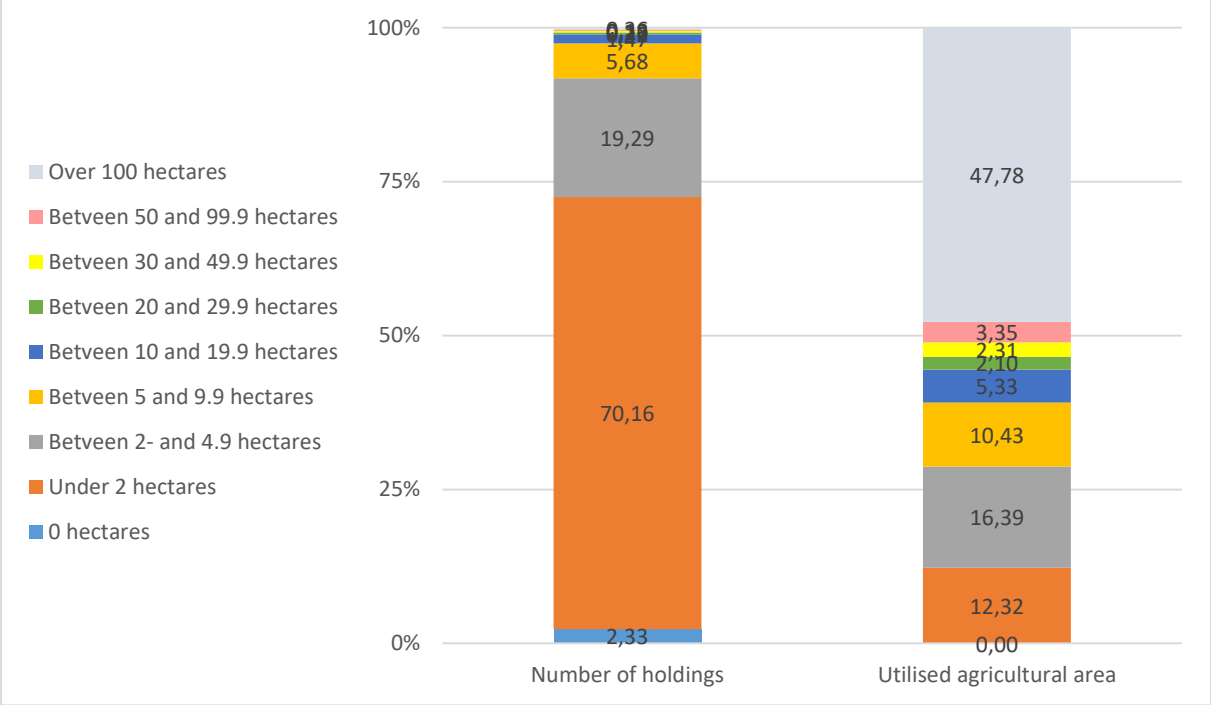
Figure 2. Share of EU Member States in agricultural output and number of holdings (%, 2016)



Source: own editing based on EUROSTAT data

The majority of farms in Romania are family farms, with farms under 5 hectares in size accounting for 90% of all farms. Family farms almost exclusively use family labour. Almost one third of the agricultural area is cultivated by small farms of less than 5 ha. While it is true that the average size of farms in Romania has increased from 3.3 to 4 hectares in recent years, this is still well below the EU average of 15 hectares. More than 3 million farms have less than 5 hectares. At the other end of the spectrum are around twelve thousand farms over 100 ha. These large farms cultivate almost 50% of the agricultural land in Romania. Thus, the agricultural structure in Romania is highly polarised.

Figure 3. Number of farms and distribution of land use by size of holding (2016)



Source: own editing based on EUROSTAT data

Based on the above data, it is not surprising that 94% of Romanian farms (3.1 million farms) have a production value of less than €8 000. The largest share (67%) is made up of farms with an output of less than €2 000 (2.3 million farms). These are generally subsistence or semi-subsistence farms. The number of farms with an output of more than € 500,000 is only 16,700, which represents 1% of all farms (Source: own calculation based on EUROSTAT data)

Agriculture in Szeklerland

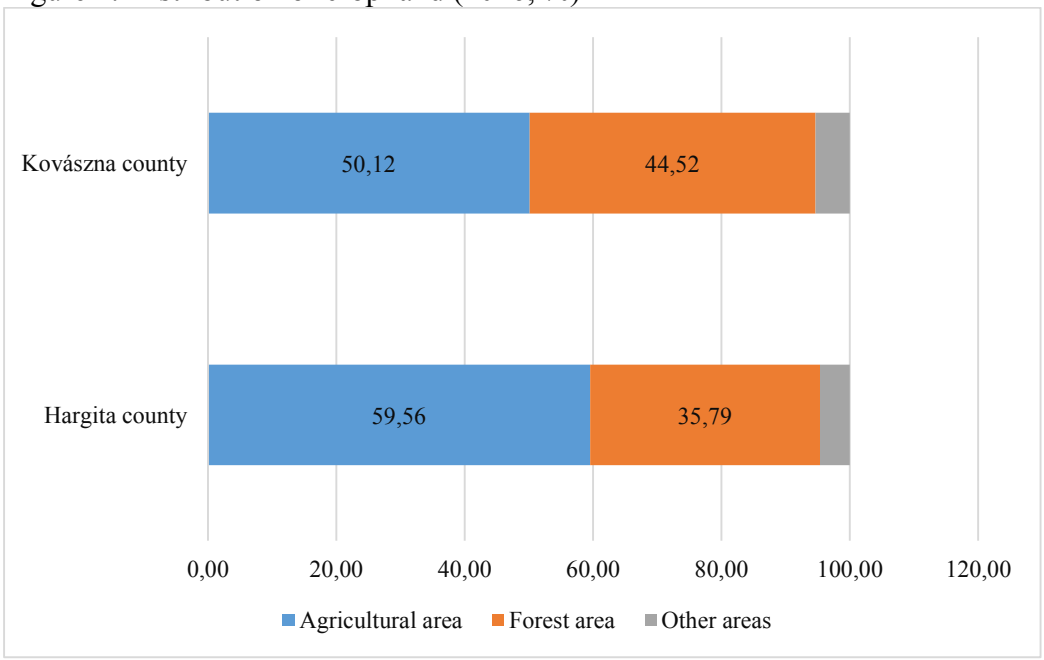
The fragmented land tenure structure typical of agriculture in Romania is even more so in Szeklerland. Even before collectivisation, Szeklerland was characterised by relatively small holdings and land scarcity. This was partly due to natural conditions, partly to inheritance patterns and agricultural overpopulation. Of course, privatisation in Szeklerland also took place under the general Romanian legal conditions. However, the final (current) land tenure structure was somewhat different due to local circumstances. It is worth pointing out here that, since the proportion of small farms was high even before collectivisation, the first privatisation laws returned more land to the old owners or heirs than in other parts of the country.

There are also significant differences between Szeklerland and other regions of Romania in terms of natural conditions and, consequently, production structure. Szeklerland is characterised by hilly and mountainous landscapes, with a relatively small proportion of flat land. Soil quality is well below the national average. The growing season is significantly shorter in mountain areas. Winters are colder

and summers cooler. It is therefore not surprising that the distribution of farming and the production structure are different from the national average.
The main differences are the much higher degree of forest cover and the much higher proportion of pasture. The weight of arable land is smaller and the proportion of crops grown there is different. It is striking, though not surprising, that Szeklerland's ploughland hardly produces any oilseed crops, especially sunflowers. Maize production is also more prevalent in the warmer climate of Covasna and Mures counties. Cereals and potatoes are most common in the cooler regions. The latter is the most important cash crop in Szeklerland, and its production also has comparative advantages. Pastures in mountainous areas and valleys are well suited to semi-intensive livestock farming. However, livestock numbers are declining. The few cow farms in these areas are not able to meet the requirements of both economic viability and EU standards. However, there are few larger farms in the whole region.

Until the accession to the EU, but not since then, agriculture in Szeklerland has not changed fundamentally: the predominantly family-run small farms, the former dominant varieties and production technologies have remained. In the Szekler counties, the production model is characterised by small plots of land, self-sufficient, individual (family) farms. The average size of farms is very small by EU standards.
A part of the agricultural products produced in the region is still exported as raw material with a low degree of processing. Several exemplary initiatives have been launched in recent years to increase the degree of processing and organise marketing. In particular, there are examples of milk processing in the region which could be used as a model for the development of a competitive processing sector in the long term.
The figure below shows that the weight of agricultural land in Harghita County is even lower than in Covasna County. In Harghita County, which has a cooler climate, cereals and potatoes are the most widespread crops. The size of pastures, on the other hand, provides good conditions for livestock production. Cattle, pig, sheep, goat and poultry breeding and rearing are typical of the region.

Figure 4. Distribution of crop land (2016, %)



Source: own editing based on INSSE data

In Harghita County, the average size of a farm is 4.55 hectares, in most cases also in several parcels. The agricultural activity of the region is mainly based on ensuring the self-sufficiency of the population in food production and on the exchange - sale of products on the local market. Between 5

and 10% of family farms have a link with the market, and production is mainly geared towards self-sufficiency and local bartering. There are only a few market farms per settlement and whatever they produce for the market, they also produce the quantity needed for self-sufficiency (Bíró A.Z.- Gagyi J.- Oláh S.,1994). Almost 70% of the land holdings are less than 3 hectares. Most of the private land in the border areas of the villages of the county is divided into small holdings of 3-5 ha, with a small number of holdings of 5-10 ha. In Harghita County, 13.1% of the land is owned by enterprises, i.e. 86.9% of the land is owned by family farms, which produce mainly for subsistence (Source: Own calculation based on data from the Harghita County Statistical Office).
The following are the main data and findings of our own questionnaire survey in Harghita County.

2.Main facts and findings of the questionnaire survey

Type of questionnaire and sampling method

Although the main objective of our research was to study family farms, we used a household questionnaire. It is well known that family farms in Szeklerland, including those in Harghita County, are small. In such farms, household and farm are not completely separated. This is true both for the factors of production (labour, machinery, buildings, but also financing) and for the results of farming and the use of products (sale, internal production use, self-sufficiency). In such farms, the resources and factors of production serve both the farming and the household's purposes, and a very significant proportion of the goods produced are directly put on the household's or relatives' table. Moreover, it is accepted in international research practice that household questionnaires are used to survey small farms (Buchenrieder, 2007).
The subjects of the questionnaire survey were selected on the basis of sampling. The sampling was carried out in 7 municipalities of Harghita County. The survey was carried out by students of Sapientia EMTE, by face-to-face interviews in the summer of 2021. In selecting the sample items, we aimed to have an evenly distributed sample of respondents in the given municipality, and to have a diverse sample size. We interviewed the heads of household, but of course we also included information on other household members. For the facts of farming, we were primarily interested in data for 2020, but in some cases we also asked for earlier data. For farms that were not yet farming in 2018, we also asked about the considerations that led them to start farming. After checking the data, a database of 173 questionnaires was compiled. The main characteristics of the sample are described below.

Distribution of the sample, some correlations

We know from the literature and from our previous research that cooperation is common among Szekler farmers, both in the use of tools and in work, typically with informal arrangements. However, this does not mean that extended family living is common. In our sample, too, we found that only 9 out of 173 households are single-headed households, but the majority are households with 2-4 persons, the maximum being 6 persons, of which only 2 are single-headed. Thus, we can conclude that the extended family lifestyle is not typical among farmers in Harghita County.
It is known from the literature and from statistical data that most of the farms in Szeklerland are family farms and their size is small. This is not different in our sample. In about 15 % of the interviewed households the size of the cultivated land is less than 1 hectare. And between 1 and 5 hectares is more than 40%. So about half of the farms are less than 5 hectares. And holdings over 50 ha are extremely rare.

It is also worth looking at the distribution of farms by area farmed and age of the head of household. These data are shown in the following table based on the sample data

Table 1. Distribution of holdings by cultivated area and age of head of household

	Under 40 years	Betveen 40 and65 years old	Over 65 years old
1 under hectares	4	20	1
Betveen 1and 6 hectares	13	45	11
Betveen 6 and 10 hektares	9	24	7
Betveen 10 and 20 hectares	6	10	0
Betveen 10 and 50 hectares	2	7	0
Over 50 hectares	1	2	0

Source: own edit

These data also show that, as is generally believed, older people have smaller farms. However, it cannot be said that only older people have small farms. Even among young farmers under 40, who are eligible for EU support, there are still quite a few small farms. However, it is also true that the majority of farmers (heads of household) belong to the middle-aged group. The same 'middle ground' can also be seen in the educational attainment of heads of household. More than two thirds (70%) of the household heads surveyed have completed secondary education. It is also typical that this secondary education is mostly vocational school without a school leaving certificate. Heads of household with tertiary education are quite rare in the sample, and there are hardly any with tertiary education in agriculture.

Another important feature is that there are also some people in the sample who have recently started farming. More specifically, we asked whether the farm existed in 2018. We found it a bit surprising that almost 10 percent of the sample are farms that did not exist before 2018. We also asked what role different considerations played in the start-up of farming, and tried to measure the intensity of these considerations by scaling. The small numbers of cases suggest caution, but in any case remarkable trends emerge.
The so-called 'compulsory farmer considerations' (job loss, retirement, etc.) were not significant. Rather, they cited income generation, obtaining EU subsidies, the use of recently purchased land, and especially food supply for the household as the main reasons. Such an importance of the latter is surprising even if we know that one of the characteristics of family farms in Szeklerland is the high importance of subsistence production. However, it was previously assumed that this was more typical of older people and those who had been farming for a longer time. We do not know, however, whether these figures allow us to predict the persistence of food self-sufficiency, or whether it is a temporary reaction to the epidemic situation. In any case, we can assume that self-sufficiency will remain a basic characteristic of farming in Szeklerland in the near future. In any case, the importance of this form of farming in Romania, and within it in Szeklerland, is high among all EU Member States, not only in terms of the number of farms, but also in terms of land use.

The following data group farms according to the occupation of the head of household and the area cultivated.

Table 2. Distribution of farms by area cultivated and occupation of head of household

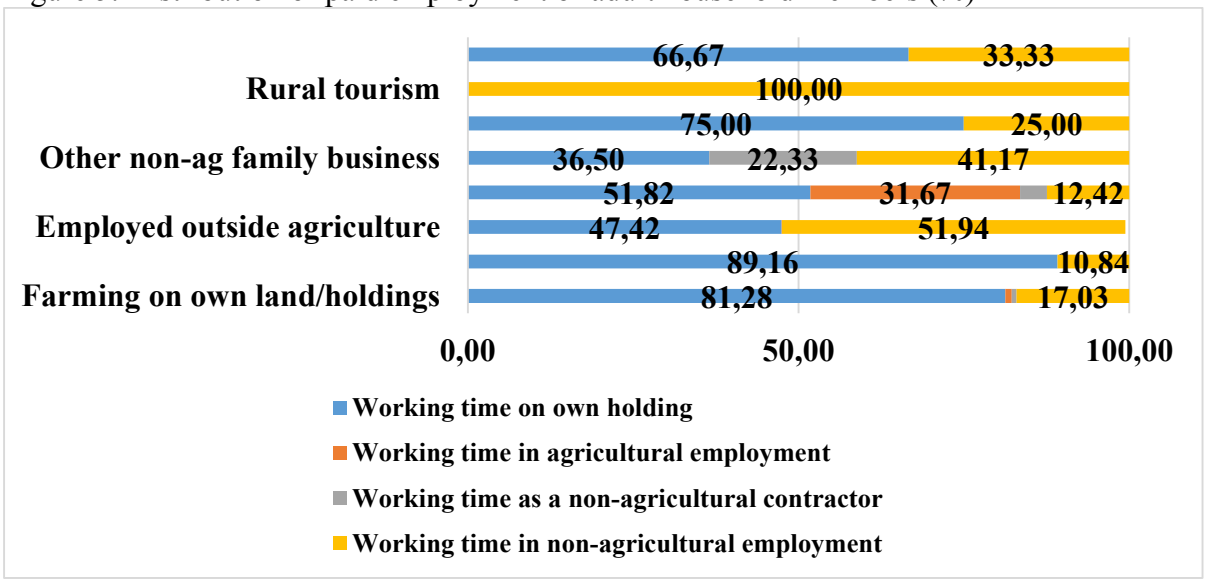
	Under 1 hectares	Betven 1 and 6 hectares	Betveen 6 and 10 hectares	Betveen 10 and 20 hectares	Betveen 10 and 50 hectares	Over 50 hectares
Farming on own land/estate	6	9	9	6	9	3
Employed work in agriculture	0	5	3	2	0	0
Employed outside agriculture	16	40	21	6	0	0
Other non-agricultural family business	0	3	1	1	0	0
Rural tourism	0	0	0	1	0	0
Retired	1	10	5	0	0	0
Housework/household work	0	1	0	0	0	0
Unemployed	0	1		0	0	0

Source: own edit

Given the size and carrying capacity of farms, it is not surprising that the majority of heads of household (about two-thirds) are not in agriculture. However, the vast majority of those in agricultural occupations (around 80%) are selfemployed farmers. As already mentioned, the majority of the holdings in the sample cultivate less than 5 ha of land. Farms larger than the local scale are more likely to be found only among the group of heads of household in agricultural occupations. In terms of occupation, the group of non-agricultural employees is the most numerous. The majority of retired farms are between 1 and 5 ha. Overall, the occupation of the heads of household also shows that the majority of holdings are part-time.

This part-time nature of course varies from group to group. The following figure shows the distribution of the time spent by adult household members in gainful activity (working on own farm, as farm employee, in own non-farm enterprise or as non-farm employee) by occupational group.

Figure 5. Distribution of paid employment of adult household members (%)



Source: own edit

The data show that even adult members of households with small farms spend a lot of time on the farm. Within total money-earning activities, only the share of time spent on the farm is lower than 50% for households in the non-farm employees, higher education, non-farm business and less than 1 ha farm groups.

About the factors of production

We have already discussed land use in the section on land distribution. It is well known that Szeklerland is traditionally characterised by a scarcity of arable land. Consequently, the price of land and the functioning of the land market are of particular importance in farming. Moreover, in addition to farming aspects, land has had, and to a certain extent still has, a symbolic, status-marking role in village communities. This is why we asked farmers for their views on buying, selling and renting land. Here again, the scaling method was used to measure intensity.
The results of the survey and the measurement show that more farmers want to buy land than to sell it. In addition, there is a specific land market factor: unclear land tenure and ownership. We would venture that this is one of the obstacles to agricultural development and investment. The unclear ownership situation and the lack of land registers not only limit the scope of marketable agricultural land, and complicate the acces to susidies. As regards land use data, it is also worth mentioning that since 2018, 26 of the farms surveyed have increased their land area by a total of around 100 ha, mainly (60%) due to an increase in ownership. Moreover, the area of kitchen gardens has also increased.
From the answers of the respondents it appears that there are almost never permanent employees in family farms in Harghita County. The use of labour is essentially family labour. Temporary employees are also rarely used, rather only during peak periods. Of course, it is possible that in reality the use of outside labour is somewhat more frequent than reported, but this is more likely to be informal. This may include mutual favours (kaláka) and unannounced hiring of labour.
Another important factor of production is the number of machines, tools and even their existence. Given the size of farms and the time use of household members, the low level of mechanisation is not really surprising. More precisely, the low share of work done with own machines. According to the respondents, the proportion of farms typically relying on manual labour is barely more than 10 %, and the proportion of farms typically relying on animal labour is below that level. Their share has remained essentially unchanged compared to 2018. In 2021, the share of farms typically relying on own machinery was only 30%. In 2020, however, this share increased by about 5 percentage points. The share of farms that typically rely on other people's machines (shared use, contracted use) has remained more or less unchanged: one in five farms is or was in this category. The share of holdings that partly own their own machines and partly use other people's machines has decreased slightly. The most significant change is therefore the increase in the share of own use.
In addition to the size of the holding, the number of own machines is also dispersed according to the age of the household heads (the farmers): younger people have more and more machines. The actual machine ownership, or more precisely machine use, is nevertheless more favourable than the machine ownership rate. This is because, as the typical work data show, some of the mechanical work is done with other people's machines. Nor is it uncommon to find so-called machine kaláka. In some cases, individual farmers own different machines and 'work together'. These co-operations usually involve members of a few related and/or friendly households. In recent years, mechanisation has increased, particularly on larger farms, and EU subsidies are likely to have played a significant role in this.
We also asked farmers about the adequacy of their current farm buildings. More specifically, whether they need more buildings to continue producing goods. Just over a fifth of all respondents said yes. This proportion was higher than average, more than double the average, among those with larger farms and among the younger and better educated.

3.Opinions on subsidies, development ideas

Under current EU agricultural policy, farmers receive substantial subsidy. However, the scale of EU agricultural subsidy is not indifferent to the way in which it is delivered. Compared to the early years, when price support was the dominant form of subsidy, this has changed following the CAP reforms, so that direct payments, or in more common terms land-based payments, now account for the largest share. This change had already taken place before the accession of the new Member States and is now, with some transition and minor differences, the main form of subsidy in the new Member States. The slight differences mean two things. Firstly, in the old Member States it is essentially a property right, determined on the basis of past production or price support received. In the new Member States, the aid is based on annual land use. There is also a difference in that the amount per hectare is higher in the old Member States because of differences in the so-called reference yields. The more fragmented farm structure in the new Member States also means that no aid can be granted for areas below the minimum eligible parcel size. In addition to land-based payments, there is also a significant amount of development aid, which is available on the basis of tenders, and agri-environmental payments.

Based on the sample data, the number and proportion of people who applied for these types of aid was examined. Not surprisingly, the highest proportion of beneficiaries received land-based payments, which do not require a co-payment and can be applied for and received on a so-called normative basis. In other words, they are available to all those who qualify. In view of this fact, it is rather to be explained why only farms representing about 60% of the sample applied and why some of them did not receive it. This could be due to a smaller plot size than the minimum required and/or inaccurate land registration.

The proportion of people applying for development aid is much lower, with one fifth of respondents in this group, but despite the fact that it is available through a grant application and with a co-payment, the success rate is still quite high: only a few unsuccessful applicants. The result was that successful applicants accounted for around one sixth of the sample. Although not included in the questionnaire survey, we know from other information that most of the development applications were for machinery. Otherwise, not surprisingly, both among the applicants and among the successful applicants, there was an over-representation of farms with larger farms, farms with younger and more educated heads of household.

In the third category, which aims to promote or reward environmentally friendly farming, applications are rare. Here too, larger farms tend to be over-represented.

Farmers were also asked about their future plans for the farm. Specifically, whether they plan to expand, maintain or transfer their farm, and where they plan to develop it and what resources they plan to use. As with current tendering data, there is an over-representation of farms owned by those with larger holdings and younger and more educated heads of household, but by no means exclusively. The proportion planning to develop with bank finance is very small, with around 6% of respondents selecting this option as part of their plans. It may be partly because they find access difficult or do not want to get into debt. Own resources, including family assistance, were most often cited as a source of financing for development plans.

Farmers were also asked about the projected future of the farm. Those who want to keep it at the current level are the most numerous: just over 40% of them belong to this group. About 15% plan to transfer or sell the farm. The majority are planning to transfer their farms, only a few are planning to sell. Around one eighth are planning to reduce their holdings, so that overall those planning to transfer, sell or reduce their holdings make up just over a quarter of the sample. In these groups, older people are naturally more numerous. On the other hand, middle-aged, middle-educated and middle-owned are over-represented among the level holders. The share of those planning to expand the farm as a whole is about one fifth, and the share of those planning to specialise (expand some activities and reduce others) is about half. Young and middle-aged people are over-represented among those intending to expand. These trends are favourable for the modernisation of agricultural production.

4.Summary, conclusions, proposals

The family farms in Szeklerland (Harghita County) are still characterised by small farm sizes. An important characteristic of land use is the uncertain legal situation. More precisely, the lack of clarity in the actual use and in the official records. To a large extent, this situation is a consequence of the way privatisation has taken place. One of the most important issues to be resolved for the development of agriculture and the functioning of the land market would be to clarify land tenure. The nature of the task requires the involvement of the state and the legislature. However, farmers' organisations and development agencies could also play a role. For example, by promoting membership, providing funding or even organising. Of course, we are not talking about compulsory but voluntary, so-called civic participation.

Of the three main forms of support (despite the shortcomings of the land register), the highest proportion of beneficiaries is land-based support (direct payments). This is followed by development aid. To their knowledge, machinery purchases are the most important in this category. This is no coincidence, as the tendering, implementation and financing of these is much simpler than, for example, construction investments. This form of support will presumably remain popular, but given the small size of farms, it would be worth considering ways of implementing it that would better promote mechanisation on smaller farms. E.g. investment or possibly operational support for machinery rings, machinery service providers.

The use of agri-environmental subsidies is rather limited, so to speak only for larger farms. However, in the next financing period up to 2027, the role of agri-environmental support in the EU will be enhanced. As agri-environmental requirements will be used even more as a precondition for first pillar (land-based, direct payments). In addition, the share of agri-environment payments in total EU agricultural support will increase. It is therefore essential to prepare for this change and to prepare farmers for it. Otherwise, according to our experience, Szekler farmers are typical for environmentally friendly farming, but they are rather weak in "administering" it, in obtaining formal certifications. Therefore, help in this area is needed rather than awareness raising.

It is well known that farmers in Szeklerland are committed to agriculture. This is also reflected in their attachment to this activity, with relatively few thinking about giving up, selling the farm or transferring the property. The latter is also more likely to be done within the family. and older people are more likely to do so. Another encouraging trend is that younger, more skilled farmers have plans for development and expansion.

Bibliography

Books and studies

- Arkleton Trust (1989): Rural Change in Europe: Research Programme on Farm Struktures and Pluriactivity. Nethy Bridge, U.K.
- Benedek József: Területfejlesztés és regionális fejlődés, Kolozsvári Egyetemi Kiadó, Kolozsvár, 2006
- Bíró A. Zoltán, Gagyi József, Oláh Sándor: Gazdálkodási gyakorlat a Székelyföldön. A paraszti mentalitás működése a gazdálkodásban és korlátozó szerepe a piacgazdaság kialakulásában. Antroplógiai Műhely 1.(4.) 7-39 o., 1994.
- Buchenrieder, G. et.al: Conceptual Framework for Analysing Structural Change in Agriculture and Rural Livehoods. IAMO, Discussion Paper No. 113., Halle, 2007
- Camelia Serbănescu, Daniela Giurca, Mirela Rusali: The Romanian Agri-leírni a lefood Trade 1998-2003: a Top-ten Analysis. In: Globalization, European Integration and Economic Transformation, Edited by Gábor Fóti and Tamás Novák, Budapest, 2005
- EC (2020): Agriculture, forestry and fishery statistics 2020 edition, Statistical Books, ISBN 978-92-76-21522-6, doi:10.2785/496803 doi:10.2785/143455
- EC (2020): Recomandări adresate statelor membre cu privire la planurile lor strategice pentru
- Elek Sándor: Részmunkaidõs farmok a fejlett országokban. In: Szociológiai Szemle /l994/ No. 1.

- Elek Sándor – Fogarasi József: A romániai agrárgazdaság EU csatlakozásának első tapasztalatai. In: Csata Andrea – Elek Sándor (szerk.): Gazdaságpolitika – vidékfejlesztés. Az európai uniós tagság kihívásai Székelyföldön. Scientia Kiadó, Kolozsvár, 2009.
- Elek Sándor -György Ottilia - Illyés László - Péter Katalin: Családi kisgazdaságok Magyarországon és Romániában. Presa Universitara Clujeana / Kolozsvári Egyetemi Kiadó, Kolozsvár, 2016, 1- 174. pp. (ISBN: 978-973-595-9)
- Fritzsh, J. – Buchenrieder, G.- Möllers, J. : Non Farm Diversification of Rural Households in Central and Southeastern Europe: an Aplication of Fuzzy Set Thyeory, paper presented at 118th EAAE Seminar, Ljubjana, 2010
- Fuguitt, G.V. (1961): A typology of the part-time farmers. Rural Sociology. Vol.26.No.1.
- Fuller, A.M. (1984): Part-time farming: The enigmas and the realities. In. Research in Rural Sociology and Development, Volume 1: Focus on Agriculture, Schwarzweller, H.(ed): Jai Press, Grenwich, Conn
- Gasson, R. et al: (1988): The Farms as a Family Business. Journal of Agricultural Economics, 39 (1): 1-41
- Ghib Marie-Luce, Larkham Krystyna, Luca Lucian: Small farm in Romania: evolution under localization constraint? Seminar 'Small Farms: decline or persistence' University of Kent, Canterbury, UK, poster paper, 2009
- Hann, C. (1987): Worker-Peasants in the Three World. In.: Shamin, T. (ed): Peasants and Peasant Societies. Oxford, Basil Blackwell
- Hargita megye középtávú stratégiai fejlesztési terve 2002-2013
- Horváth Gyula (szerk.): Székelyföld, MTA –Regionális Kutatások Központja, Dialóg Campus Kiadó, Budapest-Pécs, 2003
- Kocsis Tamás: Emberi teljesség és fogyasztói társadalom –Egy székelyföldi és egy nyugat – dunántúli felmérés tapasztalatai (Közgazdász fórum –elektronikus archívum)
- Schütz Nándor: Románia és Bulgária EU-csatlakozásának hatása agrárgazdaságukra – konferencia anyag - Balkán: együttműködés vagy verseny a mezőgazdálkodásban, 2006. április
- Pasti Vladimir, Miroiu Mihaela, Codiță Cornel: România - starea de fapt, vol I., Societatea (România –Helyzetjelentés), Nemira Kiadó, Bukarest, 1996
- Péter Emőke Katalin: Földbirtokváltozás Romániában. In: Csata Andrea – Elek Sándor (szerk.): Gazdaságpolitika – vidékfejlesztés. Az európai uniós tagság kihívásai Székelyföldön. Scientia Kiadó, Kolozsvár, megjelenés alatt.
- Politica Agricolă Comună, Bruxelles, SWD(2020) 391 final (https://eur-lex.europa.eu/legal-content/RO/TXT/?uri=CELEX:52020DC0846)
- Sepsiszéki Nagy Balázs: Székelyföld falvai a Huszadik század végén Csík –Kászon és Gyergyószék, Nap Kiadó, Budapest, 2000
- Summer, D.R. (1982): The off farm labour supply of farmers. American Journal of Agricultural Economics. Vol.64. August, pp. 499-510
- Székelyudvarhely Fenntartható Stratégiája- Helyzetelemzés, 2008
- Vofkori László (1997): Település- és területfejlesztés Udvarhely térségében (Regionális fejlesztési koncepció és területrendezési kerettanulmány).

Websites:

- http://www.agrarkapu.hu/sajto.php?cikk=13027&hcs=17
- http://www.agromediu.ro/date/c461894df92992ece289cd3db64f88f2/rodosz.pdf)
- http://www.kovaszna.lap.hu
- http://statistici.insse.ro/
- https://szekelygazda.ro/
- https://ec.europa.eu/eurostat/data/database
- http://statistici.insse.ro:8077/tempo-online/

GYÖRGY OTTILIA:
LABOUR MARKET IMPLICATIONS OF THE TRANSITION TO A CIRCULAR ECONOMY

1. Introduction

The labour market is undergoing a major transformation in modern times, influenced by three processes: digitalisation, the post-COVID wave and the greening of the economy. The ongoing greening of the economy has and will have a major impact on employment and the labour market.
The circular economy has a high potential for job creation, estimated at more than 1 million jobs in the former EU27 by 2030 (EuropeBusiness, 2021). These jobs will be created most quickly in those countries where employment in the waste management sector is already higher (e.g. Germany, UK).
In the period ahead, it will be particularly important to integrate circularity principles directly into education and training curricula, and to acquire the right knowledge, competences and attitudes in this area. The structural changes resulting from the green transition are complex and have implications for individuals, sectors and/or regions and will be implemented at different scales in different countries.

2. Literature review

Greening of jobs

The greening of jobs and the promotion of green jobs is already set out in the Europe 2020 strategy. Its primary objective is to promote sustainable development and achieve sustainability goals by transforming the labour market. The creation of green jobs in all sectors (agriculture, manufacturing, research and development, public administration and services) aims at preserving or restoring environmental quality through employment (Kiss, 2015).
The European Parliament took a position on the Green Jobs Initiative at its session of 8 July 2015 (European Parliament, 2015), which aims to exploit the job creation potential of the green economy. The report on the Green Jobs Initiative is called "Harnessing the job creation potential of the green economy" and was prepared by the EP Committee on Employment and Social Affairs. The resolution outlines the potential of the labour market in this respect, including the creation of sustainable jobs and the skills needed for green employment (including the need for competency-based matching, new competences, qualifications and occupations). Accordingly, the preparation of an EU Agenda for New Skills and Jobs became important and was subsequently adopted.
The aim is not to create a new form of employment, but to green the economy through employment. The transformation towards sustainable societies and economies is to create jobs that are green and to transform existing jobs into green jobs in different sectors along the whole value chain. This means reducing the environmental burden and ecological footprint of existing activities (Zachár, 2018). The green ambition for employment is linked to the CE Action Plan for the Circular Economy in that one of the four pillars of the CE Action Plan is the formation of attitudes, in which jobs play a significant role. A definition of green jobs can be found in the Green/EFA Group in the European Parliament's publication "Green Jobs, Successes and Opportunities for Europe".
Workplaces that use environmentally friendly technologies, carry out environmentally friendly activities, aim at technological improvements to protect the environment, carry out research aimed at protecting the environment. Green jobs" can therefore include any profession or activity that contributes to environmental protection, advances efforts to combat climate change, save energy and raw materials, use renewable energy, reduce waste, reduce pollution and protect biodiversity and ecosystems (Green Jobs, EFA). Together, these contribute to the success of the transition to a circular economy.
In their study, Simonas Gaušas and colleagues (2013) investigated the effects of greening industries on employment. They found that greening of firms will have a double impact on employment. On the one hand, new professions will emerge (with new qualifications) and, on the other hand, jobs will change, i.e. they will be extended to include new tasks related to environmental responsibility. In this

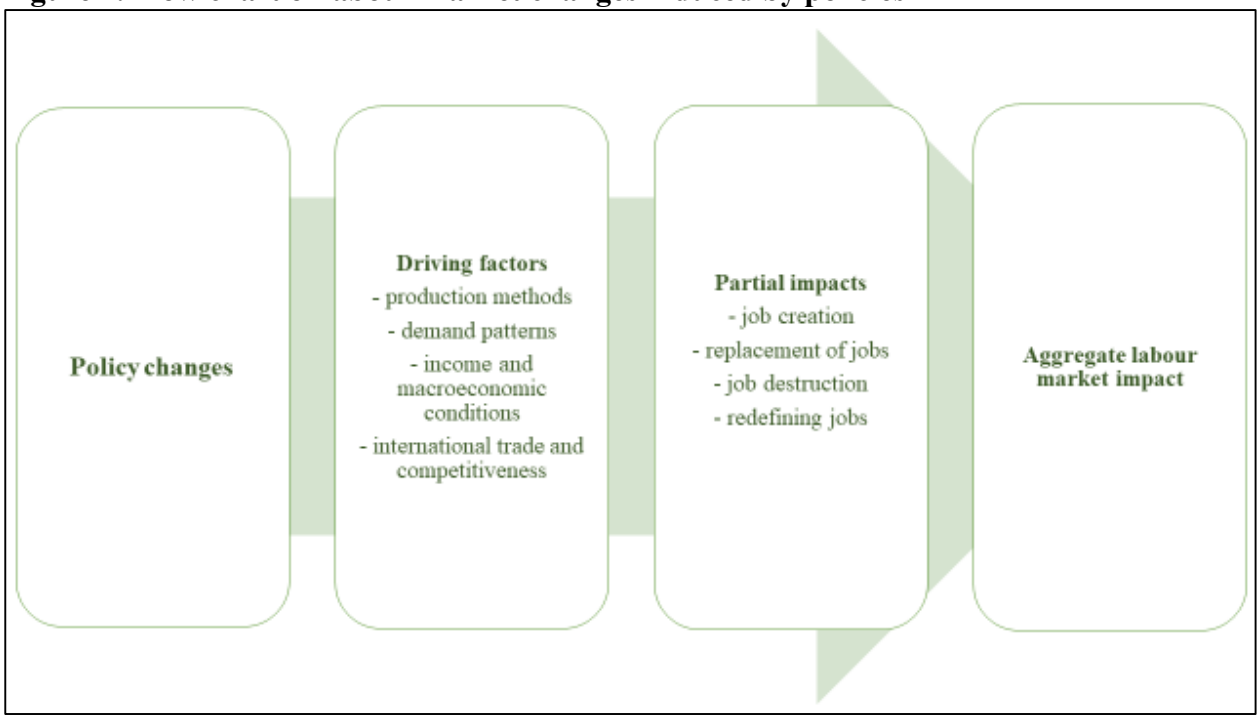
way, the green economy will have an impact on jobs in four main areas: job and career security, skills development, employee well-being and health, work-life balance.
BusinessEurope's 2021 publication makes it clear that a distinction should be made between green jobs and greener jobs, as we are part of a transition process. Some Member States distinguish between 'green' jobs and 'greener' jobs or 'hybrid jobs' (Duell, 2021).

The transition to a green economy requires first and foremost policy changes that lead to structural changes in employment. These changes are likely to be slow and will first be visible in sectors using green technology.

These changes include (Laubinger et al., 2020):

- job creation: new jobs are created to reduce environmental pressures or increase resource efficiency, i.e. circular business models;
- job substitution: economic activities within and between sectors shift from resource-intensive activities to more circular activities;
- job destruction: some jobs are lost, mostly in sectors with negative environmental impacts;
- job redefinition: new skills will be needed in existing jobs.

Figure 1. Flow chart of labour market changes induced by policies



Source: Own ed. based on Laubinger et al.,2020.

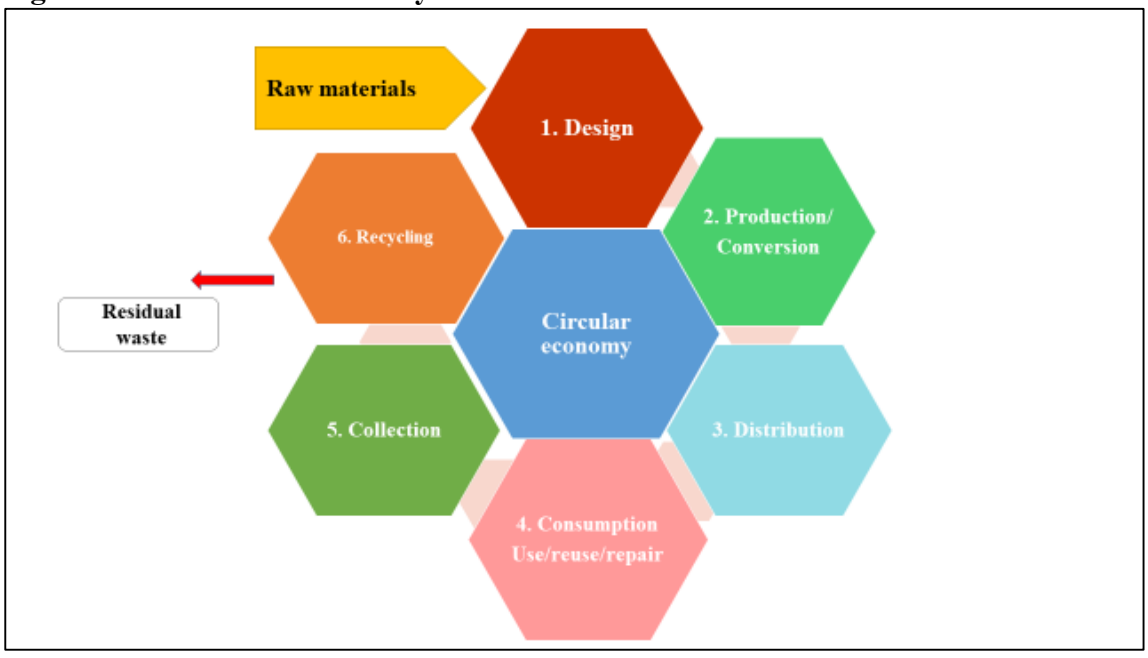
These changes will not be quick and spectacular, but they will be continuous and will transform the whole labour market. Today, only 0.3% of the total employed workforce in Europe is in a job that can be described as green, and 0.4% in OECD countries. This share is expected to be only 1% of the European workforce by 2030. But the shift to green growth will be an important factor in structural changes in the labour market.
Several studies have investigated which sectors are most likely to transform employment as a result of the transition to a circular economy According to the ILO 2018 report, the circular economy has the highest job demand growth (in percentage terms). According to the research, the manufacturing and mining sectors are expected to lose the most jobs, while secondary manufacturing (lead recycling, precious metals recycling, copper recycling, wood recycling, steel and aluminium recycling) and solar electricity generation will see the largest increases (ILO, 2018).

A European Commission study (EC, 2018) looks at 5 sectors where a shift to a circular economy is needed. The study shows that of the 5 sectors, 2 sectors across Europe will see job growth (waste management and services) and 2 sectors where raw material processing and production takes place (construction, non-metallic minerals, electronics and automotive) will see job losses.
Briefly about the circular economy model

The dimensions of the implementation of the circular economy can be considered at three levels: macro (at the level of countries, regions), meso (at the level of industries, eco-industrial networks), micro (Barreiro-Lozano, 2020). The meso level focuses on how waste (material or energy) from one company becomes raw material for another company, the micro level, focuses on whether and how the environmental performance of a given organisation is improved. The transition to a circular economy is a wide-ranging activity, from consumers to businesses to governments, and depends on the actions of everyone. The circular economy takes its name from the term "circular economy" (CE), also known as the circular economy, which has appeared and is used in foreign literature.

In the CE model, economic processes flow in a closed system and the key principle is that waste and by-products are almost 100% recycled. So the shift to a circular economy aims to stop waste and recycle it, thereby introducing a new way of looking at waste as a resource to reverse further production processes. This means taking environmental aspects and waste prevention into account right from the design stage. One of the fundamental tasks of the circular economy is therefore to change the way the economy has always worked, which entails not only a change in production processes but also a change in jobs.

Figure 2. The circular economy model



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https://www.europarl.europa.eu/news/hu/headlines/economy/20151201STO05603/korkorosgazdasag-mit-jelent-miert-fontos-es-mi-a-haszna

3. Skills and job types for the transition to a circular economy

With the transition to a circular economy, it is clear that new types of knowledge and learning are/will be needed to transform skills. Thus, one of the priorities of the renewed skills agenda (EC, 2020) published in 2020 is to support the development of green basic skills across the economy. Training is needed that will create a generation of climate, environment and health conscious workers. So-called

"green professionals" are needed, with a holistic vision and the appropriate professional knowledge to be considered "sustainable". The challenge is to transform existing occupational profiles and create the right workforce and knowledge for new professions.
In order for economies to successfully transition to work in the circular economy, labour supply must match labour demand, with workers with the education, experience and skills to match the new types of jobs (Burger et al., 2018).
Education plays a key role in promoting the transition to circularity. The circular economy requires new competences, and the creation of these competences contributes to the development and application of new methods (Sumter et al.,2021).
According to the European Commission's report "The impact of circular economy policies on the labour market", employment in reuse and recycling industries will increase significantly as economies become more circular. According to a study by the European Recycling Network, remanufacturing could create around 34,000-65,000 new jobs in Europe (EC, 2018). Another study suggests that a shift to a circular economy could create up to 1.2-3 million jobs in Europe (Peter -Keith, 2015).

Table 1. Literature on job creation in the circular economy

Sector	Study-maker Coverage	Study-maker Coverage	Job types
Recycling	EEA (2011)	EU	low-skilled jobs, but also medium- and high-skilled jobs, from collection, handling and processing to the manufacture of products
Recycling	ILO (2011)	Germany	16% low-skilled, 47% skilled, 11% technical, 25% university degree
Waste collection	ECOTEC (2002)	EU	labour supply for waste collection and management at relatively low wage levels
Recycling	APPSRG (2014)	UK	skilled workforce, with significant training needs
Waste management	SITA (2012)	UK	a large number of jobs, but particularly significant in mid-level (supervisors/ supervisors, operators) and low-level (manual) occupations
	Eunomia (2011)	UK	many skills needed, including jobs requiring higher education
Deposit return system (DRS) for packaging	Beck (2011)	USA	relatively high skill and training requirements

Source: Green Alliance, W. (2015), Opportunities to tackle Britain's labour market challenges through growth in the circular economy,

There is now a wealth of research and literature on the job creation potential of the circular economy. These studies focus on the need rather than the skills required. The table above is summarised from a study by GreenAlliance, whose main message is that the circular economy can create many types of jobs in the future, from low-skilled to high-skilled, depending on the industry and the activity. For the time being, the available data on specialisation and retraining as a result of the transition are scarce, with only partial studies looking at a slice or a branch.

The different levels and demands for skills and their transformation are also agreed by Burger and colleagues (2018). In their study they investigated the nature of circular employment and the needs and requirements of the (future) labour market. Their analysis reveals that a very heterogeneous and diverse labour market is required for the transition to a circular economy, both in terms of education

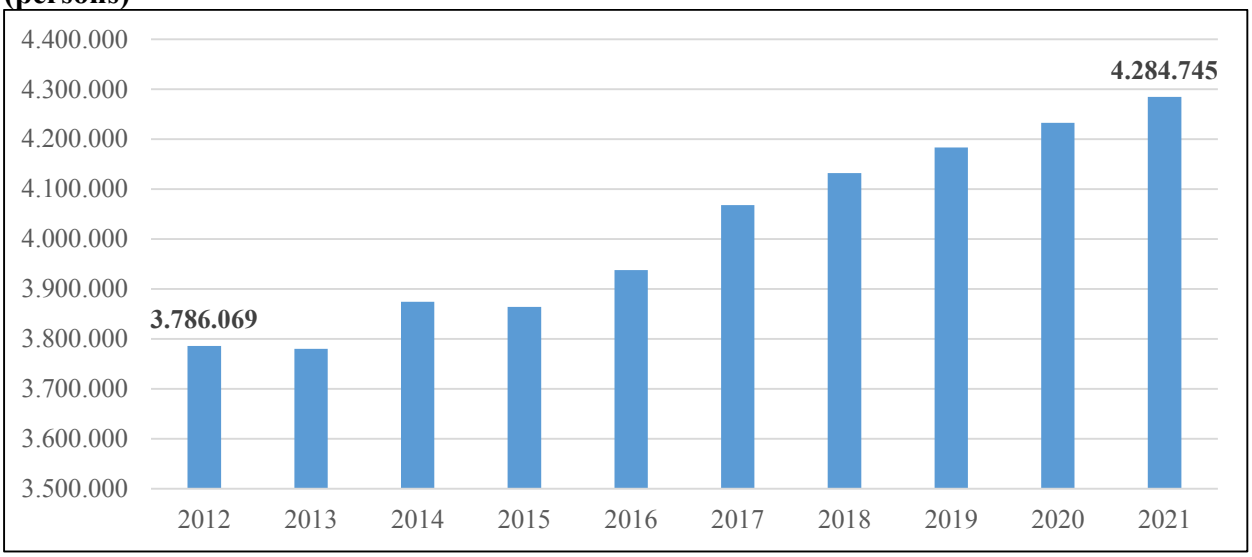
levels and skills, i.e. the education level and skill requirements differ across activities. On average, jobs in the basic productive sectors require on average lower levels of education, while jobs in the basic, research and development sectors require higher levels of education. Overall, there is a higher demand for circular jobs in terms of available skills. Thus, specific education and training programmes are needed to create circularity in the future.

Of interest is the study by Sumter et al (2021), which examined the new competences needed for planning according to the circular economy approach. The study presents nine key competencies required for design in the circular economy: (1) Circular systems thinking, (2) Design for use, (3) Design for multi-cycle use, (4) Circular business proposal development, (5) Circular user engagement, (6) Circular materials and manufacturing, knowledge, (7) Circular impact assessment, (8) Circular economic collaboration, and (9) Circular economy storytelling (shared vision and ideation). The combination of these competences underpins the growing interest in circular design.

3. Some statistics on the population employed in the circular economy (EU and Romania)

Below, I have looked at the number of people employed in the circular economy, taken from statistics on the EUROSTAT website. The indicator measures the 'number of persons employed' in three sectors: recycling, repair and reuse and rental and leasing. Jobs are expressed as the number of persons employed and as a percentage of total employment.

Figure 3. Evolution of the number of persons employed in circular economy sectors in the EU (persons)



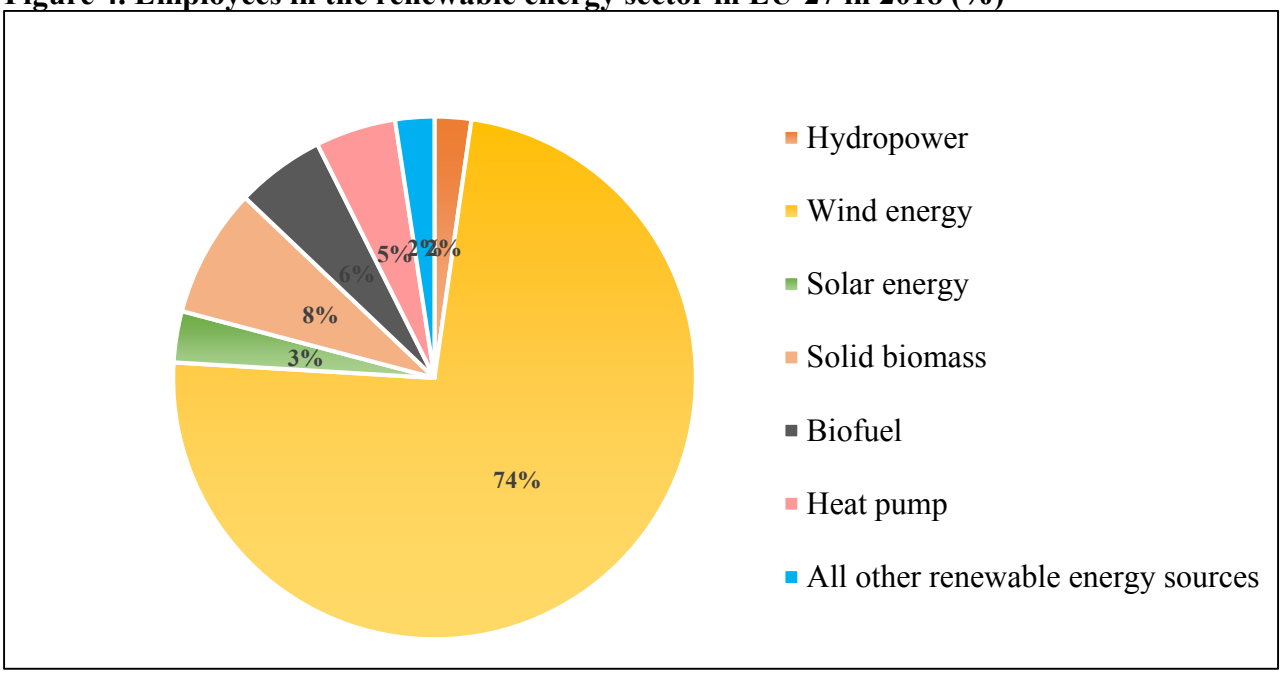
Source: own editing based on EUROSTAT data

Although the graph above clearly shows an increase, it is nevertheless fair to say that the overall growth trend is very low, with only a 13% increase over the last 9 years, which is an increase of nearly 500,000 people.

If we look beyond the numbers, by country, we see that the countries with the largest increases in the period under review, i.e. over the last 9 years, are Ireland (42% increase), Germany (27% increase), Estonia, Spain (32% increase) and Cyprus (58% increase).

If we look at the countries with the highest number of people working in the circular economy, we see that Germany (758) is in first place, followed by Italy (613), France (523), Spain (454) and Poland (441). Obviously, these are absolute figures, which do not yet show how much this represents in relation to total employment.

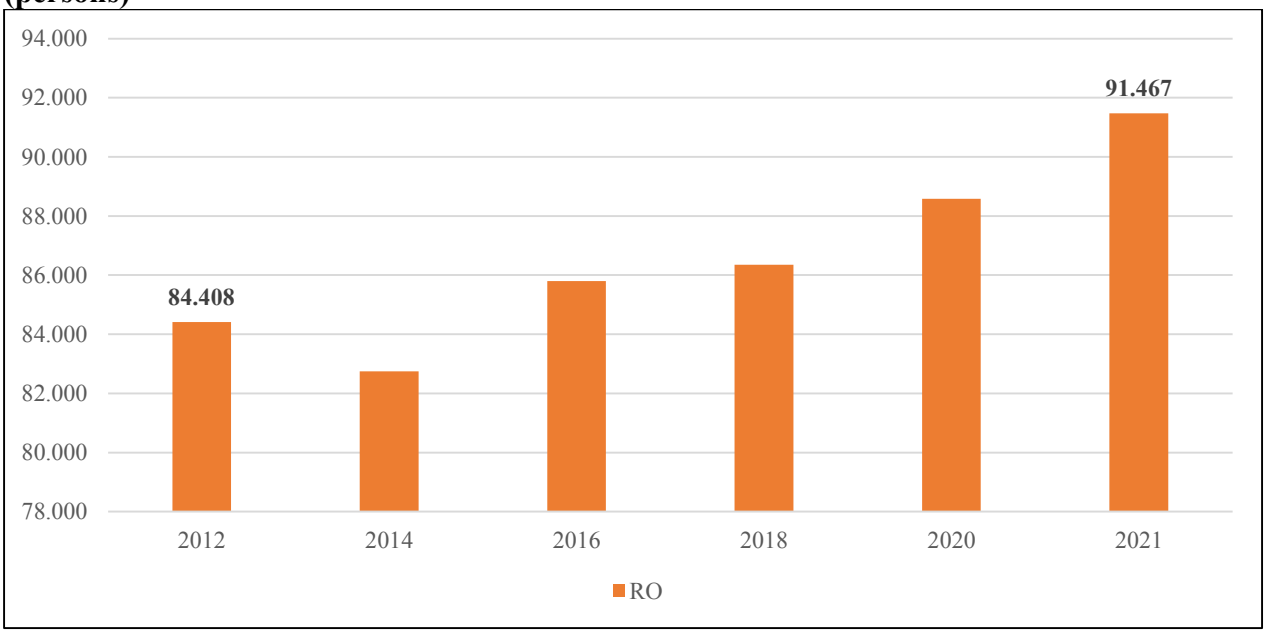
Figure 4. Employees in the renewable energy sector in EU-27 in 2018 (%)



Source: EUrObservER Renewable Energy policy factsheet 2020 https://www.eurobserv-er.org/eurobserver-policy-files-for-all-eu-28-member-states/

In the EU-27, only 4,78% of the active population is working in the green economy, according to Eurostat 2020 data. However, in terms of employment, the wind energy and the solid biomass segments show the highest share in 2018 (see Figure 4). The transition to a low-carbon energy system is one of the EU's top priorities. Several EU instruments support the development of renewable energy sources during this period.

Figure 5. Evolution of the number of persons employed in circular economy sectors in Romania (persons)



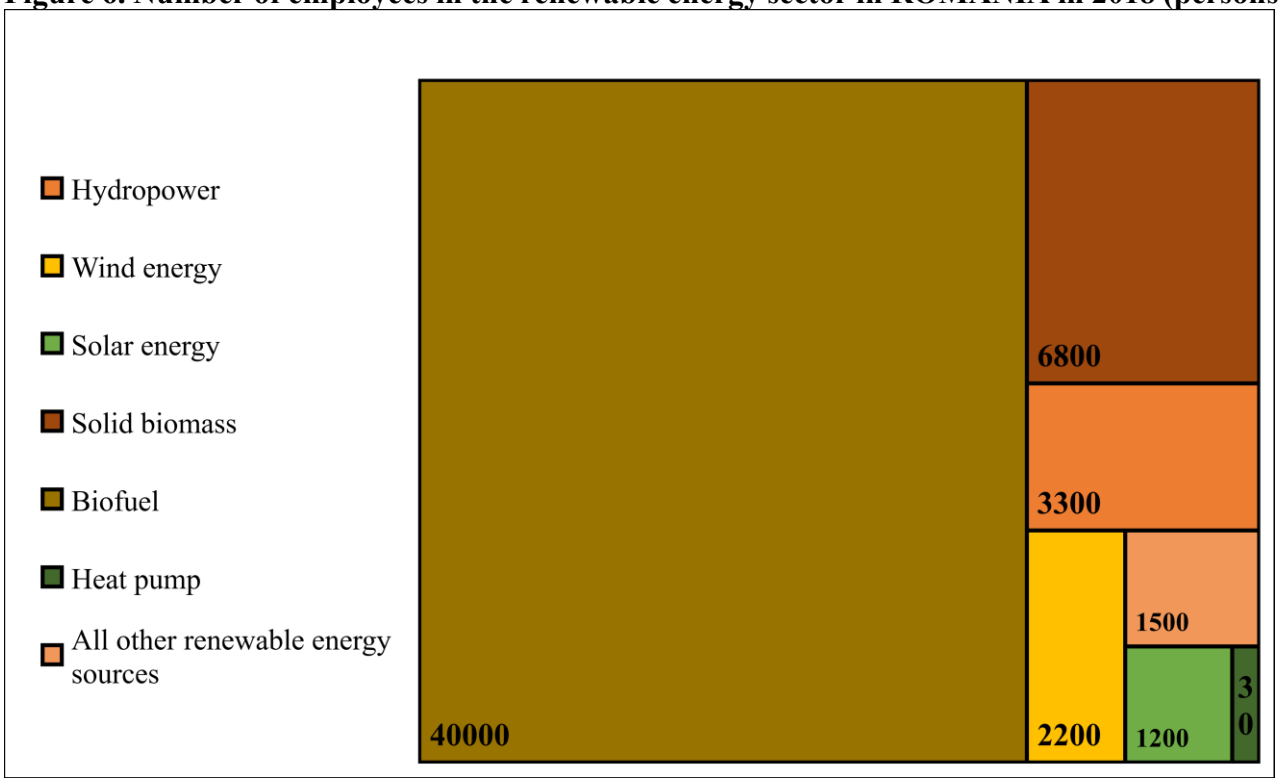
Source: own editing based on EUROSTAT data

If we look at how the share of people working in the circular economy has evolved in Romania, we can see that the numbers have remained largely unchanged, with a small increase in Romania. However, when compared to the share of total employment, these numbers are negligible.

In Romania, the National Strategy for Green Jobs 2018 - 2025 has been prepared, in which one of the specific objectives is to improve the skills of the workforce in order to ensure quality employment, especially in competitive sectors that create green jobs. The study shows that Romania has experienced a large reduction in employment in the following economic activities (2006-2018): industry, construction, agriculture, forestry and fishing, manufacturing, electricity, gas, steam and hot water supply, mining and quarrying, public administration and defence, public social security. The economic activities in which the number of persons employed increased between 2008 and 2016 were: administrative and support service activities, hotels and restaurants, professional activities, scientific and technical activities, information and communication, other service activities water supply, sewerage, waste management, remediation activities, and remediation of pollution.

In Romania, only 1 percent of the active population is calculated to be employed in the green economy, according to Eurostat's 2016 estimates. However, the solid biomass and biofuel segments show the highest share in terms of employment (see Figure 6).

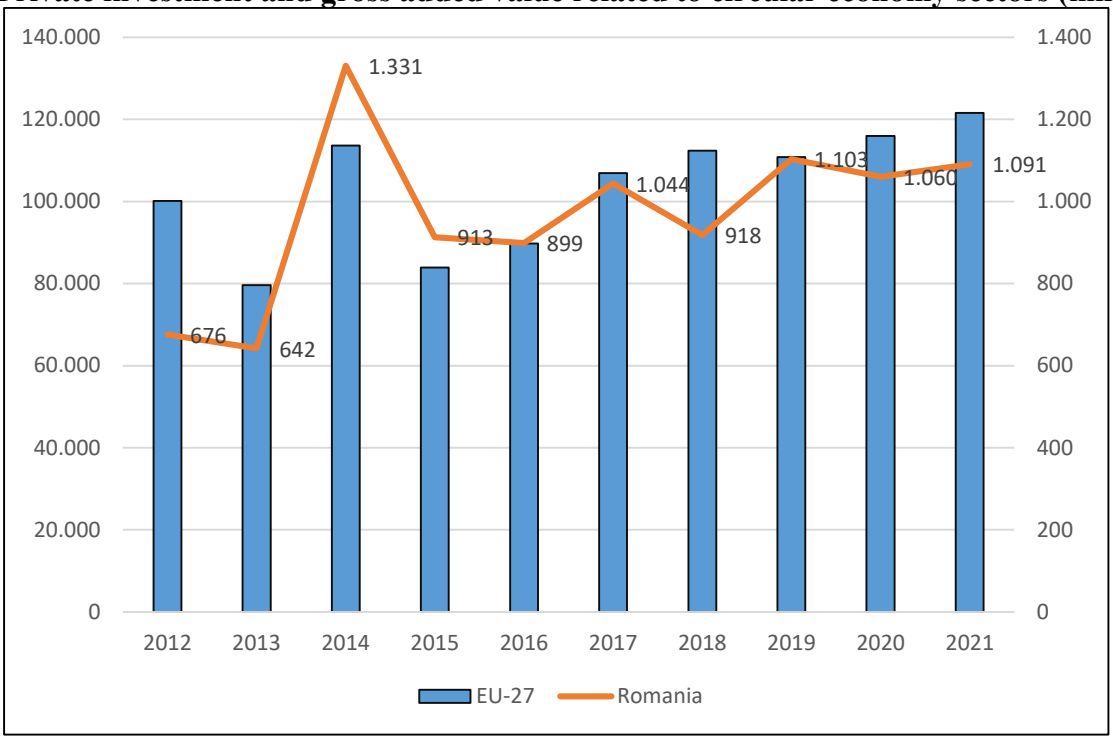
Figure 6. Number of employees in the renewable energy sector in ROMANIA in 2018 (persons)



Source: EUrObservER Renewable Energy policy factsheet 2020 https://www.eurobserv-er.org/eurobserver-policy-files-for-all-eu-28-member-states/

The indicator "Private investment, jobs and gross value added linked to sectors of the circular economy" is a key indicator in the Eurostat database of innovation indicators for the circular economy. The graph below shows that such investments in the EU have been gradually increasing since 2015. In contrast, in Romania, this indicator shows a continuous fluctuation over the period under review, with a slight increase followed by a decrease year on year. There has also been no major change in this respect over the period under review.

Private investment and gross added value related to circular economy sectors (million euro)



Source: own editing based on EUROSTAT data

5. Conclusion

What is certain is that the transition to a circular economy will have a significant impact on the labour market in terms of both quality and quantity. This will require flexibility, openness and change on the part of both workers and employers, which can be achieved primarily through further training and/or retraining. The transition is likely to result in an increase in the number of jobs focused on the design and manufacture of new, circular products, and in the demand for professionals who can take on work with new, more complex equipment.

6. Bibliography

- Barreiro-Gen, M - Lozano, R. (2020): How circular is the circular economy? Analysing the implementation of circular economy in organisations. Business Strategy and the Environment. doi:10.1002/bse.2590
- Burger, M., Stavropoulos, S., Ramkumar, S., Dufourmont, J., & van Oort, F. (2018). The heterogeneous skill-base of circular economy employment. Research Policy. doi:10.1016/j.respol.2018.08.015
- BusinessEurope (2021): Greening the economy - employment and skills aspects, position paper, Brussels.
- Csányi Veronika (2020): Zöld munkahelyek az Európai Unióban és Magyarországon. MKIK Gazdaság- és Vállalkozáskutató Intézet. Kutatási Füzetek 2020/2 Budapest. Elérhető: https://gvi.hu/files/researches/604/z%C3%B6ldfoglal_kutat%C3%A1sif%C3%BCzet2020_20200428.pdf
- Dalnoky Noémi (2018): https://bcsdh.hu/wp-content/uploads/2021/05/01_Korforgasos-Gazdasagi-Strategia_Dalnoky-Noemi_20210518.pdf
- Duell Nicola (2021): Greening of the labour market – impacts for the Public Employment Services, European PES Network.. Brussels, p. 8.

- EC (2020): European Skills Agenda for sustainable competitiveness, social fairness and resilience Brussels, 1.7.2020, COM(2020) 274 final. https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:52020DC0274.
- European Commission (2018): Impacts of circular economy policies on the labour market. https://publications.europa.eu/en/publication-detail/-/publication/fc373862-704d-11e8-9483-01aa75ed71a1/language-en/format-PDF/source-72385040
- European Parliament (2015): Green Employment Initiative: Tapping into the job creation potential of the green economy. (2014/2238(INI)) https://oeil.secure.europarl.europa.eu/oeil/popups/printsummary.pdf?id=1396469&l=en&t=E
- Green Alliance, W. (2015), Opportunities to tackle Britain's labour market challenges through growth in the circular economy. https://green-alliance.org.uk/wp-content/uploads/2021/12/Opportunities-to-tackle-UK-Labour-Market-Challenges_sgl.pdf
- Gaušas, S. et al. (2013): Greening of industries in the EU: Anticipating and managing the effects on quantity and quality of jobs. European Foundation for the Improvement of Living and Working Conditions
- ILO (2018): World employment social outlook 2018. Greening with jobs, International Labour Organisation, https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_615594.pdf. (accessed on 30 March 2023)
- Kiss Monika (2015): At a glance Plenary – 2 July 2015 EPRS | European Parliamentary Research Service, Members' Research Service ENPE 564.369 European Union. https://www.europarl.europa.eu/RegData/etudes/ATAG/2015/564369/EPRS_ATA(2015)564369_EN.pdf
- Laubinger, F., E. Lanzi and J. Chateau (2020): "Labour market consequences of a transition to a circular economy: A review paper", OECD Environment Working Papers, No. 162, OECD Publishing, Paris, https://doi.org/10.1787/e57a300a-en.
- Peter Mitchell – Keith James (2015): Economic Growth Potential of more Circular Economies. Publisher: WRAP
- Sumter, D.; de Koning, J.; Bakker, C.; Balkenende, R. Key (2021): Competencies for Design in a Circular Economy: Exploring Gaps in Design Knowledge and Skills for a Circular Economy. Sustainability 2021, 13, 776. https://doi.org/10.3390/su13020776
- Zachár János (2018): Zöld foglalkoztatás. In: Lépések a fenntarthatóság felé 23. évfolyam 2. szám (72) 2018. tavasz pp.18-19.
- EUrObservER Renewable Energy policy factsheet 2020 Magyarország. https://www.eurobserv-er.org/policy-and-statistic-reports/
- https://www.greens-fa.eu/legacy/fileadmin/dam/Documents/Publications/GND/Green_jobs_EN_01.pdf
- http://www.mmuncii.ro/j33/images/Documente/Munca/2018/21082018_SN_Locuri-_Munca_Verzi_2018-2025.pdf

PÉTER EMŐKE KATALIN:
THE SITUATION OF MEMBERS OF COMMONAGES IN THE KÉZDIVÁSÁRHELY AREA

Human resources play a key role in regional development. The skills and knowledge of the workforce are becoming more valuable.
The short food supply chain is nowadays becoming a widespread alternative for traditional chains, in which qualified workforce and knowledge play an important role. Farming based on extensive use of energy sources are gradually replaced by more efficiently functioning farms and at the same time a new categroy of consumers sensitive to environmental problems started to emerge bringing effective demand to the local farmer's market offering a narrow range of products. Due to the specificities of their farm structure the vast majority of farms in Hargita county are small family farms preserving their structures developed nearly thirty years ago, and in which the farmers have inherited their farming knowledge from previous generations.

Keywords: short food supply chain, farming knowledge, agriculture

1. Introduction

Public commonages are a long-established form of forest and land ownership organisation that play an important role in the lives of owners and communities and in their economic development, especially in the light of the current global economic crisis for energy resources. After the political change in 1989, members of communal commonages were able to reclaim their land and forests, but this process got off to a difficult start. Nevertheless, the communal commonages managed to re-establish themselves, but they were now organised as a new principled organisation, which was now only concerned with their own economic well-being. Thus, the newly established communal commonages finally sought to serve and ensure the material well-being of the Szekler people. The research is based on a survey among members of the "Fagus" communal commonage in Kézdiszentlélek, "Kis and Nagybonyó" in Gelenc, and "Székely" in Alsócsernáton, which were established in the vicinity of Kézdivásárhely, seeking to reveal their opinions and attitudes towards the commonage, as well as their vision for its future.

2. Literature

Common landownership (compossesorat) is a political-social organisation typical of Transylvania and Maramures, and it involves common management of property (pasture, timber, firewood, etc.) needed to purchase the goods that cover the expenses necessary to build and maintain roads, bridges, forestry, pasture, churches and other community infrastructure. In the 14th century they were transformed into lordly commons. This was mainly the public domain of Maramures over arable land and pastures, and in Transylvania over forests and pastures. The forests and pastures are all public property. Hence the name of the commons, and the name of the owners of the commons. The common property of forests and pastures has always been passed down from generation to generation in its entirety, as an ancient tradition (Definitie composesorat - ce inseamna composesorat - Dex Online)
The remnants of the ancient feudal commons and its present form can be traced back to Maria Theresa. By 1911, the members of the village noble estates had been completely absorbed into the peasantry (Kolossai-Puskás, 1978). In the 20th century, a plan emerged requiring members to prove that their ancestors were indeed members of the Szekler border regiment. This unfeasible and humiliating idea was never elevated to the status of a law (Producer communities in Szeklerland then and now, Népszava 24.X.1943).
At the beginning of the 19th century serfdom was abolished, so that the forests and lands within the boundaries of the villages remained in undivided possession of the village, which became known as the "commons of former serfs", the name being given by the name of the village. At the end of the

19th century, the Parliament of Hungary abolished the distinction between the two types of commons (peasant and serf). They introduced the *hübéres* system, which created an "owner-landlord" type of relationship in the *hübérség* (Péter,2020).
In the 20th century, the communist regime in Romania saw the communes as a real enemy, so they were destroyed by all means to prevent them from functioning or existing (Mihai Dancus - Zona etnografica Maramures; Filipascu Alexandru: Enciclopedia familiilor nobile maramuresene de origine romana, Golden Bull,1222)
Transylvanian communal estates played an important role in the life of the Szekler families as they helped them to make a living. Taking advantage of the rich environment of forests and pastures, they were able to help self-sustainability by providing timber and common grazing. In Transylvania, the public estates were established on the basis of Hungarian liberal legislation. The laws of the 19th century allowed the inhabitants of the settlements to collectively organise their mowing, animal husbandry, and obtaining firewood and timber for buildings, which was a great help in the early 20th century. In the second half of the 19th century, there were three main types of commons: forest communes, pastoral communes, and mountain communes.
The land reform of 1921 severely curtailed the forest and pasture communes, and in 1948 nationalisation meant that people lost their land for nearly 50 years. Law No 1 of 2000 allowed the restoration of the commons to begin (Peter, 2009).
In terms of land holdings, the size of the forest and wooded pastures of the Szekler communal estates varied considerably in the first half of the 20th century. Naturally, their economic weight and activity in a given village was related to the size of the commons. There were villages whose holdings were located very far from the inner boundary of the village, in which case the holding served as a second boundary. These commons had to be content with 100-300 acres (40-120 ha) of land.
In the early 20th century, the estates which the Szekler communes could claim as their own were managed by the village communities or parishes of 2-3 villages in the earlier 17th and 18th centuries, and helped the economy and the life of the villagers.
Membership was based on rights defined according to the estates of forest and grazing lands. Members were allowed to participate in public landowner assemblies where they could vote in proportion to the 'rights' they held and the votes they cast there. Membership was passed down from generation to generation, but the number of 'rights' could be increased by purchase. This system still applies today, with the difference that the public estates decide the value of the rights they grant to their members. The number of rights is the basis on which members share in the public property benefits. In the case of votes, each member's vote is calculated in proportion to the number of rights he holds. The commons tried to be careful about the number of rights (Bors Réka, 2003; Bárth,2010)
In the early days of socialism, the nationalisation of forest holdings was simple and easy, as there was a totalitarian dictatorship. The same cannot be said for the reverse transaction after 1989, where a convoluted, cumbersome, corrupt and irresponsible set of laws was used to return forests to the owners. Now, more than thirty years later, it is not even fully completed everywhere.

Commonages in Szeklerland by region and county (Tamás. L,2021, 44p)

Landscape units	Commonages	County
Csíkszék és Kászonok	49	Hargita
Gyergyószék	14	Hargita
Udvarhelyszék	74	Hargita
Erdővidék	18	Kovászna
Kézdiszék	37	Kovászna
Orbaiszék	16	Kovászna
Sepsiszék	38	Kovászna
Marosszék	12	Maros
Total	258	

source s: (Tamás. L,2021, 44p)

The commonages in Szeklerland are mostly linked to a particular settlement, but it is not uncommon to find several public offices in one settlement.
At the moment, the importance of community forests depends on what proportion of the total forest area they represent. Out of more than one million hectares of forest, they represent about twenty percent of the Romanian forests in 2014.
In fact, the complete forest, pasture and land restitution was made possible by Chapter IV of the 2010 law. However, this has led to a lot of problems, misunderstandings and dissatisfaction. The County Land Allotment Committee established the list of public landowners and their property shares on the basis of Law 1/2000. This cannot be changed because then they would be committing an illegal act. The forest or pasture reclaimed by Law 247/2005 is no longer divided among the members of the communal landholding on the basis of a single figure, but on the basis of the supporting documents. This law stipulates that the property to be returned is the one which existed in 1948, and that the evidence closest to that date is taken into account rather than the oldest supporting documents (usually issued around 1913).
It is a chaotic situation. In 2000, there was no way of knowing that a land law would later be issued under which everything could be reclaimed. At that time, in 2000, all kinds of supporting documents were accepted from everyone. Law 247, which came out in 2005, tore up all the lists of public landowners that had been compiled up to that point. So again, in the Szekler villages, forest properties were lost, properties whose owners could prove their right, everyone knew they were right, but thanks to the headless, chaotic Romanian legislation, they could not put their property into the commonage, but they could not do anything with a small piece of privately owned forest on their own. This is where the corruption came in - and you can still hear about lawsuits today - that these desperate people bought their forests at a low price, and after buying many of these small forests, a private forestry conglomerate was created, which could now compete in the market economy with the public landowners, and even with the harvesting and processing of state-owned forest land. Thus, once again, the commonages were the worst off because of the succession of conflicting Romanian land laws.

3. Material and method

The quantitative research sought to find out how the members of the "Fagus" communal commonage in Kézdiszentlélek near Kézdivásárhely, the "Kis and Nagybonyó" commonage in Gelenče and the "Székely" commonage in Lower Cernáton perceive the situation of the commonages in general, and what decisions they make regarding their annual distributions. The questionnaire tries to cover all possible aspects that could affect a member of a communal property (thanks to Rőbert Szarvadi for the query).
A hard copy of the questionnaire was sent to the members. The printed version was necessary because most of the members surveyed did not have the computer skills required for an online survey. The questionnaire was filled in by members of the commonage living in the municipalities in the vicinity of the Kézdivásárhely district (Gelence, Hilib, Haraly, Almás, Chernáton) in the months preceding the closure of Covid. The present questionnaire was completed by 54 persons.amely érinthet egy közbirtokossági tagot (Thanks to Rőbert Szarvadi for the query).
Members received a printed copy of the questionnaire. The printed version was necessary because most of the members surveyed did not have the computer skills required for an online survey. The questionnaire was filled in by members of the public community living in the municipalities in the vicinity of the Handicrafts region (Gelence, Hilib, Haraly, Almás, Chernáton) in the months preceding the Covid-related closures. The present questionnaire was completed by 54 persons.

4. Results

The commonage is responsible for the maintenance of the forest, a task carried out by an authorised forestry service. The replanting of trees is realised by the forestry department in cooperation with the communal landowners and is done by specialised people under the supervision of the forestry department.
The main difficulty of the commonage is the realisation of income, in addition to the members receiving their benefits. The extent of this difficulty is greatly influenced by the location of the forest to be harvested and the timber stock. For those parts of the forest that are difficult to harvest, commonages can receive subsidies from both Romania and Hungary. As far as subsidies are concerned, commonages which have pasture land can apply for a special subsidy for their pasture land from the Agricultural Intervention and Payment Agency (APIA).
There are two sources of members' allowances. The first is when a cash payment is requested. In this case, the amount of the allowance depends on the profit of the commonage and the amount allocated for the allowance is voted at the general assembly, taking into account the future expenses of the unit. In the case of the communes of Small and Large Bonyo, members receive RON 700 per hectare. The second form of allowance is when a member requests building wood or firewood equivalent in value to the amount of cash he would receiveh.

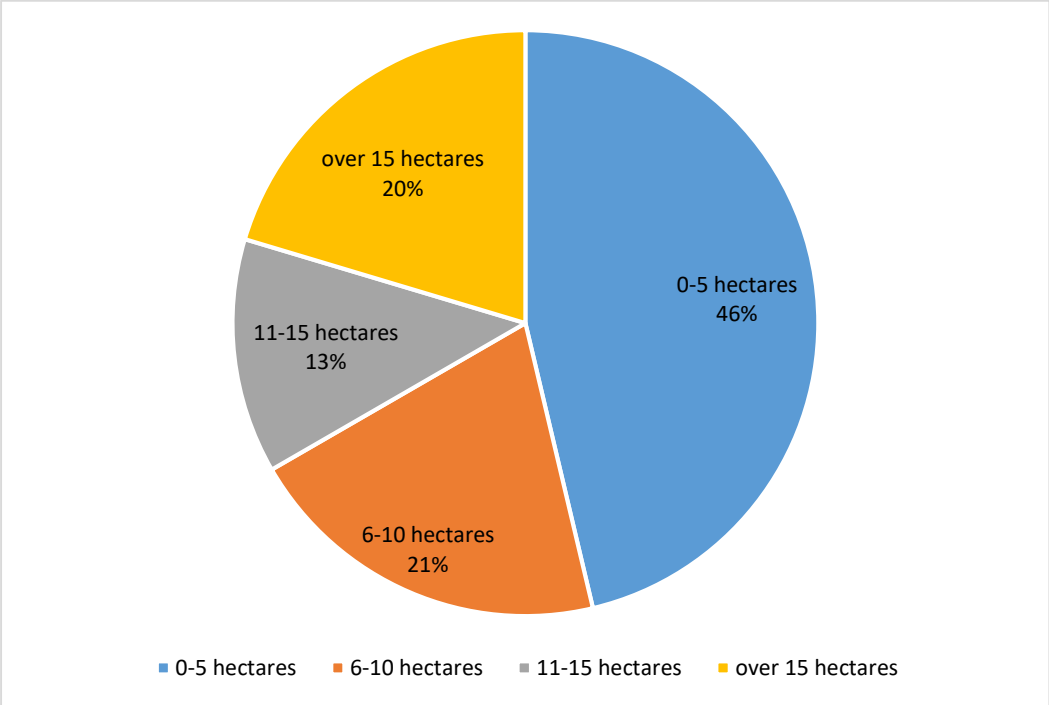


Figure 1, Distribution of the amount of land owned by members, source: own editing, based on research

Figure 1 illustrates the distribution of commonage members by size of their area. The majority of forest owners have less than 5 hectares of forest, more precisely 25 out of the 54 public landowners surveyed have a share of 5 hectares or less, which represents 46%. The number of members owning between 6 and 10 hectares is 11 out of 54, representing 21%. A significant proportion of the members owning more than 10 hectares of forest, in addition to inherited land have also purchased land within the commonage. The number of those who own more than 10 hectares is 18 out of 54, making up 33% (13% + 20%) of the people surveyed. Overall, the figure shows that most public landowners, more than 67%, have not purchased any public land beyond their inheritance

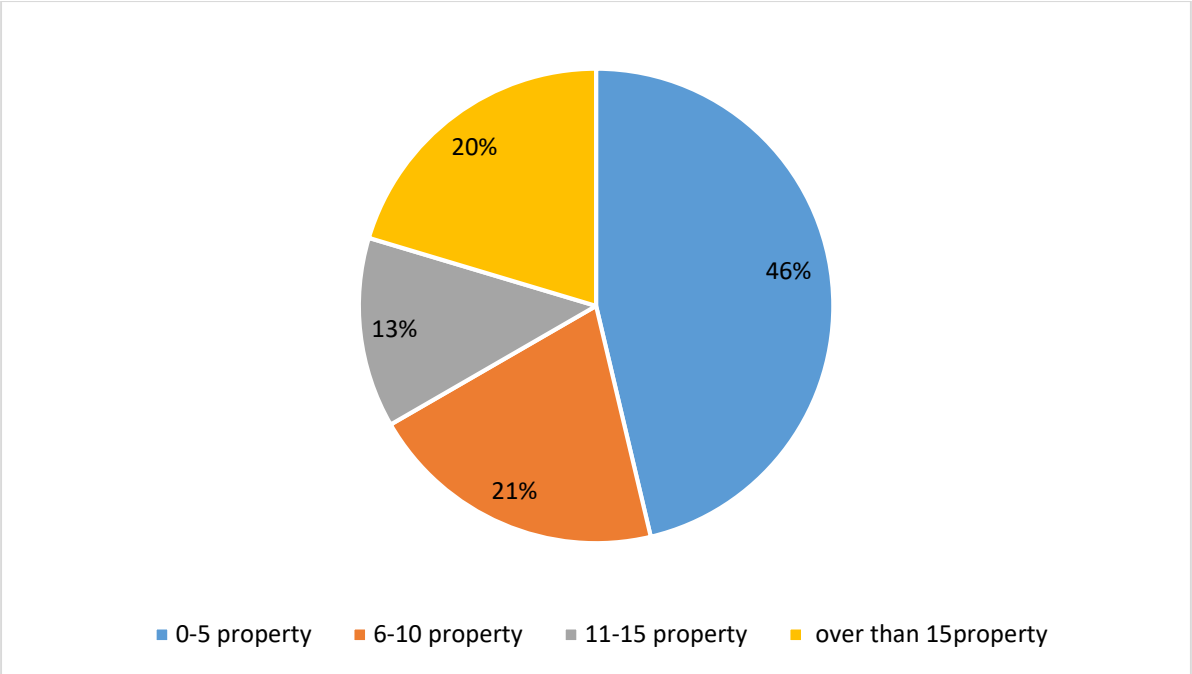


Figure 2, Distribution by number of members' rights, source: own editing, based on research

The result and meaning of the graph on the number of public property rights (Figure 2) is fully consistent with the graph on the area share of members, since the rights are granted to public property members in proportion to the size of the area, as evidenced by the full correlation.

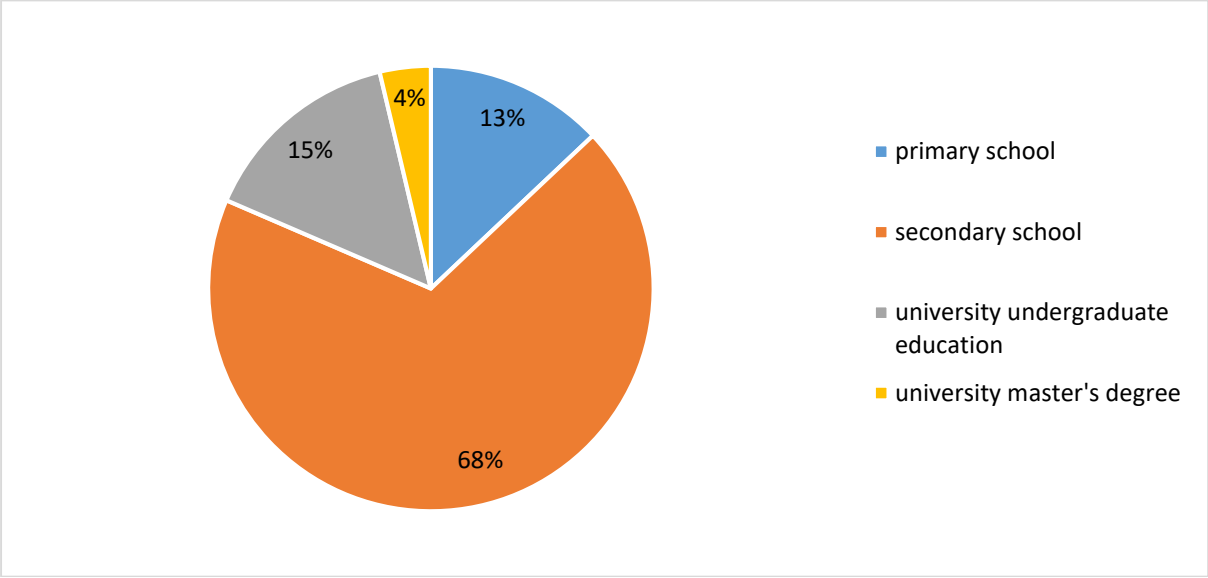


Figure 3, Education level of public landowners, source: own editing, based on research

Figure 3 shows the distribution of public landowners by education. Most of the 54 public landowners surveyed had completed secondary school, 68% to be precise. Relatively few have a bachelor's degree, only 19%, and even fewer have a master's degree, 4%. 13% have only completed primary school. The questionnaire did not cover the question of why they only completed primary school, but we believe that this is partly due to the fact that before the 1990s families could easily have been on the "kulak list", which they could have done by having a little more land than others or by owning a farm machine. Children from kulak families found it difficult to get into the 9th grade and even harder to go to university.

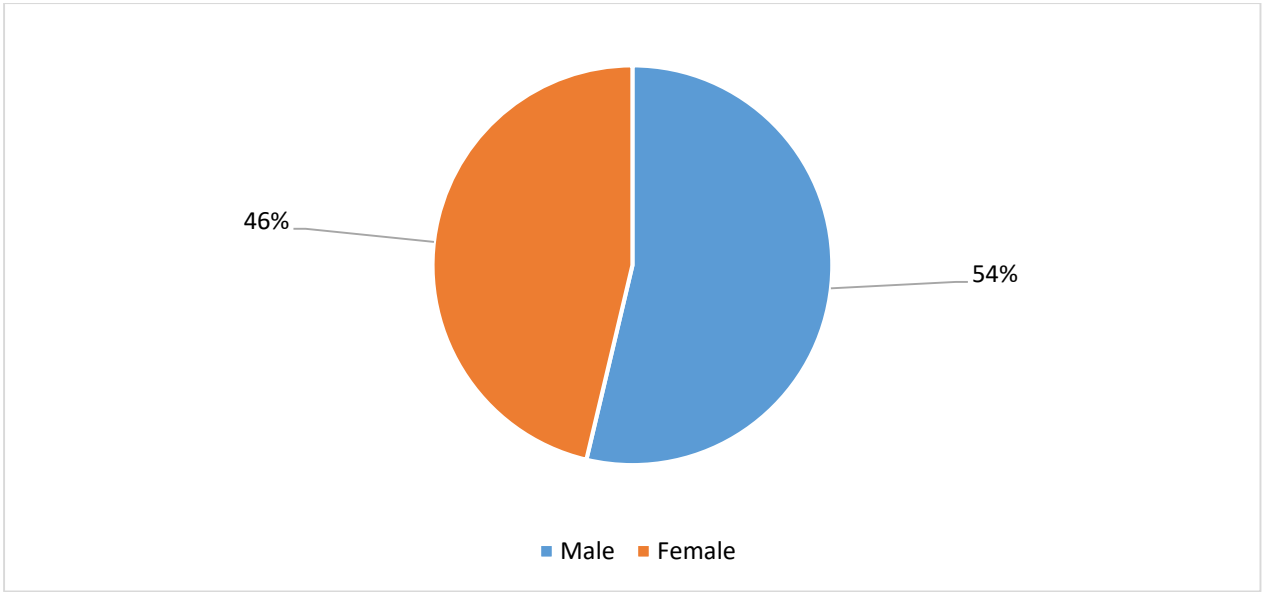


Figure 4, Distribution of members by gender, source: own editing, based on research

Figure 4 shows the gender distribution of the public landowners. There is only an 8% difference between female and male members. Female public landowners account for 46%, while male public landowners account for 54%.

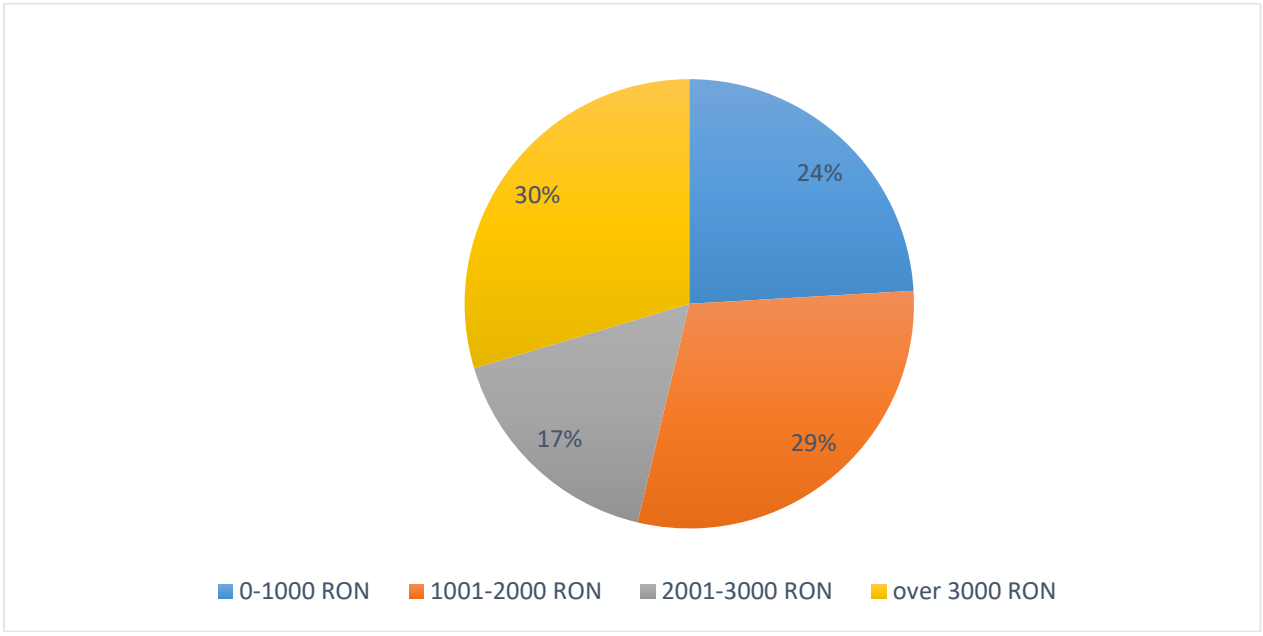


Figure 5, Distribution of members' benefits by amount, source: own editing, based on research

Figure 5 shows the value of the public landowners' allowance. These values are largely influenced by the amount per right that the public property determines the members receive. The number of members receiving an allowance of up to RON 1000 is 13 out of 54, or 24%. The next interval is that of members realising between RON 1001 and RON 2000, which is 29%, with 16 out of 54 members. 9 out of 54 people representing 17% receive an amount between RON 2001 and RON 3000. The last category is the group of those realising over 3000 RON, with 16 out of 54 members, representing 30%. In my opinion, this is a fairly distributed chart.

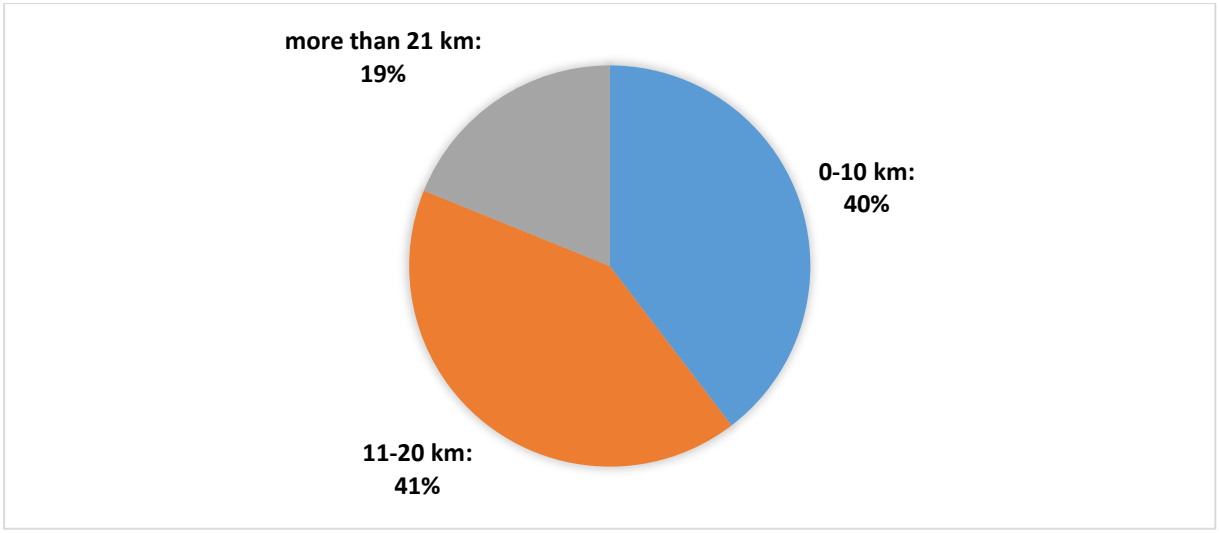


Figure 6, Distribution of public landholding members by place of residence and distance between their areas
source: own editing, based on research

Figure 6 illustrates that 40% of members live between 0-10 km from the area of the communage where they are members. In most cases this distance represents the distance from their house to the forest at the edge of their communage. A similar figure is seen for those living 11-20 km from their communal land. The remaining 19% represent members who have moved away from their home village.

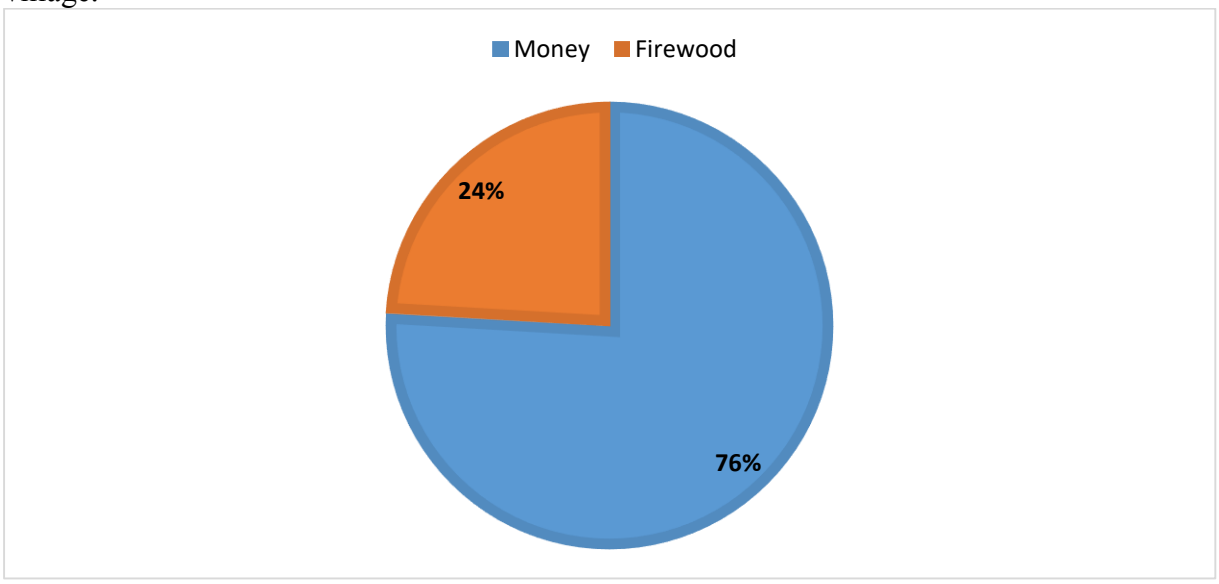


Figure 7, Distribution of members' benefits by form, source: own editing, based on research

Figure 7 shows the type of benefit for members of the commons. A distribution of 24%-76% is shown. Of the 54 people interviewed, 13 said that they did not request their benefit in the form of money but in the form of firewood processed by the public landowner, representing 24% of the orange box on the graph. The remaining 41 people requested their benefit in the form of money, representing 76%. I would justify this distribution by saying that people are more happy with the cash benefit because they can decide what to buy with it and those who may not have wood heating may claim firewood in vain. Commonages with small forest areas can barely afford - or cannot fully afford - their winter firewood, as well as the maintenance, clearing and replanting of forests. In case someone is entitled to a larger amount of firewood, it will be delivered to their yard free of charge.

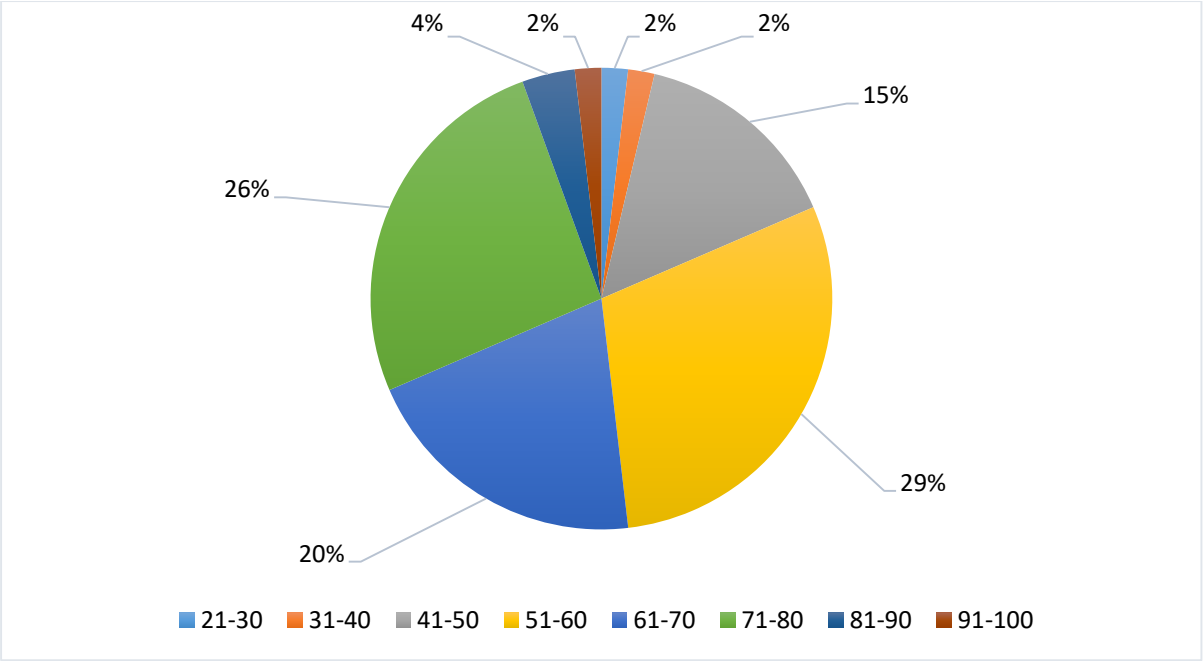


Figure 8, Distribution of members by age, source: own editing, based on research

Figure 8 shows the age distribution of the members of the communal property. It can be clearly seen that the majority of the members of the public holding are between 41 and 80 years old, i.e. 90% of the members. This is due to the inheritance process, which is passed down from generation to generation.

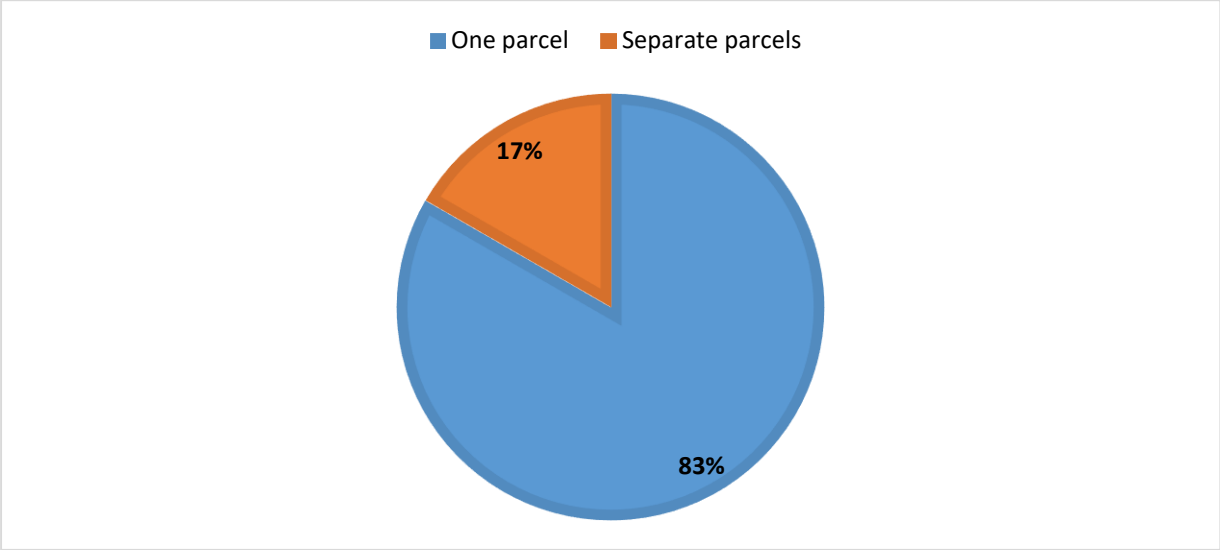


Figure 9, Distribution of public landholding members according to the fragmentation of their areas, source: own editing, based on research

The diagram (Figure 12) shows the distribution of the fragmentation of the public landholding members' areas, with 83% of the public landholding members having their areas in one piece, which in most cases means that they are in one public landholding company.

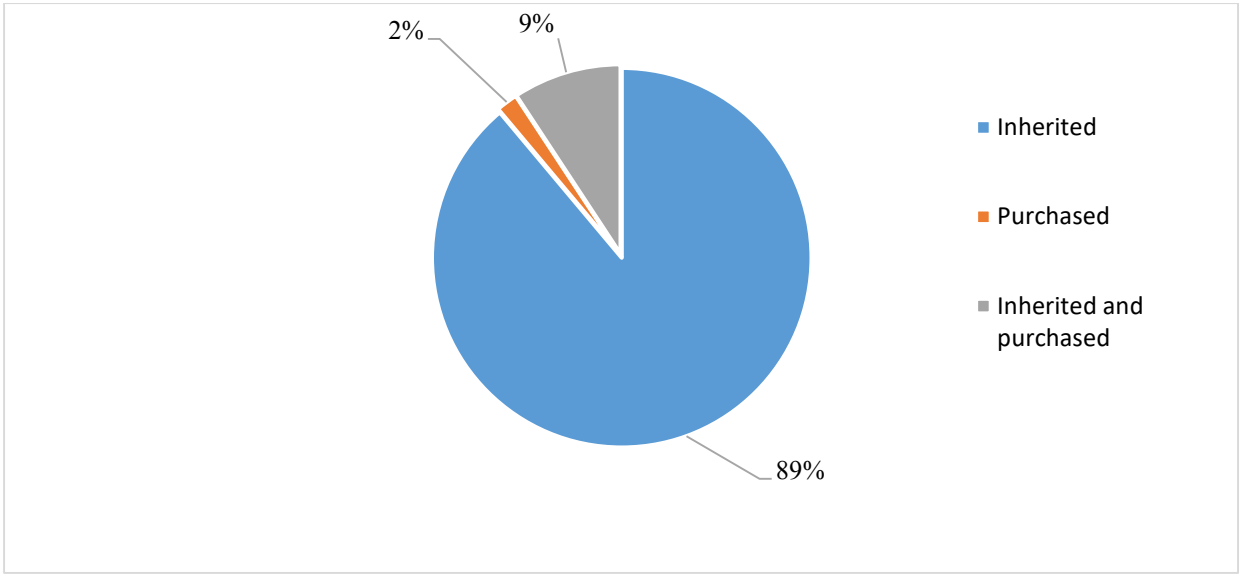


Figure 9, Distribution of members after their acquisition, source: own editing, based on research

Figure 9 illustrates how the members of the commons acquired land in the commons. The majority of members became members by inheriting the public domain rights. The distribution also supports a principle that public landholdings have long espoused, namely to help families earn a living, across generations.

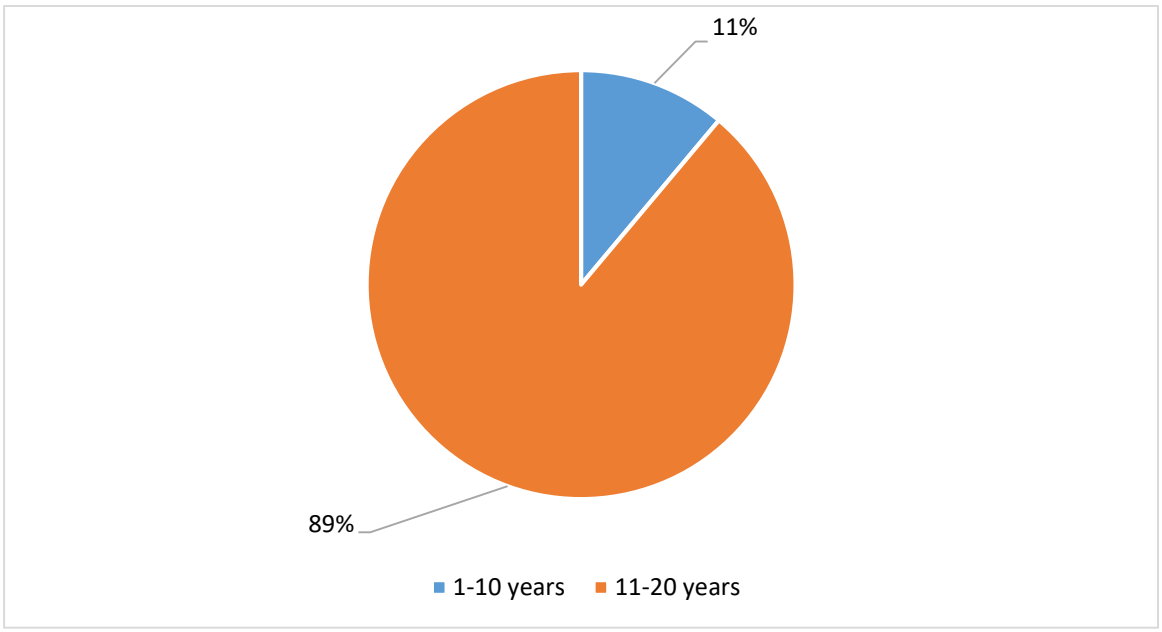


Figure 10, Distribution of members by seniority in public ownershipip, source: own editing, based on research

Figure 10 shows the members of the commons and the age of their membership by year. The vast majority of people surveyed have been members of the commons for more than 11 years. Based on this data, I conclude that in the next few years, a large proportion of public land tenure will be passed on, as the older generation often gives up public land in favour of the new generation.

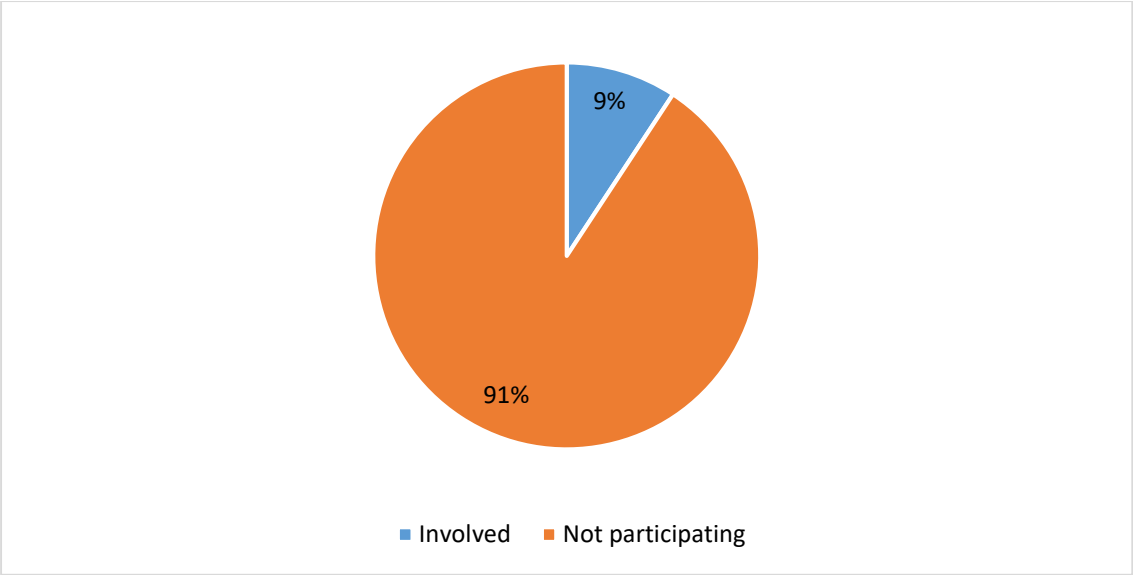


Figure 11, Members' participation in work around the commonage, source: own editing, based on research

Figure 11 looks at the activity of members within public landholdings. 91% of members are not involved in the work of the commons. This can be explained by the fact that activities such as logging, wood processing, and tree planting can only be carried out by specialised companies. The only way they can take action is to vote in the meetings on what action the management board should take. The remaining 9% participation from my research is mostly administrative participation. There is no interest from the younger generation in this annual activity in the public domain, even though many young people are graduating from forestry technical schools, colleges and universities. As there are fast-track job offers in Western Europe, young people there earn much more money in a few months, plus their responsibilities are minimal. So, unfortunately, they cannot involve the youth in their activities.
In the forestry sector, it is very difficult to ensure continuity in the training of professionals, because it is a profession with a long operational cycle and constant problem solving. It is not an attractive life model.

The 54 people interviewed were unanimous in saying that they want to leave the rights and land they own to posterity. The management board places great emphasis on the replacement of harvested wood in order to leave a sustainable unit for future generations. They regretted that it is difficult to obtain development grants.

5. Summary

It can be seen that it is very important to strengthen the cohesiveness of the commune, because it is not enough to help organize different events where the members of the village go to celebrate together, but it is even more important to help the members of the commune, or the village members in general, to make a living. To create the conditions where they can better carry out their economic activities, to make their families' budgets predictable, and predictable for a year in advance. This way they can know that they will have their winter fuel or wood for construction secured, a large part of the church maintenance will be solved, the community house can be used, but most importantly of all, they can start the activity of animal husbandry, which can provide a large part of the food supply for the families.

It was good to see that the younger generation also cares about the fate of the communal land, as I met members in their twenties who try to ensure that the wood cut and processed from the communal land is replaced in an environmentally conscious way. The neglect of forest regeneration could bring about hige problems in the future.
As it was in the past, so it is now that the members of the communal landholding receive subsidies from the communal landholding in the form of firewood and/or cash. This fact can be a huge help for those who may not have the opportunity to work, or the members can regard it as extra income.
Many people own land in more than one communes at the same time. Those who have their land in separate places have said that it would be better for them if they had their land in one place. Many families have still not been able to reclaim all their land since the change of regime.
The public landowners interviewed in the survey said that they had little success in applying for subsidies, which often led to financial difficulties.
The future of the communes looks positive as the research shows that the management of the communes is enthusiastic and dedicated to the tasks that contribute to the sustainability of these associations. The members hold on to their territories and rights, which they try to take care of and pass down to the next generation.

BIBLIOGRAPHY:

1. Aranybulla,1222 Az Aranybulla története - Aranybulla800 - Országgyűlés (parlament.hu) (letöltés dátuma: 2022.03.05)
2. Bárth.J.(2010): Székely Közbirtokosságok a 20. Század első felében http://publikacio.uni-eszterhazy.hu/3483/1/51-63_Barth.pdf (letöltés dátuma: 2020.02.06.)
3. Bárth J.(2007): Az eleven székely tízesek,Kiadó: Bács-Kiskun megyei Önkormányzat Múzeumi Szervezete Kecskemét 2007
4. Biró A. Z., Tamás L.(2021): Közösségi vagyon – Közösségi szerep, Státusz Kiadó, Csikszereda, 2021
5. Bors R.(2003): A közbirtokosságok szerepe és fejlesztésük lehetőségei székelyföldön (2003): In.*GAZDÁLKODÁS*, XLVII. évfolyam 3. sz. 41–93.
6. Definíció: Definitie composesorat - ce inseamna composesorat - Dex Online (letöltés dátuma: 2022.02.01.)
7. Garda D.(2002): A székely közbirtokosság - I kötet (Státus Könyvkiadó, 2002)
8. Kolossai T.-Puskás J.,(1978): 100Kat. holdon felüli bírtokterület struktórája Magyarországon 1911-ben, In. Agrártörténeti szemle, 1978 3-4 sz.
9. Iosif Jivan: Composesoratele de pădure, 2014, Volumul 14 (1), 2014 | Restituiri http://bucovina-forestiera.ro/BF%20old%20site/Bucovina%20forestiera/www.bucovina-forestiera.ro/article/composesoratele-de-padure-indrumator/index.html (letöltés dátuma: 2022.03.09)
10. Legea Naţionalizării din 1948 (http://enciclopediaromaniei.ro/wiki/Legea_Na%C5%A3ionaliz%C4%83rii_din_1948) (letöltés dátuma: 2022.03.10)
11. New EU Forest Strategy for 2030 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0572 (letöltés dátuma: 2022.03.11)
12. Népszava 1943.X.24: „Termelőközösségek Szkelyföldön egykor eé most”
13. **Péter,E.K.(**2009):-*Földbirtokváltozás Romániában*” In Gazdaságpolitika-Vidékpolitika-, Editura Scientia, Cluj Napoca, ISBN:9789731970240,p. 141-153

14. **Péter,E.**K,(2020):.Membership decision making in the Zetelaka commonage Harghita County In: Balogh,Gábor-László, Gyula-Sipos, Norbert: Farkas Ferenc II Nemzetközi Tudományos Konferencia, p.85-98,

15. Tamás László(2022): A székelyföldi erdővagyon és erdőgazdálkodás mint endogén erőforrás, In. Észak-magyarországi Stratégiai Füzetek XIX. évf., 2022
16. Revista Meridiane Forestiere nr. 2 iunie 2021 Revista Meridiane Forestiere nr. 2 iunie 2021 - Asociația Forestierilor din România - ASFOR (letöltés dátuma: 2022.03.09)
17. Revista Pădurilor 131(1), 2020, 1-14 oldal Revista-Padurilor-nr.-1_2020-1.pdf (revistapadurilor.com) (letöltés dátuma: 2022.04.12)
18. Szarvadi Róbert(2022):Közbírtokosságok Kézdivásárhely vonzáskörzetében -Kézírat
19. Szikszai Tamás: Az Európai Unióhoz történõ csatlakozás hatása a székely erdõgazdálkodásra, Romániai Magyar Jogtudományi Közlöny, 2005/2, Kolozsvár: http://rmjk.adatbank.transindex.ro/pdf/07.Szikszai.pdf letöltés dátuma: 2022.03.10)
20. Volumul de lemn ce se recolteaza annual http://www.rosilva.ro/articole/volumul_de_lemn_ce_se_recolteaza_anual_din_paduri__p_93.htm (letöltés dátuma: 2022.05.02)
21. Definitie composesorat - ce inseamna composesorat - Dex Online

CAPITAL MARKET, CORPORATE FINANCE AND FINANCIAL ANALYSIS SECTION

SZABOLCS GRÉBEL, TAMÁS PESUTH: REFLECTIONS ON THE RELATIONSHIP BETWEEN GEOPOLITICS AND CAPITAL MARKETS – THE EFFECTS OF THE RUSSIA-UKRAINE CONFLICT

Abstract
The role of geopolitics is being appreciated both in financial theory and practice. This study aims to examine the main points of connection between geopolitics and the stock market. The motivation for our research is also the connection between the increasingly important geopolitical risk factor and stock market returns. In addition to the presentation of classic geopolitical theories, the study presents possible connections between stock market returns and the geopolitical risk index (GPR) in the CEE region, focusing on recent events. We use linear regression models to estimate the effect of geopolitical risk, and the distance from the Russia-Ukraine conflict on stock returns in 45 countries (OECD and non-OECD members). Based on our study, geopolitical risk may play a role in international diversification, especially on the developing markets. Higher geopolitical risk typically had a negative impact on returns in the period under review. However, the negative impact fades after one year from the beginning of the conflict.
Keywords: geopolitics, geopolitical risk, capital market, Russia-Ukraine conflict
JEL codes: G10, G11, G15

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Introduction

The evolution of capital market movements is discussed in considerable detail and in a variety of ways in the financial literature. The goal of this paper is to go beyond technical approaches and explore the linkages between geopolitics and equity markets. This approach is relevant from both a theoretical and a practical point of view, especially in the light of the major geopolitical events of the second decade of the 2000s. The largest players in the investment world are also paying close attention to geopolitical risks. One good example is the world's largest fund manager, BlackRock's annual summary of current geopolitical risks. The vast majority of the risks indicated in the analysis have not changed in the last 2 years, at most the likelihood of them changing. However, the risk that had been the dominant risk in people's daily lives up to 2021, namely COVID-19, has been completely removed from the 2022 risk dashboard and replaced by the Russia-Ukraine conflict, which also affects many areas of the economy and society. The analysis, published in December 2022, identifies the top 10 geopolitical risks in Table 1.

Table 1: 10 top geopolitical risks in 2022, based on BlackRock's analysis.

Geopolitical risks	Probability	Short description
Global technology fragmentation	high	The strategic rivalry between the US and China will lead to a significant acceleration in the scale and scope of technological fragmentation
Cyber attacks	high	Cyber-attacks cause disruptions to critical infrastructures - physical and digital.
Russian-NATO conflict	high	The US and the EU reacted to Russia's attack on Ukraine with financial, energy and technological sanctions. There is a risk of further escalation - intentional or unintentional - between Russia and NATO.
Terrorist attacks	medium	Terrorist attacks cause loss of life and economic disruption to trade.
Political crises in emerging markets	medium	The spill-over effects of the Ukrainian crisis on the political systems and institutions of emerging markets.
US-China strategic rivalry	medium	China launches military action against Taiwan or asserts its claims by force in the South China Sea.
Gulf Coast tensions	medium	As the Iran nuclear talks collapse, tensions escalate, increasing the risk of a regional conflict.
North Korean conflict	medium	North Korea continues to pursue its nuclear weapons and to carry out provocative actions (such as missile attacks)
Climate policy dead end	medium	Advanced economies are not succeeding in increasing public investment towards net zero emissions
European fragmentation	low	The energy crisis and inflationary pressures are leading to the rise of populists and economic shocks.

Source: own edits based on analysis by BlackRock (2022) BlackRock. (2022). Geopolitical Risk Dashboard. Source: https://www.blackrock.com/corporate/insights/blackrock-investment-institute/interactive-charts/geopolitical-risk-dashboard [downloaded: 2023.01.15)

The outbreak of the Russia-Ukraine conflict on 24 February 2022 has fundamentally reassessed the role of geopolitics and, from a practical point of view, the intertwining of geopolitics and financial markets. This is illustrated quite clearly in Figure 1, which shows Google Trends searches for geopolitics.

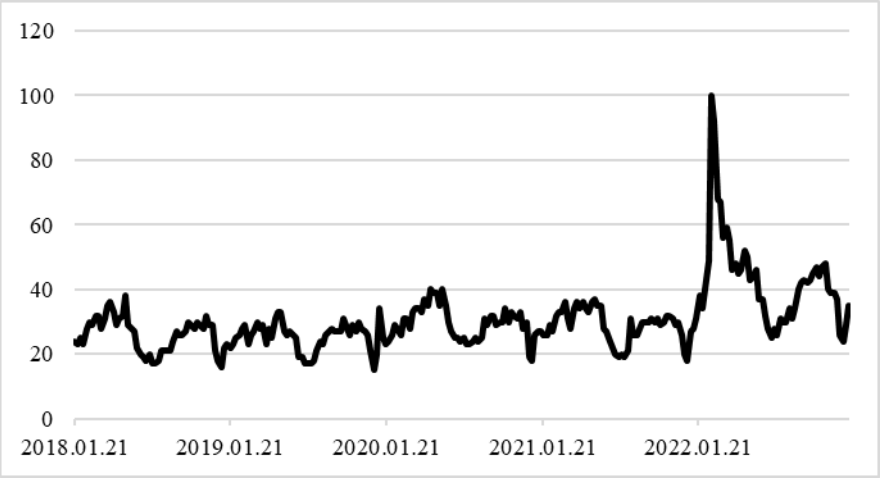

Figure 1: Google Trends searches on geopolitics in the last 5 years. Source: Google Trends (2023), own ed.

The examples presented in the analysis are sometimes more closely and sometimes less clearly related to geopolitics in the classical sense, but certain events can be examined according to the classical geopolitics point of view. From a financial perspective, however, the relevance is that these geopolitical events/risks have an impact on capital markets, according to BlackRock's analysis. This statement is not surprising, but from an academic perspective, it is the length and extent of these effects that is a relevant area of investigation. Risks are always present in capital markets, it is the identification and management of these that is relevant. The analysis suggests that, under a baseline scenario, average cumulative capital market returns in the United States have tended to increase slightly over the past decades. Conversely, as geopolitical risks intensify, capital market returns "go down" on average, even in favourable periods, falling below zero if the overall economic environment is not supportive with returns even weaker over a 30-day period (BlackRock, 2021). This paper aims to illustrate this newly emerged and intensified approach to capital market analysis.
See Figure 2 for BlackRock's geopolitical risk map.

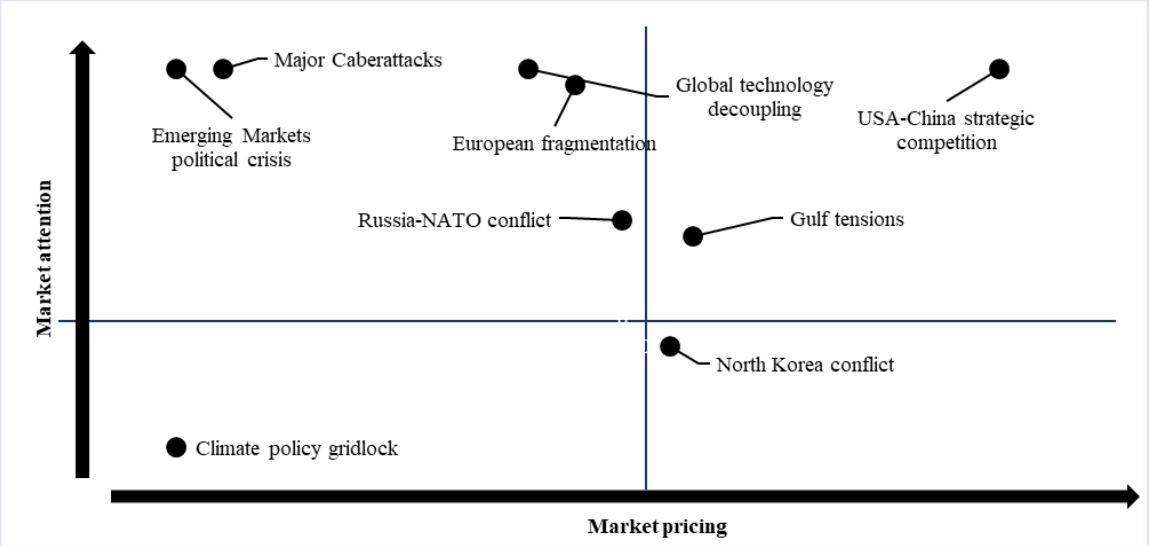

Figure 2: Global geopolitical risk map. Source: own editing based on BlackRock (2022: page 4) Geopolitical Risk Dashboard

In the first half of the paper, we use classical geopolitical analysis to examine events in the CEE region. Although the capital market effects stemming from the strategic rivalry between the United States and China are also relevant, as shown in Figure 2, we would like to examine the effects of the Russia-Ukraine conflict specifically by CEE region. For this analysis, we use the Geopolitical Risk Index (GPR) developed by Dario Caldara and Matteo Iacoviello (2022), with additional data from Bloomberg, OECD and CEPII databases. This can also help to identify potential risks in the capital markets. Although predicting them and measuring their impact is more difficult, identifying risks can be the first step towards an investor's appropriate risk management. Geopolitical risk can affect many asset classes. Quantitative methods can also be introduced to measure risk. Risk in the capital markets can be measured by volatility/dispersion. This requires looking at the timing of past events and the market movements since then, in addition to capital market returns. It is important to note that the geopolitical risk has been intensified not only by the outbreak of the Russia-Ukraine conflict, but also by the technological rivalry between the United States and China, which has been intensifying since 2018, and the introduction of trade restrictions and tariffs. And investors have also faced increased volatility in recent years, partly due to geopolitical risks, as seen for example in the evolution of the VIX index, which measures the implied volatility of the S&P 500 index, in Figure 3. After the 2008

economic crisis, investors have typically seen a decline in volatility in US stock markets, but we can see spikes in 2018 and 2019, for example, and the outbreak of the COVID-19 epidemic, as well as the last two years of increased volatility, with a local minimum still typically higher than in the 2013-2015 and 2003-2007 periods.

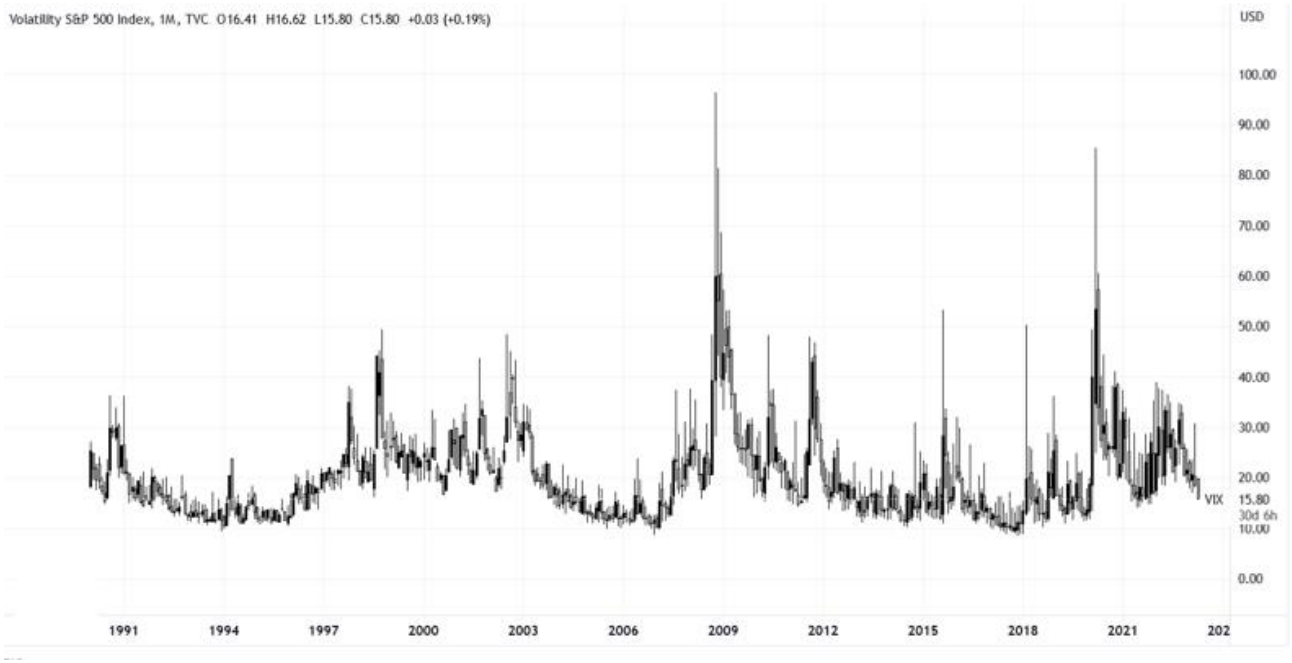

Figure 3: S&P 500 VIX index, Source: Tradingview.com

A classical geopolitical approach

The relationship between the United States and China can also be examined in the classical geopolitical approach. Although other approaches have emerged since then, Mackinder and Mahan's theories may still have explanatory power for the situation in the Asian region and for explaining the conflict between the United States and China. This is despite the fact that international relations have changed significantly since the theories of Alfred Thayer Mahan and Sir Halford Mackinder were first developed.

Alfred Thayer Mahan and maritime power

In his best-known works (The Influence of Sea Power Upon History 1660-1783, The Influence of Sea Power upon the French Revolution and Empire 1793-1812), Admiral Alfred Thayer Mahan summarized the main factors associated with sea power. Basically, geography clearly influences which country can build up maritime power, but population, geographic extent, government structure are also influencing factors. According to Mahan, maritime power is more influential than land power, as maritime trade routes provide access to raw materials, and a strong navy can blockade regions in the event of conflict. In addition, 70 percent of the Earth's surface is water, another argument for the dominance of maritime power over land power. Mahan's proposals had a major influence on the geostrategy of the United States in the 20th century. In his book, Mahan defined Britain, the United States and Japan as maritime powers, while Russia, France, the Austro-Hungarian Empire and Germany were interpreted as continental powers. An important point Mahan made about China was that, although he thought of it essentially as a land power, he saw the potential for China to become a maritime power because of its wide coastline (Mahan, 1890). Of course, the balance of power was different in the early 20th century, but looking at contemporary events, China clearly seems to be striving for this. In the long term, therefore, Mahan's 'prediction' for China's rise seems to have been borne out. Examples: South China Sea expansion, artificial islands tensions around Taiwan. It is also at the heart of today's major geopolitical risks. But China is not only strengthening its influence at sea, but also on land. China's maritime influence has been steadily increasing in recent years. For

example, the Asia Maritime Transparency Initiative's website provides a map of how China's influence and leverage in the region is evolving. And the One Belt One Road One Sea initiative includes both land and sea routes, with major infrastructure development through Central Asia to Central and Eastern Europe.

Sir Halford John Mackinder and the Heartland

" Who rules East Europe commands the Heartland;
who rules the Heartland commands the World-Island;
who rules the World-Island commands the world[†].
(Mackinder, 1919:186)

Admiral Mahan's theories laid the foundations for later geopolitical trends. Sir Halford John Mackinder coined the concepts of the Heartland and the World Island in his The Geographical Pivot of History, describing the acquisition of influence on the Eurasian continent. Mackinder defined the Eurasian continent as the core territory, the area of mainly Siberian territory held by Russia. Germany, for example, lies on the periphery surrounding it, and the Middle East, India and Japan lie in the Asian part. The Asian countries also outline a zone in which conflicts could arise. China, for example, would be encroaching on this with its expansion in the South China Sea. But alongside Asian expansion, China's One Belt One Road initiative also deserves attention. The implementation of this initiative would connect the three oceans, which would be a priority as it would provide access to sea exits from the mainland (Bernek, 2018). This would in turn give China and its allies control over the World Island vis-à-vis Western powers. But Mackinder's theory also suggests that once land powers have stable positions, they may turn to the sea, which poses a significant threat to the status quo. China has strengthened its land positions in recent years. It has reached agreements with Russia, North Korea and Mongolia on territorial issues. This in turn has allowed it to expand increasingly at sea and makes China more of a hybrid power (Benjamin, 2017). The theories of Mackinder and Mahan explain the prominence of the Southeast Asian region, mainly by China's acquisition of maritime influence, which is of course interpreted as a threat by the United States. For example, by expanding in the South China Sea, China could reach out to US allies and exercise control over virtually the entire South China Sea. However, besides China and the United States, the conflict that has had the greatest impact in Europe is the Russia-Ukraine conflict that erupted on 24 February 2022. The direct and indirect effects of the conflict have also affected capital markets, while the economic environment in European countries has already shown slowing economic growth and a rising inflationary environment throughout 2021. However, the outlook has been materially affected by the Russia-Ukraine conflict, which has also had a significant negative impact on global economic growth. Of course, the conflict is associated with a heightened geopolitical risk index, unfortunately, in the current situation, the conflict, which is at the forefront of both combat activities and press coverage, makes the reasons for the high-risk index clear. In retrospect, of course, the trends are clearer, but the question currently arises whether, if it is possible to measure geopolitical risk, and the GPR index can be used as a forecast or as an explaining power. Before the outbreak of the Russia-Ukraine conflict, we need to look at how the geopolitical risk index has evolved. The recent events show that the geography of conflicts is once again bringing classical geopolitical approaches to the fore, although a new geopolitical approach may be needed, Bernek (2018 B).

[†] Halford J. Mackinder (1919): Democratic Ideals and Reality. A Study in the Politics of Reconstruction. New York: Henry Holt and Company, 186.

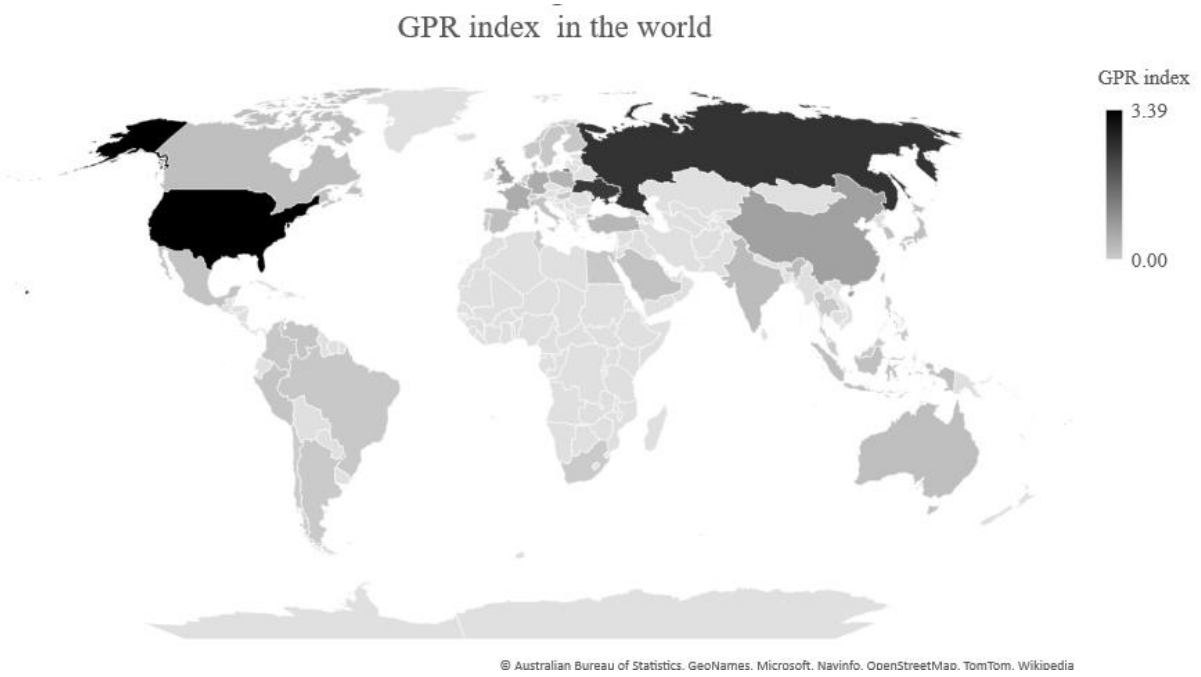

Figure 4: The value of the Geopolitical Risk Index in December 2022. A higher value indicates a higher risk. Areas in grey do not have a risk index available. Currently, the United States, Russia, Finland, Ukraine and China have higher index values. Source: Dario Caldara and Matteo Iacoviello (2022)

How to measure geopolitical risks

Classical geopolitical trends also provide a reference point for contemporary events, whether we are looking at maritime power in the Asian region or China's assertion of influence on land, or the situation of the CEE region. Capital market movements are examined in relation to Asia and Europe, as this region is primarily the arena for conflict and risk, and where the most tangible effects can be felt if there is a change that affects companies. Of course, the spill-over effects cannot be ignored because of the global trade implications. Geopolitical risk is difficult to quantify, it is not like interest rate risk. It is best to rely on sentiment indicators. These are compiled from current news, measuring how often certain terms are mentioned. A more sophisticated analysis is provided by the so-called Geopolitical Risk index, created by Dario Caldara and Matteo Iacoviello (2018, 2022) and Matteo Iacoviello (2018, 2022) at the Federal Reserve. The essence of the index is to try to measure different geopolitical risks by the frequency of occurrence of a given event in different media. The index does this by means of "text mining", i.e. by continuously monitoring different news and analyses to look at the frequency of occurrence of certain terms. The search looks at terms related to war threats, terrorist threats, nuclear threats, military forces. The index is designed to be highly sensitive to past events that represent major conflicts (e.g. World Wars I and II, the Gulf War, the September 11 terrorist attacks, the Iraq war or the 2014 Russia-Ukraine crisis). Of course, the indicator measures not only the most high-profile events, but also events of minor importance. It can also have the added advantage that news can appear before the outbreak of a conflict, giving the indicator a certain degree of predictive power. In a 2011 study, Berkman, Jacobsen and Lee found that geopolitical risks and catastrophic events have a negative impact on stock returns.

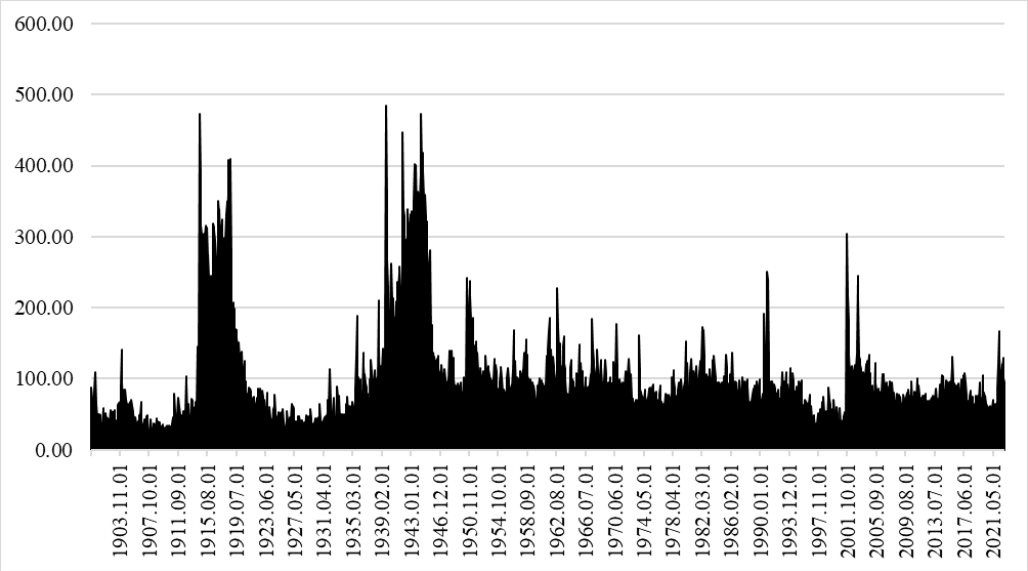

Figure 5. Historical evolution of the GPR index. The figure clearly shows the spikes in the GPR index during the world wars, as well as the spike in the risk index following the terrorist attacks of 11 September 2001, and unfortunately, recent events are also noteworthy, which also show an increased GPR index. Source: Caldara, Dario and Matteo Iacoviello (2022)

Geopolitics has been in the spotlight in the capital markets recently, especially since the outbreak of the Russian war in Ukraine in 2022, but also at other events in which geopolitics may play a role. Classical geopolitics can provide a starting point for recent events, and we use geography as a starting point to try to find correlations between the strategies of different countries. The aim of this paper is to show, in a quantitative way, that there may be a link between geopolitical risks and investor behaviour. Although there are many other factors that can influence investor behaviour, geopolitical risk is only one of them, and it is worth considering during certain periods of heightened risk. In our study, we use these existing methodologies to explain stock market returns in 2022. Our aim is not necessarily forecasting, as geopolitical risks are not a good predictor of the outbreak of a war, for example, but they can act as a sentiment index in the capital markets and influence investor behaviour, which can be reflected in the level of returns. Of course, there may also be a correlation with other risk indicators such as CDS spreads, bond yields and credit ratings. In the study of geopolitics, however, we try to use geography as a tool to explain events, and this is what we attempt to do in this paper.

Data

In our study, we focus on the CEE region, looking primarily at the impact of changes in geopolitical risk on equity market returns in this region, but also shedding light on the data in a global comparison. Our sample is based on 45 countries, of which 37 are OECD members and the remaining 8 are non-OECD members. The data were collected from countries included in the OECD database. The variables also include monthly stock index data per country from the OECD database, as well as 10-year bond yields. The CEPII[‡] database was used to determine the distance between countries and capitals. The GPR indices for each country were considered based on the database of Caldara and Iacoviello (2022). Unfortunately, in this case, GPR indices are not available for all countries in the OECD database. Missing values were replaced by median GPR indices. And based on Damodaran's[§]

[‡] Mayer, T. & Zignago, S. (2011), Notes on CEPII's distances measures : the GeoDist Database, CEPII Working Paper 2011-25

[§]Damodaran, Aswath, Country Risk: Determinants, Measures and Implications - The 2022 Edition (July 5, 2022). Available at SSRN: https://ssrn.com/abstract=4161010 or http://dx.doi.org/10.2139/ssrn.4161010 https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

database, the credit ratings and country risk premiums for each country were used for the analysis. In summary, our cross-sectional database contains the following data:

Short name of the variable	*Description*
BEF_WAR_1M	1 month return before the war in 2022 February
M1_RET	1 month return after the breakout
M3_RET	3 months return after the breakout
M6_RET	6 months return after the breakout
Y1_RET	1 Year return after the breakout
DIST_TO_KIJ	Capital distance to Kiev, the variables were standardized
EUROZ	Eurozone member, dummy variable
NATO	NATO member, dummy variable
RATING	Moody's rating
CTRY_RISKP_2023	Country risk premium 2023
CTRY_RISKP_2022	Country risk premium 2022
CNTRY_RISK_CHG1Y	Country risk premium change
GPR_JAN	Geopolitical risk index 2022 January
GPR_FEBR	Geopolitical risk index 2022 February
GPR_MAR	Geopolitical risk index 2022 March
GPR_ACT	Geopolitical risk index one year after the beginning of the war
Y10_CHG	Percentage points change in 10-year interest yield between 2022 January and May

Methodology

Based on our cross-sectional database (n=45, number of countries), we show how geographical distance has influenced it over 5 selected time periods. The time horizon is the year 2022, around the outbreak of the Russian war in Ukraine, and the period since then. However, the stock market is also priced forward in many cases, so we also looked at monthly returns before the date of the outbreak of the war. Our multivariate OLS regression model includes the following dependent variables:

1) BEF_WAR_1M
2) M1_RET
3) M3_RET
4) M6_RET
5) Y1_RET

These represent the 5 time windows at which I would like to examine the stock market reaction.
Our explanatory variables include the standardised distance from Kiev, membership of the Eurozone or NATO, the change in the country risk premium over the period, the geopolitical risk index for the corresponding time periods, and the change in 10-year bond yields. Our preliminary hypotheses are:

(i) Geographical distance and higher levels of geopolitical risk have had a negative impact on equity market returns in the countries concerned
(ii) Since the outbreak of the Russia-Ukraine war in 2022, this effect has diminished

Results

The Geopolitical Risk Index was already rising before the war, which is not surprising because articles and analyses on the potential risks of war were published long before the outbreak of the war. For this reason, we have chosen a period in our cross-sectional database that includes data before the outbreak of war. The stock market is also priced in advance in many cases, so investors are trying to prepare for the risks and, where appropriate, to escape from assets that are likely to be at higher risk. Figure 6 also shows monthly returns prior to the war, which tended to be negative in Europe and near Kiev.

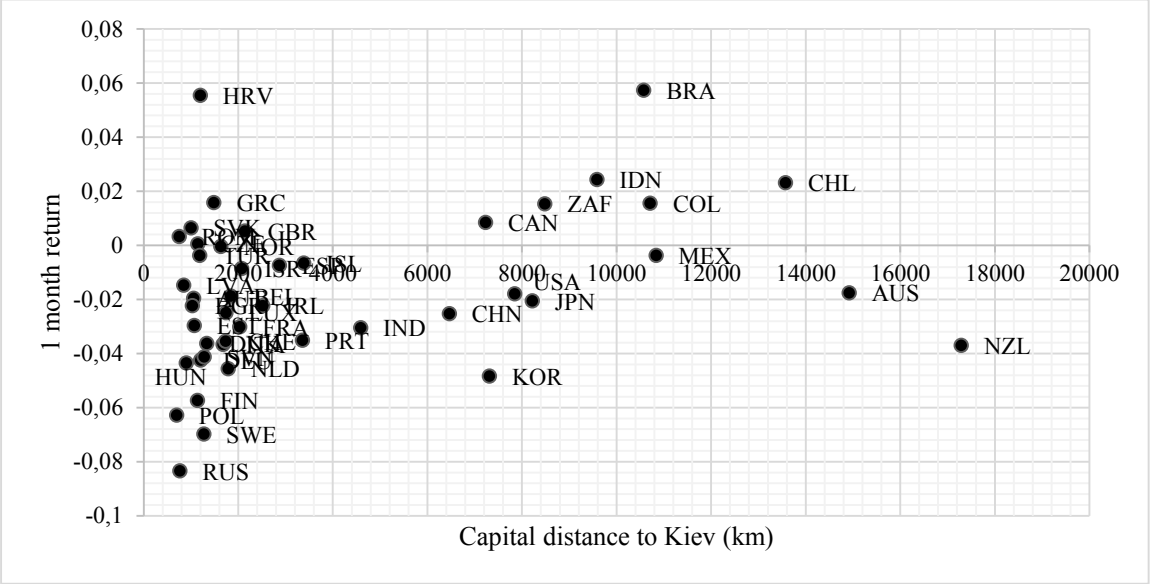

Figure 6: Stock market returns around the outbreak of the war in 2022. The monthly returns were measured against the distance to Kiev. The returns were calculated one month before the war. We already can see some negative returns, especially in the CEE region and in Nordic states. Countries were represented by official country codes. Source: author's own editing

It was at the outbreak of the war that the biggest falls in stock market indices were seen, and the evidence showed that the pre-war trend continued. According to our regression model, geographic distance (p-value=0.0087) was already significant in time window 1 before the outbreak of the war, while NATO membership, country credit rating and geopolitical risk index for the period also had additional explanatory power. After the outbreak of the war, distance and the geopolitical risk index also showed significant explanatory power at 99% (s_DIST_TO_KIJ p-value=0.0030, GPR_FEBR p-value 0.0050). For three-month returns, we still see an acceptable level of significance, however, after 6 and 12 months, the distance and the explanatory power of the geopolitical risk index decreases even further, suggesting that geopolitical risk is fading in the capital markets over time and that investors are mostly only paying attention in the short term.

Model: OLS, using observations 1-45
Dependent variable: M1_RET
Heteroskedasticity-robust standard errors, variant HC1

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0,0262473	0,0173666	−1,511	0,1388	
EUROZ	−0,0279193	0,0198407	−1,407	0,1673	
NATO	0,0372668	0,0213645	1,744	0,0890	*
RATING	−0,00222228	0,00190075	−1,169	0,2494	
s_DIST_TO_KIJ	0,0341143	0,0107758	3,166	0,0030	***
GPR_FEBR	−0,0190682	0,00641049	−2,975	0,0050	***

Our results confirm both hypotheses, showing that geographic distance and geopolitical risk had a significant impact on stock market returns in the early stages of the war (i), while over time these factors lost explanatory power (ii). It may be worth investigating further what factors may have influenced markets, for example in Europe or across OECD member countries, to the extent that the effects of age-policy risk no longer show explanatory power. In its study, the European Central Bank[**] only looked at the distance from Kiev, but also found similar results. In our study we tried to include more factors in the analysis besides distance, but our results point in a similar direction. The conclusion of our results is that, unfortunately, today investors may face negative return effects in the stock market due to the increase in geopolitical risks.

Summary

Looking at the stock market performance of a few countries in the OECD members, we can conclude that a higher value of the geopolitical risk indicator is likely to lead to worse stock market returns in that country, especially in the short term. This also confirms the basic assumption based on the literature. However, further analysis could be carried out on the extent to which the GPR indicator can explain returns in the stock market of a given country and, in particular, to what extent falls are explained by the indicator. The GPR indicator is not the only one that tries to quantify geopolitical risk, similar examples can be seen for example in the case of BlackRock who have also created their own indicator. However, geopolitical risk indicators may be worth considering when making investment decisions or as a risk management tool. Complemented with the classical geopolitical fundamentals, these risks can be weighed when investing in specific regions/countries and can contribute to more rational investment decisions. Overall, the geopolitical risk indices also show that there has been an increasing trend in the CEE region, and also in Asia in recent years of announcements and news pointing to potential conflict. This is interesting from an investor's point of view, and may also provide an example of how classical geopolitical theories can be used, even in finance. This could be a useful complementary tool to assess and explain what is going on. We intend to continue the research we have started on this topic by examining the GPR indicator and various events. Based on the analysis so far, the initial assumption is that the current geopolitical risk environment may also pose extra market risk in the region, which investors should be aware of. While in developed markets and countries geographically more distant from the key conflict zones, the negative effects may be more limited. Risks have always been present in the history of capital markets, and it is precisely current events - political, economic or natural - that have influenced investors' thinking. However, the last few years, and in particular 2022, have brought these types of risks to the fore once again. This may highlight the need, as capital market investors, to consider qualitative methodologies in addition to classical risk measurement tools, or to quantify concepts less closely related to capital market prices in order to make investment decisions, for example the geopolitical risk index, but also the possibility of looking at different market sentiment indices. For

[**] How do markets respond to war and geopolitics?
https://www.ecb.europa.eu/press/blog/date/2022/html/ecb.blog220928~a4845ecd8c.en.html

an investor who also wants to be informed about geopolitics, classical geopolitics can also provide a reference point, and although the relevant theories may seem dated, comparing global buffer zones is unlikely to show much change, despite the fact that country borders have also been significantly redrawn over the last 100-150 years. Our study can therefore highlight the importance of a multidisciplinary approach to investment.

Bibliography

Benjamin, S. (2017) Towards Contested 'Spheres of Influence' in the Western Pacific: Rising China, Classical Geopolitics, and Asia-Pacific Stability, Geopolitics, 24 (2) 503-522.
Berkman, H., Jacobsen, B., & Lee, J. (2011). time-varying rare disaster risk and stock returns. Journal of Financial Economics, 101(2) pp. 313-332.
Bernek, A. (2018 A). Hazánk keleti nyitás politikája és a 21. századi geopolitikai stratégiák összefüggései.
Bernek Á. (2018 B): Közép- és Kelet-Európa a 21. század geopolitikai/geoökonómiai stratégiáiban, Akadémiai Kiadó, BudapestBlackRock. (2021). Gauging Geopolitics. Source: https://www.blackrock.com/us/individual/insights/blackrock-investment-institute/geopolitical-risk-framework [downloaded: 2023.01.15]
BlackRock. (2021). Geopolitical Risk Dashboard. Source: https://www.blackrock.com/corporate/literature/whitepaper/geopolitical-risk-dashboard-december-2021.pdf [downloaded: 2023.01.15)
BlackRock. (2022). Geopolitical Risk Dashboard. Source: https://www.blackrock.com/corporate/insights/blackrock-investment-institute/interactive-charts/geopolitical-risk-dashboard [downloaded: 2023.01.15)
Caldaro, D., & Matteo, I. (2018) Measuring Geopolitical Risk, International Finance Discussion Papers.
Caldara, Dario and Matteo Iacoviello (2022), "Measuring Geopolitical Risk," American Economic Review, April, 112(4), pp.1194-1225.
Damodaran, A. (2022), Country Risk: Determinants, Measures and Implications - The 2022 Edition (July 5, 2022). Available at SSRN: https://ssrn.com/abstract=4161010
ECB (2022): How do markets respond to war and geopolitics? https://www.ecb.europa.eu/press/blog/date/2022/html/ecb.blog220928~a4845ecd8c.en.html
Mackinder, H. (1904) The Geographical Pivot of History, The Geographical Journal, 4/23 pp 55.
Halford J. Mackinder (1919): Democratic Ideals and Reality. A Study in the Politics of Reconstruction. New York: Henry Holt and Company, 186.
Mahan, A. (1890) Influence of Sea Power Upon History, 1660-1783.
Mayer, T. & Zignago, S. (2011), Notes on CEPII's distances measures : the GeoDist Database, CEPII Working Paper 2011-25

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Appendix

Summary Statistics, using the observations 1 - 45
for the variable BEF_WAR_1M (45 valid observations)

Mean	Median	Minimum	Maximum
-0,017028	-0,019527	-0,083364	0,057368
Std. Dev.	C.V.	Skewness	Ex. kurtosis
0,029303	1,7209	0,32524	0,35095
5% Perc.	95% Perc.	IQ range	Missing obs.
-0,067640	0,046131	0,038284	0

Summary Statistics, using the observations 1 - 45
for the variable M1_RET (45 valid observations)

Mean	Median	Minimum	Maximum
-0,035100	-0,028287	-0,24445	0,062442
Std. Dev.	C.V.	Skewness	Ex. kurtosis
0,060692	1,7291	-0,87807	1,5462
5% Perc.	95% Perc.	IQ range	Missing obs.
-0,14138	0,054992	0,087076	0

Summary Statistics, using the observations 1 - 45
for the variable M3_RET (45 valid observations)

Mean	Median	Minimum	Maximum
-0,052697	-0,056425	-0,27539	0,21629
Std. Dev.	C.V.	Skewness	Ex. kurtosis
0,081677	1,5499	0,65431	2,5759
5% Perc.	95% Perc.	IQ range	Missing obs.
-0,17992	0,12827	0,065744	0

Summary Statistics, using the observations 1 - 45
for the variable M6_RET (45 valid observations)

Mean	Median	Minimum	Maximum
-0,050052	-0,070293	-0,33230	0,46566
Std. Dev.	C.V.	Skewness	Ex. kurtosis
0,12449	2,4872	1,8790	5,9841
5% Perc.	95% Perc.	IQ range	Missing obs.
-0,17442	0,24226	0,092243	0

Summary Statistics, using the observations 1 - 45
for the variable Y1_RET (45 valid observations)

Mean	Median	Minimum	Maximum
-0,018786	-0,074363	-0,39197	1,6150
Std. Dev.	C.V.	Skewness	Ex. kurtosis
0,26808	14,270	5,1358	29,190
5% Perc.	95% Perc.	IQ range	Missing obs.
-0,16806	0,19813	0,13222	0

Summary Statistics, using the observations 1 - 45
for the variable Y10_CHG (45 valid observations)

Mean	Median	Minimum	Maximum
1,2080	1,1900	0,00000	2,6400
Std. Dev.	C.V.	Skewness	Ex. kurtosis
0,60803	0,50333	0,13362	0,33452
5% Perc.	95% Perc.	IQ range	Missing obs.
0,012870	2,4840	0,76850	0

Summary Statistics, using the observations 1 - 45
for the variable DIST_TO_KIJ (45 valid observations)

Mean	Median	Minimum	Maximum
4124,2	1781,7	690,82	17284,
Std. Dev.	C.V.	Skewness	Ex. kurtosis
4354,1	1,0557	1,4025	0,94058
5% Perc.	95% Perc.	IQ range	Missing obs.
750,25	14509,	6105,2	0

Summary Statistics, using the observations 1 - 45
for the variable GPR_JAN (45 valid observations)

Mean	Median	Minimum	Maximum
0,41150	0,16000	0,00000	3,3635
Std. Dev.	C.V.	Skewness	Ex. kurtosis
0,68513	1,6650	3,0514	9,0880
5% Perc.	95% Perc.	IQ range	Missing obs.
0,016493	2,5054	0,16243	0

Summary Statistics, using the observations 1 - 45
for the variable GPR_FEBR (45 valid observations)

Mean	Median	Minimum	Maximum
0,66055	0,20000	0,010390	5,4701
Std. Dev.	C.V.	Skewness	Ex. kurtosis
1,1732	1,7761	2,9341	8,1457
5% Perc.	95% Perc.	IQ range	Missing obs.
0,036364	4,3278	0,25455	0

Summary Statistics, using the observations 1 - 45
for the variable GPR_MAR (45 valid observations)

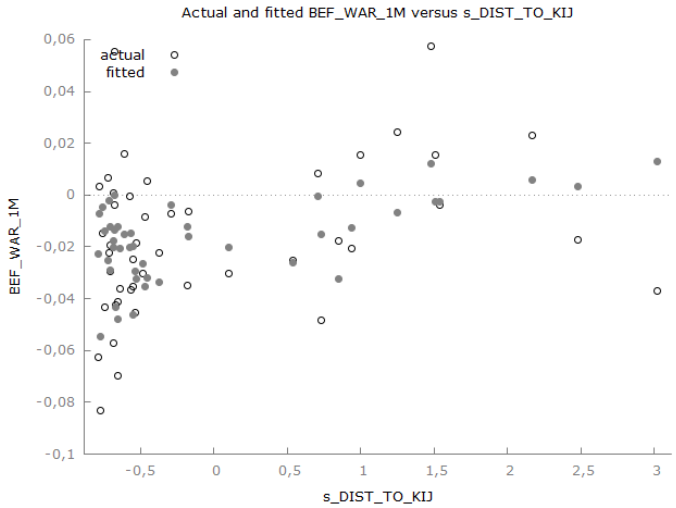
Mean	Median	Minimum	Maximum
0,99137	0,38000	0,019900	8,9747
Std. Dev.	C.V.	Skewness	Ex. kurtosis
1,7376	1,7528	3,3110	11,000
5% Perc.	95% Perc.	IQ range	Missing obs.
0,031342	6,1191	0,43779	0

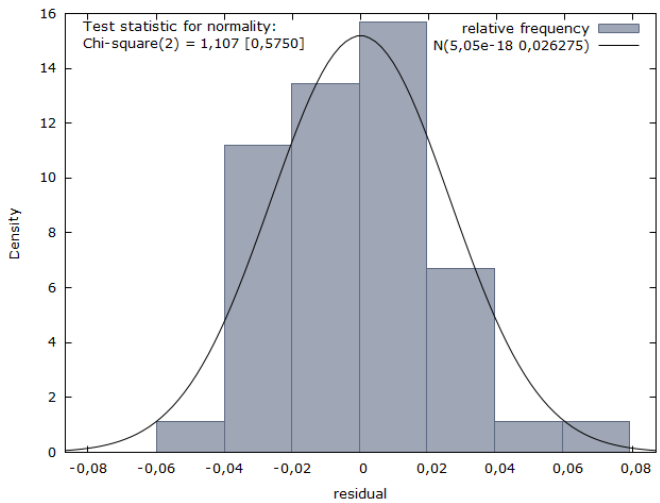
Model summaries
Before war

Model: OLS, using observations 1-45
Dependent variable: BEF_WAR_1M
Heteroskedasticity-robust standard errors, variant HC1

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0,0378544	0,00843183	−4,489	<0,0001	***
EUROZ	−0,00894224	0,00944091	−0,9472	0,3494	
NATO	0,0272443	0,0102893	2,648	0,0116	**
RATING	0,00202662	0,000974431	2,080	0,0442	**
s_DIST_TO_KIJ	0,0167891	0,00607732	2,763	0,0087	***
GPR_JAN	−0,0113834	0,00544255	−2,092	0,0430	**

Mean dependent var	−0,017028	S.D. dependent var	0,029303
Sum squared resid	0,026925	S.E. of regression	0,026275
R-squared	0,287355	Adjusted R-squared	0,195990
F(5, 39)	3,356871	P-value(F)	0,012871
Log-likelihood	103,1282	Akaike criterion	−194,2564
Schwarz criterion	−183,4165	Hannan-Quinn	−190,2154





1 month after the war

Model 10: OLS, using observations 1-45
Dependent variable: M1_RET
Heteroskedasticity-robust standard errors, variant HC1

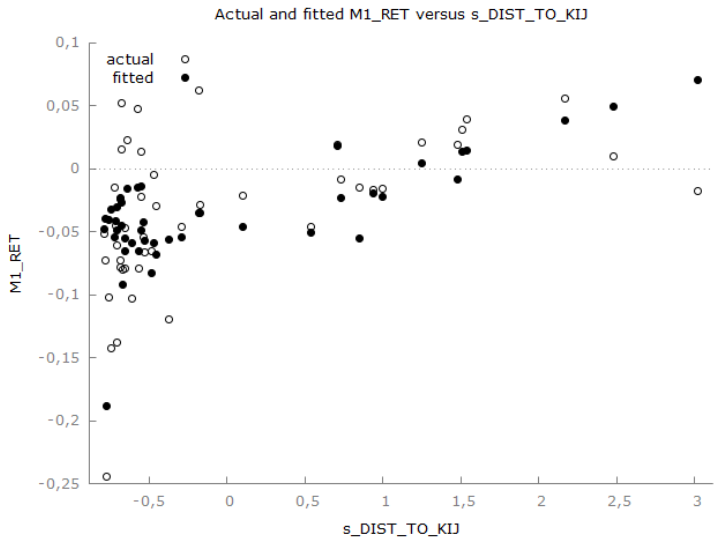
	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0,0262473	0,0173666	−1,511	0,1388	
EUROZ	−0,0279193	0,0198407	−1,407	0,1673	
NATO	0,0372668	0,0213645	1,744	0,0890	*
RATING	−0,00222228	0,00190075	−1,169	0,2494	
s_DIST_TO_KIJ	0,0341143	0,0107758	3,166	0,0030	***
GPR_FEBR	−0,0190682	0,00641049	−2,975	0,0050	***

Mean dependent var	−0,035100	S.D. dependent var	0,060692
Sum squared resid	0,089647	S.E. of regression	0,047944
R-squared	0,446883	Adjusted R-squared	0,375970
F(5, 39)	5,218761	P-value(F)	0,000922
Log-likelihood	76,06489	Akaike criterion	−140,1298
Schwarz criterion	−129,2898	Hannan-Quinn	−136,0887

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 1,26975
with p-value = 0,530002

Non-linearity test (logs) -
Null hypothesis: relationship is linear
Test statistic: LM = 1,82972
with p-value = P(Chi-square(2) > 1,82972) = 0,400573

White's test for heteroskedasticity -
Null hypothesis: heteroskedasticity not present
Test statistic: LM = 13,9074
with p-value = P(Chi-square(17) > 13,9074) = 0,673648



3 months after the war
Model 11: OLS, using observations 1-45
Dependent variable: M3_RET

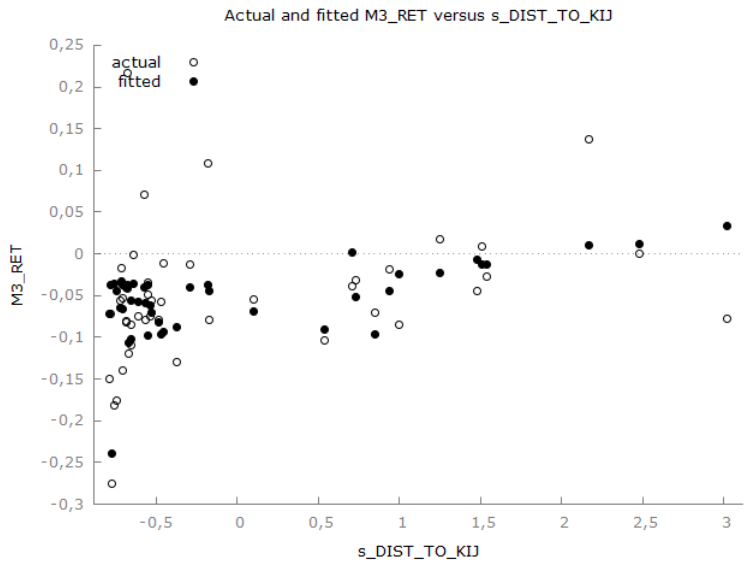
	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0,0739522	0,0308064	−2,401	0,0212	**
EUROZ	−0,0244787	0,0284321	−0,8610	0,3945	
NATO	0,0625810	0,0332378	1,883	0,0672	*
RATING	0,00101669	0,00301932	0,3367	0,7381	
s_DIST_TO_KIJ	0,0375349	0,0150907	2,487	0,0173	**
GPR_MAR	−0,0167916	0,00649928	−2,584	0,0136	**

Mean dependent var	−0,052697	S.D. dependent var	0,081677
Sum squared resid	0,212500	S.E. of regression	0,073815
R-squared	0,276055	Adjusted R-squared	0,183241
F(5, 39)	2,974294	P-value(F)	0,022795
Log-likelihood	56,64599	Akaike criterion	−101,2920
Schwarz criterion	−90,45200	Hannan-Quinn	−97,25094

White's test for heteroskedasticity -
Null hypothesis: heteroskedasticity not present
Test statistic: LM = 20,9515
with p-value = P(Chi-square(17) > 20,9515) = 0,228469

Non-linearity test (logs) -
Null hypothesis: relationship is linear
Test statistic: LM = 2,40263
with p-value = P(Chi-square(2) > 2,40263) = 0,300798

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 11,6881
with p-value = 0,0028971



6 months after war

Model 12: OLS, using observations 1-45
Dependent variable: M6_RET

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0,106008	0,0494605	−2,143	0,0384	**
EUROZ	−0,0426428	0,0456485	−0,9342	0,3560	
NATO	0,0913412	0,0533643	1,712	0,0949	*
RATING	0,00594235	0,00484761	1,226	0,2276	
s_DIST_TO_KIJ	0,0457029	0,0242286	1,886	0,0667	*
GPR_MAR	−0,0217842	0,0104348	−2,088	0,0434	**

Mean dependent var	−0,050052	S.D. dependent var	0,124489
Sum squared resid	0,547765	S.E. of regression	0,118513
R-squared	0,196695	Adjusted R-squared	0,093707
F(5, 39)	1,909886	P-value(F)	0,114796
Log-likelihood	35,34061	Akaike criterion	−58,68122
Schwarz criterion	−47,84124	Hannan-Quinn	−54,64019

12 months after the war
Model 1: OLS, using observations 1-45
Dependent variable: Y1_RET
Heteroskedasticity-robust standard errors, variant HC1

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	−0,227493	0,140270	−1,622	0,1133	
DIST_TO_KIJ	2,03558e-05	1,01970e-05	1,996	0,0533	*
EUROZ	−0,121117	0,107928	−1,122	0,2690	
NATO	0,278814	0,178391	1,563	0,1266	
RATING	0,000109765	0,00942541	0,01165	0,9908	
CNTRY_RISK_CHG1Y	7,76735	7,80889	0,9947	0,3264	
GPR_ACT	−0,186990	0,134579	−1,389	0,1730	
Y10_CHG	−0,0411430	0,0374927	−1,097	0,2796	

Mean dependent var	−0,018786	S.D. dependent var	0,268080
Sum squared resid	2,281455	S.E. of regression	0,248316
R-squared	0,278507	Adjusted R-squared	0,142009
F(7, 37)	1,026794	P-value(F)	0,429166
Log-likelihood	3,239372	Akaike criterion	9,521256
Schwarz criterion	23,97456	Hannan-Quinn	14,90930

BAREITH TIBOR[1,*] AND FERTŐ IMRE[2,3]: THE IMPACT OF MACROECONOMIC FACTORS ON FOOD PRICE INFLATION: THE CASE OF HUNGARY

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Recent episodes of high and volatile food inflation in developed and emerging economies have led policymakers around the world to confront the question of how effective monetary policy is in stabilising food price pressures. The small number of empirical studies has been limited to Central European countries, including Hungary. We analyze the role of macroeconomic factors on food inflation in Hungary from January 2007 to November 2022. The long-run relationship is confirmed among the variables using the ARDL bounds testing approach to cointegration.
Employing the Nonlinear Autoregressive Distributed Lag (NARDL) as estimation strategy, this study is probably the first attempt to examine the asymmetric relationship between food inflation and macroeconomic variables relevant to monetary policymaking. The results show that a change in consumer price index and USD exchange rate also induces changes in the food inflation in both directions in the long run. However we do not find signicant results for global food price index and monetary policy proxied monetary base. The symmetry test statistics suggest the existence of a symmetric relationship between food price inflation and macroeconomic variables in the long-run as well as in the short-run.

Keywords: food prices, inflation, monetary policy, nardl, long term

I. Introduction

Recent episodes of high and volatile food inflation in developed and emerging economies have led policymakers around the world to confront the question of how effective monetary policy is in stabilising food price pressures. Monetary restictions reduces output and income in response to food price shocks, but may not have a significant impact on food inflation because of the Engel law, while monetary policy has a larger impact on non-food prices and output. This raises a dilemma for policy makers regarding the role of monetary policy in the impact of food shocks.
Rising food inflation not only affects inflation but also creates uncertainty, leading to rising inflation expectations. This creates problems in forecasting aggregate inflation and achieving inflation targets. Producers face difficulties in making investment decisions due to rising inflation uncertainty. Furthermore, food prices negatively affect health and welfare activities by increasing infant and child mortality and malnutrition in developing countries (de Brauw, 2011; Kidane and Woldemichael, 2020).
The coronavirus epidemic and the Russian and Ukraine war have amplified these effects in Hungary. The inflation target of the Hungarian National Bank (MNB) is 3%, with a tolerance band of ±1 percentage point acceptable under the Hungarian inflation targeting system. Price growth reached 9.5% by April 2022, and prices have accelerated by over 20% since September 2022. Food price dynamics have diverged from inflation (see Figure 1).

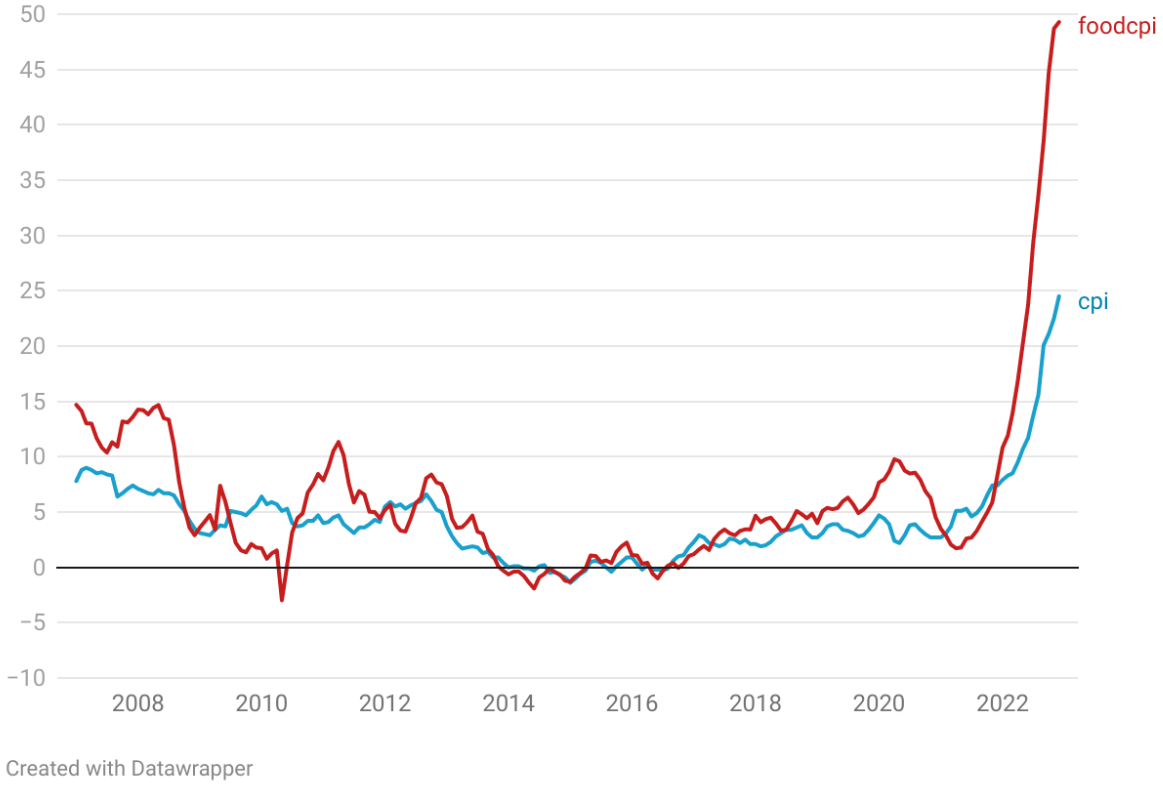

Figure 1: Food and overall inflation in Hungary

While some of the literature (Pourroy et al., 2016; Anand et al, 2015; Catao and Chang, 2015; Soto, 2003; and Aoki, 2001) provide a theoretical basis for optimal monetary policy to influence food inflation, empirical investigation of this relationship remains surprisingly limited (Bhattacharya and Jain, 2020). Recent studies focus mainly on Asian (Bhattacharya and Jain, 2020, Samal and Goyari 2022) and African countries (Iddrisu and Alagidede 2020, 2021), but there are few studies on European Union countries, and within them on Central European countries (except Bhattacharya and Jain, 2020).

The central question of our paper is: can monetary policy stabilise food price inflation? Our results provide empirical evidence on the effectiveness of monetary policy in combating domestic food price inflation. The paper contributes to the literature in several ways. Previous studies have mainly used VAR models to analyse the impact of monetary policy on food inflation. However, the related empirical literature has raised several criticisms of the use of VAR models (e.g. Iddrisu and Alagidede 2020, Samal and Goyari 2022). Food prices are among the most volatile, and therefore food prices can reach extreme values relatively quickly. The existence of extreme values in the distribution of food prices cannot be explained by an averaging approach, and hence not by the VAR model. In contrast, macroeconomic policy is based on asymmetric properties. Thus, the application of these techniques may give biased results. Following the recent empirical literature (Iddrisu and Alagidede 2020 and 2021, Samal and Goyari 2022), we use quantile regression to address this problem in order to understand the dynamics of different levels of price increases and to show the impact of monetary policy on different scenarios.

The limited number of empirical studies has been limited to Central European countries, including Hungary. Hungary is a good case study because it has a higher than average share of food in the consumer basket in the EU. Furthermore, as a small, open country exposed to world market processes, it is important to investigate the extent to which food prices in the world economy are reflected in domestic prices and the extent to which the central bank can effectively counteract this.

II. Review of related studies

Although there is a rich literature on the relationship between monetary policy and inflation, only a limited number of studies have analysed the impact of monetary policy on food inflation. One strand of the literature has focused on the United States, and in particular on the impact of monetary policy on product markets. Frankel (2008) examines the impact of monetary policy on real commodity prices in the United States over the period 1950-2005. The findings of the study show that increases in short-term real interest rates reduce aggregate commodity prices and, in 23 cases, agricultural commodity prices. Akram (2009) finds that a positive shock to real interest rates causes a decline in the real price of both oil and food. Scrimgeour (2015) finds a similar result, examining the response of commodity prices to changes in monetary policy in the United States. He estimates that a 1 per cent increase in the interest rate led to an immediate fall in commodity prices of 0.6 per cent. Hammoudeh, Nguyen, and Sousa (2015) conclude that tightening monetary policy has a lagged negative and significant effect on aggregate commodity prices. However, at the product level, tightening monetary policy significantly increases food inflation. Generalizing Dornbush's (1976) model in a new theoretical framework, Shaghaian and co-authors (2002) show that agricultural prices adjust more quickly to changes in the money supply than industrial prices, which affects relative prices in the short run, but strict long-run monetary neutrality does not hold. Alam and Gilbert (2017) find that monetary policy, global economic conditions, and the exchange rate of the US dollar play important roles in agricultural commodity price dynamics. These studies have two important features. First, they did not work directly with food inflation, but with aggregate agricultural prices, or more disaggregated product prices. On the other hand, VAR or VAR-based SVAR, FAVAR models were used in the empirical analysis.

Another group of studies deals with India. Anand, Ding and Tulin (2014) study the role of monetary policy on food price inflation in India using Bayesian techniques. The results of their study show that restrictive monetary policy reduces food inflation. Kumar and Dash (2020) conclude that monetary policy measures are more effective in reducing inflation in the manufacturing sector than in the agricultural sector. However, at the disaggregated level, tightening monetary policy significantly increases food inflation. Holtemoller and Mallick (2016) show that tightening monetary policy reduces food price inflation by raising interest rates in India. Using quantile regression analysis, Samal and Goyari (2022) find that monetary policy stabilises food inflation in all quantiles. They find that the transmission of monetary policy through exchange rate and asset price channels increases food inflation in all quantiles. In contrast, the bank credit and interest rate channels reduce it in the lower and middle quantile, i.e. at lower inflation rates.

Bhattacharya and Jain (2020) investigate the effectiveness of monetary policy in stabilizing food inflation in 16 advanced and emerging economies using quarterly data from 2006-16. The panel VAR results show that unexpected monetary tightening has a positive and significant impact on food inflation through the cost of production channel.

There are also few empirical studies available for African countries where food plays an important role in the consumption of the population. Iddrisu and Alagidede (2020) investigated the relationship between monetary policy and food prices for South Africa using quantile regression. Their results show that, in the case of rising food prices, restrictive monetary policy causes additional uncertainty in food prices. In a related study, Iddrisu and Alagidede (2021) found similar results for Ghana, where monetary policy tightening caused additional uncertainty in food prices.

For Central European countries, there are two related studies that examine the relationship between monetary policy and agricultural prices. Bakucs and co-authors (2012) examine the impact of monetary policy on agricultural prices using the theoretical model of Shaghaian and co-authors (2002). The results show that agricultural prices adjust more quickly to monetary shocks than industrial prices, which affects relative agricultural prices in the short run, but strict long-run monetary neutrality does not hold. In a related paper, Bakucs and Fertő (2014) find a similar result for Hungary, i.e. agricultural prices adjust faster to monetary shocks than industrial prices.

In short, the empirical literature confirms the impact of monetary policy on agricultural product markets and food inflation. The majority of the results find that monetary policy tightening is more likely to lead to increases in agricultural prices and food price inflation. Furthermore, they stress that in small, open economies, international processes fundamentally determine our economy, and in such an environment, the literature suggests that monetary policy is ineffective and even restrictive monetary policy can be harmful, as it introduces additional uncertainty into already highly volatile food price markets.

III. Monetary policy framework in Hungary

The main objective of the Hungarian National Bank (MNB) is to achieve and maintain price stability. To achieve this goal, the MNB has been using inflation targeting (IT) since June 2001. Effective IT requires a clear commitment by the central bank to maintain price stability as its primary objective. A key element is a clearly and quantifiably announced inflation target, which typically means low inflation of around 2-3%. Since March 2015, the MNB's inflation target has been 3% with a tolerance band of ±1 percentage point. The success of IT is significantly influenced by the transparency and accountability of the central bank.

From the mid-2000s, Hungary's economic prospects were favourable, but the global economic crisis that started in 2008 significantly reduced this, leading to a recession, high inflation and a significant increase in public debt. Inflation peaked in 2012 at 6.6%. The IMF provided the final bailout, which also involved restrictive financial policies. Food prices rose by more than 25% between 2007 and 2012, and the government responded by increasing subsidies to food producers, R&D spending and trying to reduce food imports. Despite this, food price increases have not slowed down, due to weather conditions and the ever increasing demand for food in emerging markets. In Hungary, food price increases are higher than the prevailing general inflation rate.

Responding to international trends, the Hungarian National Bank (MNB) reacted to the crisis by cutting interest rates and quantitative easing. However, inflationary pressures quickly forced the central bank to adopt a restrictive monetary policy in the early 2010s. In 2013, the MNB sought to counteract this effect by providing loans at very low interest rates to the SME sector. From 2014 onwards, a period of low interest rates was mediated, with inflation averaging around 2% until 2019, the base rate of the central bank below 2% until the end of 2021, and the central bank continued to take actions that stimulated the economy. The MNB has occasionally intervened in the foreign exchange market to manage exchange rate fluctuations and support the domestic economy.

The emergence of Covid-19 led to a sudden and severe economic decline, to which monetary policy responded by further easing, expanding its favourable SME lending programme and buying government bonds in the secondary market. In addition to monetary easing, the Hungarian government increased government spending. After more than a decade, the MNB raised interest rates significantly again and the central bank has communicated that it intends to maintain its restrictive monetary policy in the coming years, with the main aim of reducing inflation and strengthening financial stability.

IV. Data and Methodology

The analysis uses monthly data from January 2007 to December 2022. The source of the data used is the publicly available databases of the Magyar Nemzeti Bank (Central Bank of Hungary) and FRED. The following variables were included in the modelling:

- Food price inflation (foodcpi): prices of food and non-alcoholic beverages in the Hungarian consumer basket,
- Inflation (cpi): Hungarian inflation rate,
- Global food price index (gpfi): Food price inflation calculated from globally representative data,
- Dollar exchange rate (usd): USDHUF exchange rate,

- Money supply (M1, M2): Hungarian money supply data by M1 and M2.

For the USDHUF exchange rate, monthly averages were applied. In all cases, we used the logarithm of the variables on a natural basis.

In the analysis, an improved version of the ARDL model, the NARDL (Nonlinear Autoregressive Distributed Lag) model, was used to examine the impact of monetary policy. The models can be used when the model variables do not follow an I(2) process. For this reason as a first step in the analysis, the necessary unit root tests are performed (Elliott-Rothenberg-Stock, Phillips-Perron unit root tests). The use of the ARDL model is recommended to study long-term relationships when at least one cointegration vector exists. For cointegration studies, the test of Pesaran, Shin and Smith (2001) was used. The advantage of ARDL methods is that they provide reliable results even for small samples and are not sensitive to the order of integration of variables (Roy & Roy, 2022). With the NARDL model, asymmetric effects can be analysed, the model is similar to error correction models, and therefore repricing can be analysed.

In our study we used STATA version 17 for all tests and estimation procedures.

V. Results

In the presentation of results, the results of the unit root tests are presented first, followed by the cointegrations results and NARDL estimations. The results of the unit root tests are presented in Tables 1 and 2.

Table 1: Elliott-Rothenberg-Stock (AIC) unit root test

	intercept		intercept, trend	
	Level	First diff.	Level	First diff.
lngpfi	-1.144	-7.190***	-2.637**	-7.973***
lnfoodcpi	-0.911	-1.248	-0.926	-3.044**
lncpi	-0.351	-0.975	-0.223	-0.705
lnusd	-0.170	-9.600 ***	-3.621 ***	-10.020***
lnM1	2.821	-1.469	-1.140	-3.684***
lnM2	2.112	-0.718	-1.110	-2.878**

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

The Elliott-Rothenberg-Stock unit root test is based on the Akaike information criterion lag. The results indicate that, ignoring trends, none of the variables can be considered stationary. With the first difference, global food inflation, dollar exchange rate are considered stationary at a confidence level of at least 95%. With the inclusion of the trend, two variables already "passed" the test without the first difference, with the first difference only the domestic inflation variable being considered non-stationary.

Table 2: Phillips-Perron unit root test

	intercept		intercept, trend	
	Level	First diff.	Level	First diff.
lngpfi	-2.217	-8.773***	-2.314	-8.749***
lnfoodcpi	1.794	-8.344***	1.999	-8.962***
lncpi	2.570	-8.560***	3.523	-9.365***
lnusd	-0.680	-10.677***	-3.775**	-10.666***
lnM1	2.415	-14.547***	0.342	-14.919***
lnM2	2.773	-15.076***	-0.085	-15.649***

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

Based on the results of the Phillips-Perron unit root test, the dollar exchange rate can be considered stationary without a first difference when the trend is taken into account. Looking at the first differences, it can be seen that in all cases the variables are almost significant at 1% significance.
Based on the two different unit root tests, the results are identical except for inflation, and the first difference of the variables should be used in further analyses. For inflation, a adjusted Dickey-Fuller test with and without trend was also performed. The result without trend for the first difference is (-8.626; p=0.000***), with trend included (-9.415; p=0.000***). Taking into account the results of the ADF test, the differentiated variable is included in the model building for inflation.
For the cointegration analyses, the optimal lag selection model was determined using the FPE, AIC, HQIC and SBIC criteria. The lags used were those proposed by the selection model in most cases. For M1 and M2, a lag of 2 was selected. Based on these, the results of the bounds tests of Pesaran, Shin and Smith (2001) are shown in Table 3. For the NARDL, there is a long-run relationship between Hungarian food prices and money.

Table 3: NARDL bounds testing approach

M1	M2
F = 3.864*	F = 4.012***
t = -3.309	t = -3.140

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

The nonlinear ARDL model (Table 4) treats positive and negative long-run effects separately and allows for the measurement of asymmetries based on these effects (Table 6). The NARDL results suggest that international food prices and domestic inflation do not behave in the same way on the positive and negative sides. For decreasing international food prices, domestic food prices also decrease; increasing international food prices have no effect on domestic food price inflation. Increases in domestic inflation increase food prices, but this effect is not observed in the case of falling inflation, i.e. the fall in the general price level is not transmitted to food prices. As a small and open economy, foreign trade can have a significant impact on inflation, and in this study we have measured this effect through the exchange rate of the US dollar. A weakening HUF increases food prices, a strengthening HUF reduces prices. For the money stock, the sign of the coefficients is positive on both the negative and positive side, i.e. restrictive monetary policy (reducing the money supply) also increases food prices. However, these coefficients are not significant.

Table 4: NARDL model results (long term, M1)

	Long-run effect [+]			Long-run effect [-]		
	coef.	F-stat	p>F	coef.	F-stat	p>F
lngpfi	0.144	.6707	0.414	-0.461*	3.522	0.062
lncpi	1.913**	4.94	0.028	-1.522	1.889	0.171
lnusd	0.567**	4.15	0.043	-0.566**	5.336	0.022
lnM1	0.091	.1461	0.703	0.088	.04036	0.841

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

The results for the short term are shown in Table 5. There are no significant differences compared to the long-run model (see Table 4). It is important to note that monetary policy cannot have a significant impact on food inflation in the short run either, i.e. monetary policy is ineffective in terms of M1 money supply.

Table 5: NARDL model results (short term, M1)

	coef.
lnfoodcpi t-1 (ECM)	-0.104***
d.lnfoodcpi t-1	0.212***
d.lnfoodcpi t-2	-0.027
d.lnfoodcpi t-3	0.134*
lngpfiPOS t-1	0.015
lngpfiNEG t-1	0.048**
lncpiPOS t-1	0.199*
lncpiNEG t-1	0.158
lnusdPOS t-1	0.059***
lnusdNEG t-1	0.059***
lnMPOS t-1	0.009
lnMNEG t-1	-0.009
d.lngpfiPOS	0.062
d.lngpfiPOS t-1	-0.060
d.lngpfiNEG	0.059
d.lngpfiNEG t-1	-0.031
d.lncpiPOS	0.501**
d.lncpiPOS t-1	-0.086
d.lncpiNEG	0.710**
d.lncpiNEG t-1	-0.318
d.lnusdPOS	0.010
d.lnusdPOS t-1	0.003
d.lnusdNEG	-0.066
d.lnusdNEG t-1	-0.019
d.lnMPOS	-0.011
d.lnMPOS t-1	-0.056
d.lnMNEG	0.116
d.lnMNEG t-1	0.169
constant	0.493***
N	187
R^2	0.543

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

Based on the tests in Table 6, there is no difference between the magnitude of positive and negative effects. So, regardless of the direction of the shocks, the Hungarian food prices react in the same order of magnitude. Only in the short run is there a significant difference for the M1 variable, but for the short run outcome (Table 5) it can be seen that the M1 variable is not significant in either positive or negative direction.

Table 6: NARDL asymmetry tests (M1)

	Long-run		Short-run	
	F-stat	p>F	F-stat	p>F
lngpfi	0.896	0.345	0.049	0.825
lncpi	0.054	0.816	0.002	0.967
lnusd	0.000	0.995	0.799	0.373
lnM1	0.129	0.720	2.990	0.086*

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

The Portmanteau test up to lag 40 (chi2) statistic is 80.22, p-value: 0.000, the Breusch/Pagan heteroskedasticity test statistic is 0.118, p-value: 0.731, the Ramsey RESET test F is 2.804, p-value: 0.042. Finally, the Jarque-Bera test on normality (chi2) is 117.9, p-value: 0.000. In all cases except the Breusch/Pagan heteroskedasticity test, the model does not perform well in the diagnostic tests.
To check the robustness of the results, nonlinear model estimates were also obtained for the one wider money supply (M2). The results are presented in Tables 7 and 8.

Table 7: NARDL model results (long term, M2)

	Long-run effect [+]			Long-run effect [-]		
	coef.	F-stat	p>F	coef.	F-stat	p>F
lngpfi	0.250	1.634	0.203	-0.429	2.594	0.109
lncpi	1.930**	4.195	0.042	-2.303*	2.908	0.090
lnusd	0.606**	4.065	0.045	-0.654**	5.634	0.019
lnM2	0.026	.01429	0.905	0.347	.3484	0.556

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

The results are presented in the context of the differences for the M1 model. For international food prices (lngpfi), there is no significant effect on either the positive or negative side. These suggest that Hungarian food prices follow a different path than international food prices. In the model including M2, the general price level decrease already appears for food prices, reducing food prices as expected, but this effect is significant at 10%. The mechanism of action of the exchange rate is the same as in the M1 model. The variable representing monetary policy, which is the main subject of the analysis (lnM2), is not significant in either case, i.e. monetary policy continues to have no effect on food prices.
The model using the M2 money supply is not significantly different from the long-run model. It remains the case that monetary policy is ineffective in the short run.

Table 8: NARDL model results (short term, M2)

	coef
lnfoodcpi t-1 (ECM)	-0.092***
d.lnfoodcpi t-1	0.208***
lngpfiPOS t-1	0.023
lngpfiNEG t-1	0.040*
lncpiPOS t-1	0.178
lncpiNEG t-1	0.212**
lnusdPOS t-1	0.056***
lnusdNEG t-1	0.060***
lnMPOS t-1	0.002
lnMNEG t-1	-0.032
d.lngpfiPOS	0.072
d.lngpfiPOS t-1	-0.049
d.lngpfiNEG	0.043
d.lngpfiNEG t-1	-0.027
d.lncpiPOS	0.474**
d.lncpiPOS t-1	0.013
d.lncpiNEG	0.703**
d.lncpiNEG t-1	-0.308
d.lnusdPOS	-0.005

d.lnusdPOS t-1	0.004
d.lnusdNEG	-0.059
d.lnusdNEG t-1	-0.018
d.lnMPOS	0.000
d.lnMPOS t-1	0.008
d.lnMNEG	0.154
d.lnMNEG t-1	0.168
constant	0.437***
N	189
r2	0.532

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

Table 9: NARDL asymmetry tests (M2)

	Long-run		Short-run	
	F-stat	p>F	F-stat	p>F
lngpfi	0.248	0.619	0.004	0.949
lncpi	0.036	0.851	0.024	0.878
lnusd	0.040	0.842	0.501	0.480
lnM2	0.348	0.556	2.139	0.146

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

The asymmetry tests suggest that the effect size of each variable is the same on the positive and negative side, so that domestic food price inflation is neither more nor less affected by a shock.
The Portmanteau test up to lag 40 (chi2) stat. value is 85.1, p-value: 0.000, the Breusch/Pagan heteroskedasticity test stat. value is 0.102, p-value: 0.750, the Ramsey RESET test F value is 3.265, p-value: 0.023. Finally, the Jarque-Bera test on normality (chi2) stat. value is 124.6, p-value: 0.000. In all cases except the Breusch/Pagan heteroskedasticity test, the model does not perform well in the diagnostic tests.

VI. Conclusions

Food prices continue to play an important role in the overall inflation dynamics in many countries. This is particularly the case in countries where food has a larger share in the consumer basket. Surprisingly, the empirical evidence on the impact of monetary policy on food inflation is limited in the literature, especially for Central European countries. This paper partly fills this gap by examining Hungary. Currently, food inflation is one of the main challenges in Hungary. In our study, we have used NARDL model instead of the traditional VAR estimation prevalent in the literature to obtain a more detailed picture of food price dynamics and the effects of monetary policy for different levels of price increases. Due to the NARDL model, the shock effect in different directions can be measured, allowing the asymmetric effect to be investigated, while a classical VAR model assumes symmetric effects. Their results suggest that monetary policy has no effect on Hungarian food prices. In contrast, we find evidence that the general price level and the USDHUF exchange rate have an effect, with no clear evidence for international food prices. The symmetry test statistics suggest the existence of a symmetric relationship between food price inflation and macroeconomic variables in the long-run as well as in the short-run. However, inflation plays a significant role in driving food price increases. The results are robust to different specifications (M1 and M2). Our results are partially consistent with the international literature. While restrictive monetary policy can increase food price inflation in some countries (e.g., Battarcharya and Jain 2020; Iddrisu and Alagidede, 2020, 2021), this effect is not significant in Hungary. According to theories in the literature, food prices are determined by

world price trends in the long run (e.g. Durevall et al., 2013), and monetary policy can only have an impact on domestic price increases. On this basis, monetary policy cannot effectively counter food price increases and cannot break an existing global market trend. They suggest that an excessively restrictive policy will slow economic growth while being ineffective on food price increases. The problem is exacerbated by the fact that families in the lower income brackets spend a higher proportion of their income on food than those in the more affluent brackets. Our results suggest that monetary policy is not effective in counteracting food prices, in such a situation fiscal policy should complement monetary policy, as suggested by Ginn and Pourroy (2019), in such a way that severe monetary policy tightening is not necessary Further research is needed to demonstrate and analyse these tools.

VII. Funding

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VIII. References

1. Abbas, S, K., & Lan, H. (2020). Commodity price pass-through and inflation regimes. Energy Economics, 92, 104977. doi: 10.1016/j.eneco.2020.104977
2. Akram, Q. F. (2009). Commodity prices, interest rates and the dollar. Energy economics, 31(6), 838-851. doi: 10.1016/j.eneco.2009.05.016
3. Alam, M. R., & Gilbert, S. (2017). Monetary policy shocks and the dynamics of agricultural commodity prices: evidence from structural and factor-augmented VAR analyses. Agricultural economics, 48(1), 15-27. doi: 10.1111/agec.12291
4. Alem, Y., & Söderbom, M. (2012). Household-level consumption in urban Ethiopia: the effects of a large food price shock. World development, 40(1), 146-162. doi: 10.1016/j.worlddev.2011.04.020
5. Anand, R., Ding, D., & Tulin, M. V. (2014). Food inflation in India: The role for monetary policy. IMF Working Paper WP/14/178, International Monetary Fund.
6. Bakucs Lajos, Z., & Fertő, I. (2013). Monetary impacts and overshooting of agricultural prices in a transition economy. African Journal of Agricultural Research, 8(23), 2911-2917.
7. Bakucs, L. Z., Bojnec, S., & Ferto, I. (2012). Monetery impacts and overshooting of Agricultural prices: Evidence from Slovenia. Transformations in Business & Economics, 11(1).
8. Bhattacharya, R., & Jain, R. (2020). Can monetary policy stabilise food inflation? Evidence from advanced and emerging economies. Economic Modelling, 89, 122-141. doi: 10.1016/j.econmod.2019.10.005
9. Carriere-Swallow, Y., Deb, P., Furceri, D., Jimenez, D., & Ostry, J. D. (2023). Shipping costs and inflation. Journal of International Money and Finance, 130, 102771. doi: 10.1016/j.jimonfin.2022.102771
10. De Brauw, A. (2011). Migration and child development during the food price crisis in El Salvador. Food Policy, 36(1), 28-40. doi: 10.1016/j.foodpol.2010.11.002
11. Dornbusch, R. (1976). Expectations and Exchange Rate Dynamics. Journal of Political Economy 84: 1161–1176.
12. Durevall, D., Loening, J. L., & Birru, Y. A. (2013). Inflation dynamics and food prices in Ethiopia. Journal of development economics, 104, 89-106. doi: 10.1016/j.jdeveco.2013.05.002

13. Fujii, T. (2013). Impact of food inflation on poverty in the Philippines. Food policy, 39, 13-27. doi: 10.1016/j.foodpol.2012.11.009
14. Gelos, G., & Ustyugova, Y. (2017). Inflation responses to commodity price shocks–How and why do countries differ?. Journal of International Money and Finance, 72, 28-47. doi: 10.1016/j.jimonfin.2016.10.001
15. Ginn, W., & Pourroy, M. (2019). Optimal monetary policy in the presence of food price subsidies. Economic Modelling, 81, 551-575. doi: 10.1016/j.econmod.2018.06.012
16. Holtemöller, O., & Mallick, S. (2016). Global food prices and monetary policy in an emerging market economy: The case of India. Journal of Asian Economics, 46, 56-70. doi: 10.1016/j.asieco.2016.08.005
17. Iddrisu, A. A., & Alagidede, I. P. (2020). Monetary policy and food inflation in South Africa: A quantile regression analysis. Food Policy, 91, 101816. doi: 10.1016/j.foodpol.2019.101816
18. Iddrisu, A. A., & Alagidede, I. P. (2021). Asymmetry in food price responses to monetary policy: a quantile regression approach. SN Business & Economics, 1(3), 1-25. doi: 10.1007/s43546-021-00056-7
19. Kara, E. (2017). Does US monetary policy respond to oil and food prices?. Journal of International Money and Finance, 72, 118-126. doi: 10.1016/j.jimonfin.2016.12.004
20. Kidane, D., & Woldemichael, A. (2020). Does inflation kill? Exposure to food inflation and child mortality. Food Policy, 92, 101838. doi: 10.1016/j.foodpol.2020.101838
21. Kumar, A., & Dash, P. (2020). Changing transmission of monetary policy on disaggregate inflation in India. Economic Modelling, 92, 109-125. doi: 10.1016/j.econmod.2020.07.016
22. Marques, C. R., Neves, P. D., & Sarmento, L. M. (2003). Evaluating core inflation indicators. Economic modelling, 20(4), 765-775. doi: 10.1016/S0264-9993(02)00008-1
23. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of applied econometrics, 16(3), 289-326. doi: 10.1002/jae.616
24. Pourroy, M., Carton, B., & Coulibaly, D. (2016). Food prices and inflation targeting in emerging economies. International Economics, 146, 108-140. doi: 10.1016/j.inteco.2015.12.001
25. Roy, R. P., & Roy, S. S. (2022). Commodity futures prices pass-through and monetary policy in India: Does asymmetry matter?. The Journal of Economic Asymmetries, 25, e00229. doi: 10.1016/j.jeca.2021.e00229
26. Saghaian, S. H., Hasan, M. F., & Reed, M. R. (2002). Overshooting of agricultural prices in four Asian economies. Journal of Agricultural and Applied Economics, 34(1), 95-109. doi: 10.1017/S1074070800002170
27. Scrimgeour, D. (2015). Commodity price responses to monetary policy surprises. American Journal of Agricultural Economics, 97(1), 88-102. doi: 10.1093/ajae/aau054

LÁSZLÓ MÁTYÁS[1], EMŐKE-KATALIN PÉTER[2]: LINEAR AND PARABOLIC REGRESSION METHODS FOR THE STUDY OF A FUEL PRICE AND AN EXCHANGE RATE IN 2022

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Abstract
We follow certain time series of the year 2022, which have been characterized by the fact that in a certain number of countries in Europe prices related to fuel, and certain goods, have changed in a more accentuated way than in other usual period of one year. In this study we would like to see that by a careful analysis of given time intervals of the first part of the year, to which extent one may predict – at least partially – certain prices in the second part of the year. For this purpose, we use the linear and the parabolic regression method to arrive to results related to the above presented issues. The price of diesel fuel in Romania, and the euro-rubel exchange rate in 2022 is discussed.
Keywords: time series, linear regression, nonlinear regression.

1. Introduction

During the history, the mankind met for several times problems related to the exhaustion of natural resources. Running out of water and wood caused the collapse of certain civilizations. The purpose of possessing the land, special minerals or fossil fuel may have caused strong conflicts. Due to their high heating values and relative easy transportability the most used energy sources are the fossil based ones.
The first shallow oil well has been set up in Pennsylvania in 1859, since that time one drills deeper and deeper to arrive to fuel – the easily accessible places are mostly exhausted. One can observe competing interest in owing or influencing the extraction of most important fuel plants. A good part of the present problems of the society are based on the unequal distribution of natural resources (Jared Diamond, 2019). With enhancement of globalization, the connection between money and fuel became more significant (Niall Ferguson 2008).
By the end of 20th century the processing of new alternative energy sources evolved. Of course the consequences of such achievement appear gradually and we still depend on direct or indirect effects of oil prices. Important aspect the shale-oil extraction which appeared because of an increased need on market. The inflation caused by Covid epidemic also produced relatively high fuel price. The increase of fuel prices may generate crises or depression in economy (Paul Krugman 1991 and 2012). The change of oil price can be caused by exogenous effects which usually mean expansion or restriction of production. Such effects may also appear as a result of political or armed conflict. For oil importing countries, the expansion or restriction may cause low or high stocks - depending on the diversification possibility of acquisition. In case of restriction the importing countries tries to solve the oil or energy necessity by alternative ways, which in long run is less favorable for exporting countries. In case of rising stocks, the price still remains high, because of excess acquisition for unpredictable situations. Temporarily the price may remain low or high depending of the trust or vigilance of economic operators (Robert J. Schiller 2019) .
The rise of oil price produces an unfavorable supply shock in economy, which has a negative effect on GDP and results in inflation (N. Gregory Mankiw, 1997). Such economic shock has a negative effect also on a long term expectations related to increase, which usually leads to a decrease of investments. Based on the allocation theory, the demand of oil intensive products is pushed back by

the price increase. The production of economy will be shifted to products with less energy necessity, which lead to a structural change with less outcome. Usually the increase of oil prices results in GDP decrease and inversely.
Linear regression is used to a wide area of science. It is used in economics, and in all scientific fields where a linear response is possible. In certain cases, this linear response beyond to be possible it may be also expected. In case the response is not linear, one may try to use a nonlinear technique. A first trial beyond linear is the parabolic regression. Beyond these, there are also other regression methods (Ede Lázár, 2009, 2014). Regression methods are also used to estimate the price (José Luis Moraga-Gonzáles et al, 2012) or the quantity of export (László Mátyás, 1997). The prediction of outcomes of new data related to foreign activity is discussed in (Katalin Emőke Péter, and László Illyés, 2014).
Forecasting is an important scientific method to understand trends in real life. A special case is related to that regression where one of the variables is the time. As time goes by, in a human society almost everything is changing, eventually not too much, but slightly. There is a change in production, in prices, in availability of goods and natural resources. If one wants to count with possible occurrences in the future, he may have a look on the time evolution of that variable in the relatively recent past. This usually means not only one value of that variable, but a number of it. In case these values are not the same, that means that the variable changes. This change can be a fluctuation around a certain value. If not, then we may talk about an increase or decrease of that value. Such time variations show a trend in time (Rob J. Hyndman and George Athanasopoulos, 2021).
By the following reasoning we try to follow events in the close future rather than the far future, as it became relevant in multiple cases (Robert Skidelsky 2009).

2. Data Collection and Methods

Linear regression

If the trend of the time series, mentioned in the introduction is sufficiently monotonic, then at a first step one may try to fit with a linear regression line. This means that we look for a linear dependence between the variables x and y (Bronshtein I. Nikolaevich and Semendyaev K. Adolfovici, 2013)

$$y = p\,x + q.$$

We should determine the parameters p and q from the series of x and y, in such a way, that the function $S(p,q)$ which is a measure of the total deviaton from the line, to be minimal.

$$S(p,q) = \sum_{i=1}^{n} [y_i - (\,p\,x_i + q\,)]^2$$

The minimization of $S(p,q)$ requires that

$\frac{\partial S}{\partial p} = 0$ and $\frac{\partial S}{\partial q} = 0.$

We introduce the following quantities and notations

$\overline{x} = \frac{\sum_{i=1}^{n} x_i}{n}$ and $\overline{y} = \frac{\sum_{i=1}^{n} y_i}{n}$

$$\overline{x^2} = \frac{\sum_{i=1}^{n} x_i^2}{n}$$

and

$$\overline{x \cdot y} = \frac{\sum_{i=1}^{n} x_i\, y_i}{n}$$

After evaluating the partial derivatives of $S(p,q)$, one gets

$$p\,\overline{x^2} + q\overline{x} = \overline{x \cdot y}$$
$$p\,\overline{x} + q = \overline{y}.$$

Solving these equations for p and q, one obtains

$$p = \frac{\overline{x \cdot y} - \overline{x}\ \cdot\ \overline{y}}{\overline{x^2} - \overline{x}\ \cdot \overline{x}}$$

and

$$q = \overline{y} - p \cdot \overline{x}$$

As one can see that in this topic the linear regression may show adequate values for the near future, but not for long times.

Parabolic regression

When in a society a variation of a certain price is not linear, this is related to the fact that the very first values are close to an equilibrium, followed by increase or decrease. If a roughly monotonic change occurs, that means that the system leaves the former equilibrium and tends to a new one. Of course, the human society reacts to the change, by trying to find new resources or make savings on goods, and by this the increase or decrease usually will not be for longer time linear.

The first trial beyond linear is the parabolic fit of time series data.

We are looking for a function

$$f(x) = a\,x^2 + b\,x + c$$

for which the sum of the deviations of the values from the function is minimal.

The sum of the deviation S(a,b,c) reads as follows

$$S(a,b,c) = \sum_{i=1}^{n} [y_i - (a\,x_i^2 + b\,x_i + c)]^2$$

We would like to minimize the function $S(a,b,c)$.

We search for that values a,b,c for which

$\frac{\partial S}{\partial a} = 0$, $\frac{\partial S}{\partial b} = 0$ and $\frac{\partial S}{\partial c} = 0$.

The following notations are used

$\overline{x^3} = \frac{\sum_{i=1}^{n} x_i^3}{n}$ and $\overline{x^4} = \frac{\sum_{i=1}^{n} x_i^4}{n}$

The correlation of y with x^2 is related to

$$\overline{y \cdot x^2} = \frac{\sum_{i=1}^{n} y_i\ x_i^2}{n}.$$

The above three partial derivatives yield the following equations

$$-\overline{y \cdot x^2} + a \cdot \overline{x^4} + b \cdot \overline{x^3} + c \cdot \overline{x^2} = 0 \qquad (1)$$

$$-\overline{y \cdot x} + a \cdot \overline{x^3} + b \cdot \overline{x^2} + c \cdot \overline{x} = 0 \qquad (2)$$

$$-\overline{y} + a \cdot \overline{x^2} + b \cdot \overline{x} + c = 0 \qquad (3)$$

If one solves this equation for a,b,c one arrive to the parabolic function $f(x) = a\,x^2 + b\,x + c$.

3. Results and discussion

Application to the price of diesel fuel

We consider the period March 23rd and May 5th 2022, with the available data of the diesel fuel in Romania, based on www.peco-online.ro/istoric.php. The data are presented on Table 1. The first day, x=1, corresponds to March 23rd, the last day on the table x=44, corresponds to May 5th. The y coordinate indicates the price in RON.

Table 1. The price of diesel fuel.

Day, x	Price, y	Day, x	Price, y	Day, x	Price, y
1	8.12	14	8.38	28	8.49
2	8.16	15	8.41	30	8.54
3	8.24	16	8.42	31	8.56
4	8.26	19	8.4	33	8.57
6	8.31	21	8.4	34	8.57
7	8.34	22	8.4	38	8.58
8	8.35	23	8.4	40	8.62

9	8.35	24	8.43	41	8.62
10	8.37	25	8.44	43	8.69
11	8.37	26	8.44	44	8.7
12	8.38	27	8.47		

The first estimate is given by the linear regression. The constants of the linear regression, which results from the data points, are

$$p = 0{,}01021665$$
$$q = 8{,}21767179$$

The result can be seen on Figure 1.

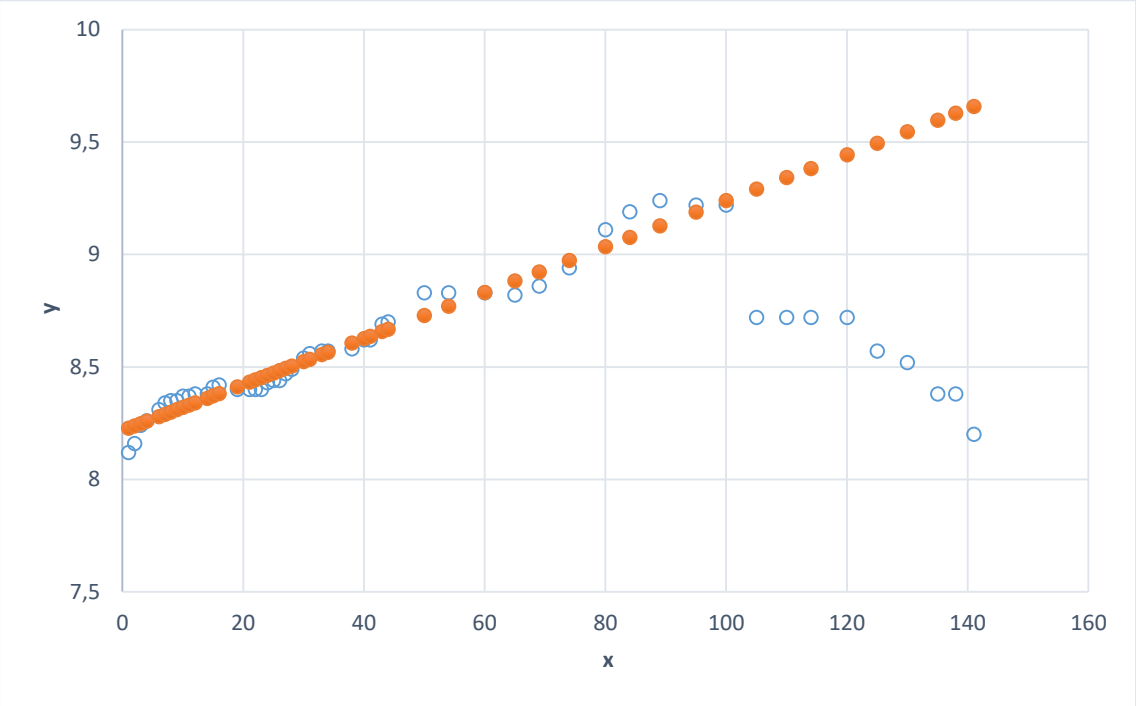

Figure 1. The price of diesel fuel – real (empty points) and regression values (filled, orange points). The coordinate x=1 corresponds to March 23.

As one can see, the linear trendline can predict values for a shorter period, but is less adequate for longer times.

A first forecast, which shows nonlinearity, is the parabolic regression.

We evaluate the above mentioned quantities, consequently we have the following equations

$$a \cdot 696019 + b \cdot 19633{,}9 + c \cdot 597{,}59 = 5111 \qquad (4)$$

$$a \cdot 19633{,}9 + b \cdot 597{,}59 + c \cdot 20{,}84 = 177{,}39 \qquad (5)$$

$$a \cdot 597{,}59 + b \cdot 20{,}84 + c = 8{,}43 \qquad (6)$$

From these values one arrive to the constants

$$a = -0{,}0000783$$
$$b = 0{,}01392$$
$$c = 8{,}18679$$

The real values and the parabolic regression line, can be seen on Figure 2.

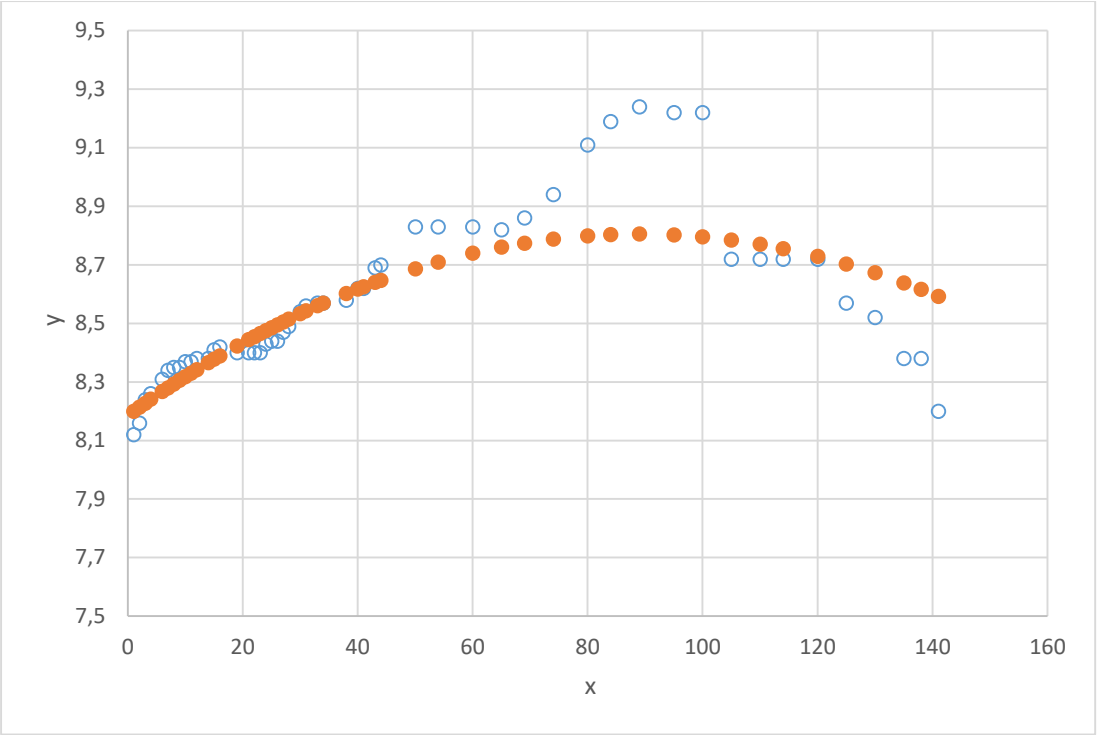

Figure 2. The diesel fuel price, and the parabolic estimate for the period 2022. March 23 – August 10. The empty points are the real values, and the filled points are the values of the parabolic regression.

Application to euro-rubel exchange rate.

The data have been collected from Refinitiv, based on the www site: https://www.bing.com/search?q=euro+rubel+exchange+rate&cvid=cf303b9128f147e68adda3e1149eb4c9&aqs=edge.0.0j69i57j0l7.2433j0j1&pglt=41&FORM=ANSPA1&PC=U531

Table 2. The euro-rubel exchange rate for the dates selected.

	Day, x	Exch rate, y
March 28	1	96.06
	8	89.4
	16	89.72
	24	86.54
	32	73.75
	40	70.16
	47	66.13
	54	62.13
May 26	60	66.68

This means $\overline{x} = 31{,}33$, $\overline{y} = 77{,}84$, $\overline{x\,y} = 2217{,}12$, $\overline{x^2} = 1360{,}66$.

The function $f(x) = p\,x + q$, has the following parameters for Table 2.

$$p = -0{,}58567$$
$$q = 96{,}192$$

The linear regression derived from the values of Table 2, one can see on Figure 3.

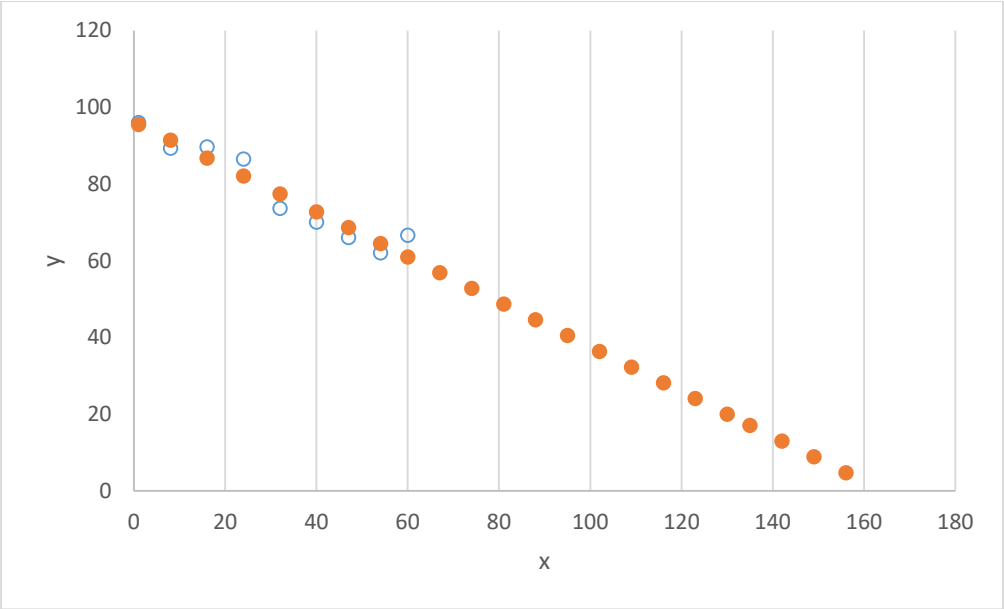

Figure 3. The exchange rate of euro-rubel (empty points, Table 2). The orange points follow the linear regression line. The coordinate x=1, corresponds to March 28.

The linear regression may be adequate for shorter times. The regression line shows the trend and may predict values for the next days or for a not too long period.

Of course the human society react to changes, usually in such a way, that it tries to diminish the consequences of that change. By this the response usually is not linear, but nonlinear. A first trial to use a nonlinear approximation is a parabolic one.

The equations of the parabolic regression

$$a \cdot 3372525 + b \cdot 65832 + c \cdot 1360{,}66 = 92634{,}36 \qquad (7)$$

$$a \cdot 65832 + b \cdot 1360{,}66 + c \cdot 31{,}33 = 2217.12 \qquad (8)$$

$$a \cdot 1360{,}66 + b \cdot 31{,}33 + c = 77{,}84 \qquad (9)$$

The explicit solution for the values a, b, c of the above equation yields the constants of parabola, derived from the values of Table 2.

$$a = 0.00281$$
$$b = -0.75679$$
$$c = 97.7218$$

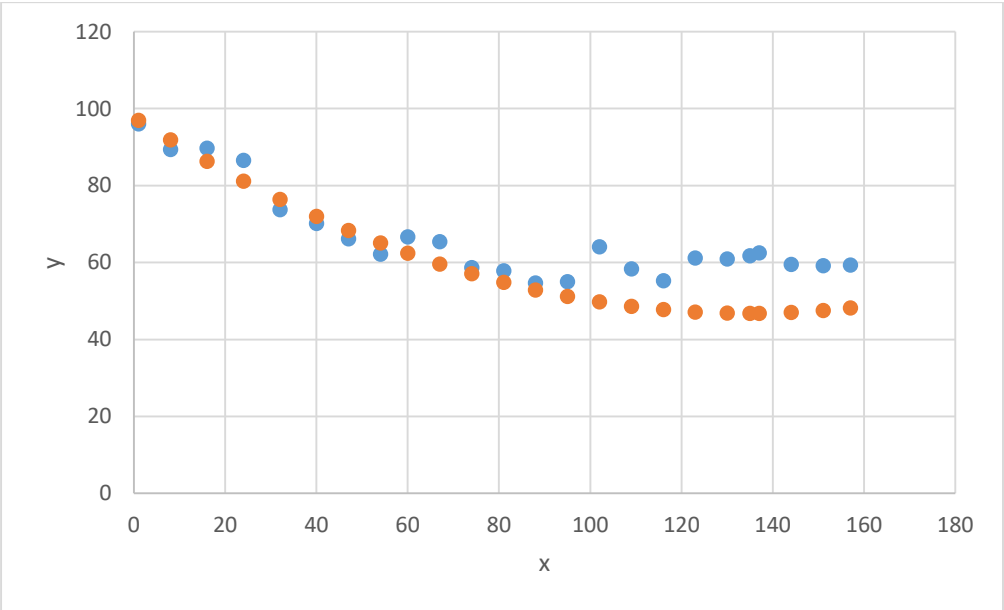

Figure 4. The exchange rate values of Table 2. – blue points – and the corresponding parabolic regression – orange points.
On Figure 4. one can see the exchange rate values – blue - and the regression values of parabola – orange. The parabola reaches the minimum at the 134,7 data point, which at rounded value means: on 135th day. This day in calendar was August the 9th, 2022.
We expected a relatively good agreement up to the minimum value, although beyond this value the parabolic prediction still has interesting increase, close to the real ones – see Figure 5.

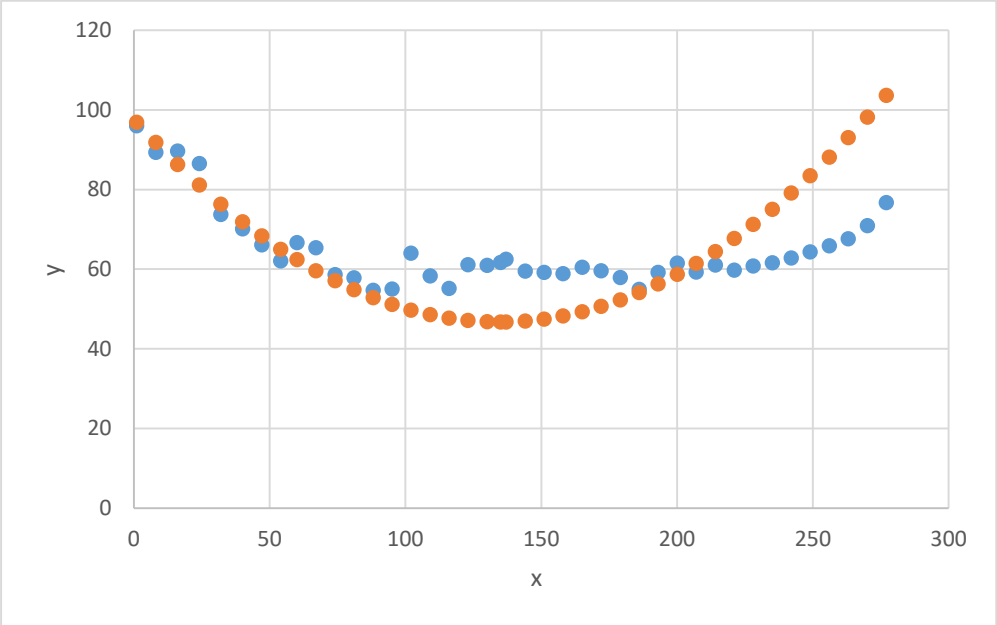

Figure 5. The real (blue) and predicted (orange) values of the euro – rubel exchange rate from March 28th to Dec. 29th, 2022.
The explicit solutions of the equations (1)-(3) read as follows

$$a = \frac{\left(\overline{y \cdot x^2} - \bar{y} \cdot \overline{x^2}\right) \cdot \left(\overline{x^2} - \bar{x} \cdot \bar{x}\right) - \left(\overline{y \cdot x} - \bar{y} \cdot \bar{x}\right) \cdot \left(\overline{x^3} - \bar{x} \cdot \overline{x^2}\right)}{\left(\overline{x^4} - \overline{x^2} \cdot \overline{x^2}\right) \cdot \left(\overline{x^2} - \bar{x} \cdot \bar{x}\right) - \left(\overline{x^3} - \bar{x} \cdot \overline{x^2}\right)^2} \tag{10}$$

$$b = \frac{\overline{y \cdot x} - \bar{y} \cdot \bar{x}}{\overline{x^2} - \bar{x} \cdot \bar{x}} - a \cdot \frac{\overline{x^3} - \bar{x} \cdot \overline{x^2}}{\overline{x^2} - \bar{x} \cdot \bar{x}} \tag{11}$$

$$c = \bar{y} - b \cdot \bar{x} - a \cdot \overline{x^2} \tag{12}$$

From the above relations one can see, that in case $a = 0$ one recovers the coefficients of linear regression.

4. Conclusions

We applied to times series of a fuel price and an exchange rate two regression methods. The first was the linear regression, which was able to predict the price for a shorter time scale. To improve the regression method, we extended the procedure to a nonlinear one, which in our case was the parabolic regression. By this step we was able to take into account the adaptability of market and the society to the new situation. In case of the increase of prices, the parabolic regression method was able to predict the time at which the price will arrive to the maxima. In a similar way in case of the exchange rate studied, the minimum point of interpolated parabola indicated the time to reach the minimum, and also gave a relatively good approximation to this lowest value.

References

Bronshtein, Ilya Nikolaevich and Semendyayev Konstantin Adolfovic, 2013, *Handbook of Mathematics*, Springer Science & Business Media, Berlin, Heidelberg.

Diamond, Jared, Upheaval. Turning Points for Nations in Crisis, Little, Brown and Company, New York, 2019.

Ferguson, Niall, 2008, *The Ascent of Money*, Penguin Books Ltd., New-York.

Hyndman, Rob J, and Athanasopoulos, George. 2021. *Forecasting: Principles and Practice*. 3rd ed. Otexts. https://otexts.com/fpp3/.

Krugman, Paul, 1991, *Target Zones and Exchange Rate Dynamics*, The Quarterly Journal of Economics 106(3), pp. 669-682, Copyright by the President and Fellows of Harvard College and Massachusetts Institute of Technology.

Krugman, Paul, 2012, *End This Depression Now!*, W.W. Norton Company, New York – London.

Lázár, Ede, *New methods in demand based price optimization*, Journal of Economics and Business Research, Year XV, No. 2, 2009, pp. 43-63.

Lázár, Ede, Quantifying the Economic Value of Warranties: A Survey, Acta Univ. Sapientiae, Economics and Business, **2,** 2014, pp. 75-94.

Mankiw, N. Gregory, Makroeconomics, 3rd ed, Worth Publishers, New York, 1997.

Mátyás, László, Proper Econometric Specification of Gravity Model, The World Economy **20** (3), pp. 363-368, 1997.

Moraga-González José Luis, Sándor Zsolt, and Wildebeest R. Matthijs, Semi-nonparametric estimation of consumer search costs, Journal of Applied Econometrics **28** (7), 1205-1223, 2012.

Péter, Emőke Katalin, and Illyés László, Neural Network Analyses of the Romanian People working in Foreign Country's, Journal of Economics and Business Research, Year XX, No. 1, pp. 21-32, 2014.

Schiller, J. Robert, 2019, Narrative Ecomics: How Stories Go Viral & Drive Major Economic Events, Princeton University Press, Princeton.

Skidelsky, Robert, 2009, *Keynes: The return of the master*, Penguin Books Ltd., London, New York, Toronto.

CSEH BALÁZS, VARGA JÓZSEF:
"FIQH AL-MUAMALAT". ECONOMIC AND FINANCIAL PERSPECTIVE OF THE RULES OF ISLAMIC BANKING TRANSACTIONS

1. Abstract

In our study, we examine how the theoretical tenets of the principles of the Islamic economic and financial legal order, reciprocity (al-taradi), striving for full fulfillment of agreement (al-wafa'), striving to provide the best and responsible activity (ihsan), protection of property, and the criterion of equal distribution or shared responsibility regulate the value-centeredness of the Islamic economy. To do this, we first examine the sources of Islamic economic rules, especially the element of Fiqh al-Muamalat, and then analyze the current global major points of value orientation and regulation of the Islamic economic system and the regulation of the Islamic economic system.
In our publication, we examine the area of Fiqh al-Muamalat within Islamic financial activity. This means everything that frames and guides Islamic economic and market behaviors in the civil environment. It deals with economic transactions on the one hand and factors influencing economic behaviour on the other, since it also settles economic legal relations in the Islamic financial market. Thus, in our publication we deal with that part of Islamic economics and law that concerns economic and business activities.
Key words: Islamic finance, Fiqh al-Muamalat, Sharia, PLS-transaction

2. Introduction

Islamic banking refers to Sharia-compliant financial operations, which means financial activities based on Sharia. The two main principles of Islamic financial activity are profit-loss sharing (PLS activities) and the prohibition of collecting and paying interest. Islamic financial activity encompasses three elements: Islamic banking, capital markets and insurance. (Ecke 2012) Note that In the literature, the terms Islamic finance and Islamic banking are often used interchangeably, but as we see, the concept of Islamic finance is broader, encompassing the concept of Islamic banking.
In our publication, we examine the area of fiqh al-Muamalat within Islamic financial activity. This means everything that frames and guides Islamic economic and market behaviors in the civil environment. It deals with economic transactions on the one hand and factors influencing economic behaviour on the other, since it also settles economic legal relations in the Islamic financial market. Thus, in our publication we deal with that part of Islamic economics and law that concerns economic and business activities.
In this articule we examine the rules and definitions of Fiqh as an understanding in the result-based relationship between man and financial rights and obligations. In doing so, the relationship between human behaviour and the relationship between economic agents seems to be highlighted. In this thesis we examine all these rules and regularities from the side of ethics and finance, mainly based on the relevant international literature, since there is currently not a large number of domestic literature available. In addition to the spread of the globally growing Islamic banking system, the topicality of the thesis is given by the global economic crisis of 2008 affecting the traditional banking system and the need for an alternative solution to the challenges of sustainable economic growth.
In our study, we examine how the theoretical tenets of the principles of the Islamic economic and financial legal order, reciprocity (al-taradi), striving for full fulfillment of agreement (al-wafa'), striving to provide the best and responsible activity (ihsan), protection of property, and the criterion of equal distribution or shared responsibility regulate the value-centeredness of the Islamic economy. To do this, we first examine the sources of Islamic economic rules, especially the element of Fiqh al-Muamalat, and then analyze the current global major points of value orientation and regulation of the Islamic economic system and the regulation of the Islamic economic system.

3. Material and Methods

Our present study is theoretical and descriptive in nature. As the method of our analysis, we have chosen to process the legal sources that serve as the background of Islamic banking operations. We have analyzed the primary and secondary sources. The processing of the secondary sources, i.e. the specialized literature, is based on the comparative and synthesizing method. During the analysis of the primary sources, we also performed their interpretation and extraction.

4. Results and Discussion

4.1. Secondary Analysis: Sources of rules of Islamic economic transactions

There are four sources of regulation in the Islamic financial world, which are known as the Islamic financial world. They can be considered canonical sources, namely: (1) the Qur'an; (2) the Sunnah (authentic hadith); (3) the Ijma (juridical consensus); (4) the Qiyas (analogical reasoning). (Visegrády 1996, p. 29.) The legislation also relies on two major sets of laws. One of them is usul al-fiqh, which is basically a set of logical operations intended to justify existing legal norms ex post, which defines the theoretical basis of fiqh. Fiqh (understanding) is the relationship in which the scholar understands and explains the norm of divine origin, and it also denotes jurisprudence, which can be understood as the sum of explanations. This whole body of law has been called jurist's law since Schacht. (Jany 2006, pp.131-134.)

The other body of law is Sharia itself (road, path to water). Sharia includes all the laws necessary for the harmonious functioning of the world created by Allah, including natural laws. But in a narrower sense, they mean the rules that prescribe the Islamic way of life, and in a more narrow sense, they mean Islamic religious law and religious law tradition, a kind of substantive right. The two sets of laws are sharply separated, since the purpose of figh is to understand Sharia and formulate it as a legal norm, but it cannot be completely identical with the celestial sphere, just as the celestial sphere cannot be identical with the material world, it can exist only as an analogy. The Al rahn also influences the use of fiqh al-Muamalat for transactions because it interprets it as a method. The objective of Al Rahn is to get as close as possible to the rationality of divine decrees, since this can only be achieved by analogy. (Hasan 2011, pp. 39-43)

Among the canonical sources, the Qur'an has absolute authority, it is considered a basic document. Although it is not a literal code of laws, it contains legally important verses, there are about 350 (Bóka 2004, p.250) such verses in it (The Qur'an contains a total of 6348 verses, so 5.5 percent of them have significant legal relevance.). It is sacred to scientists and all Muslims. To oppose the Qur'an is to oppose Allah's will, and therefore the supreme sin.

The Sunnah is intended to fill the loopholes in the Qur'an. It is of divine origin, just like the Qur'an, so its revelations are confirmed by the power of prophetic infallibility. Tradition has the greatest significance with regard to the Sunnah, since it itself consists of traditions. The personalities of the various traditionalists are based on trust in them. The authenticity of tradition is based on these foundations. (Jany 2006, p.144.)

We consider it essential to use the word trust, because it is precisely in Central and Eastern European cultures that excessive reliance on regulation is of greatest importance. (Visegrády 2003, p.15) Furthermore, it is important to emphasize that the concept of trust should be used in the narrow sense of social psychology, i.e. in such a way that the individual has confidence in someone's credibility. (Lengyel 2002 p.102.)

Ijma means consensus. Its authority is no longer secured by divine origin, but by the power of the same will born in the community. For this reason, it should be noted that there is no infallible, certain content of truth, but Islamic jurists believe that justice is likely. In forming consensus, it was taken that the privilege of legal scholars (mugtahid) is the formation of the Ijma, and its effectiveness occurs with the extinction of the generation of jurists. Because of this high criterion, Ijma gains such a certain authority that it is not possible to lower the legal norm based on it.

The Hungarian and generally accepted European meaning of Qiyas is analogy (Analogieschluss). In essence, Muslim scholars have developed it for the case when it is necessary to find a solution to a new life situation for which there is no provision in the three sources of law mentioned above. For this reason, unusually in the Islamic world, analogy is not a method of interpretation, but a concrete fountainhead of rules. (Ecke 2012, p. 23.)
In addition to the listed ones, there are so-called non-canonical sources of law. Such are ada, urf or dastur, which can be referred to as collections of customs. (Jany 2006, p.173.) These customs have found their way into positive legislation, so we can see them as a formal source of law. Amal (deed, action) encompasses judicial custom and decision-making practice. And qanun encompasses tax and administrative rules in a separate set of rules. In fact, today some Arab countries use it to designate their constitutions in the same way. (Jany 2006, p.173.)

4.2. Primary source analysis: Interpretation of Fiqh al-Muamalat

Understanding and applying Fiqh al-Muamalat is a sine qua non to understand the growth and success of the Islamic financial sector. The core of Islamic finance is this fiqh. Fiqh al-muamalat covers the commercial rules related to Islamic banking. However, there are differences between individual Islamic areas, just as Islam is not completely united, but can be divided into schools, so different models and types exist side by side. An Arabic saying goes, "There is a door to every single thing." This fiqh is the path, the door that specifically opens Islamic finance and by which Islamic finance can be accessed.
Muamalat is a branch of Fiqh. An area that deals with Sharia rules related to business and financial activities and the ability to adapt to financial situations that change rapidly from time to time and to harmonize the changing needs of the centered person with the rapid development of the whole world. Muamalat is also based on Divine revelation, the Qur'an, Sunna and Sharia, which absorbs fuqaha, experience and logical thinking. It literally means mutual relationship, which expresses mutual trade in the plural (muamalah), that is, interpesonality is rooted in the concept. (Hasan 2011, p. 39.)
According to the connotation of Fiqh al-Muamalat, it can be defined as nothing more than an interpretation (genus proximum) which, based on Sharia knowledge, defines and regulates the Islamic business and financial field from a practical point of view. Mukallaf, Usul al-Fiqh and Sharia are more extensive, Muamalat is more specific. However, here too, consciousness, belief and belief are relevant and decisive. It is essential to inculcate virtues, purity of soul and turn to Allah, as described in one of the popular hadiths. (Al-Shucara':88-89) Muamalat can also be divided into subdivisions, but this dogmatic division is not closely related to the topic, so we will only list them, also taking into account the possibilities of length. Based on the views of Prof. Dr. Wahbah al-Zuhayli, we can speak of Al-Ahwal al-Shakhsiyyah, Al-Madaniyyah, Al-Jina'iyyah, Al-Murafaat, Al-Dusturiyyah, Al-Duwaliyyah, Al-Iqtisadiyyah wa al-Maliyyah and Al-Adab. (Jalil – Ramli – Shahwan 2014 p.8.) For all this, the approach of haqiqa and magaz is available. By haqiqa we mean the literal, colloquial sense, and by magaz we can define a kind of broad, metaphorical meaning when applying Fiqh al-Muamalat in some cases. However, both are accepted and used methods. Metaphorical meaning provides theology with the opportunity to adapt one's action, the action, to religion, to bend law. It is also possible to conduct submissions (e.g. Sharia Councils), to conform certain attitudes to religion and legality, to make them ideological and legitimate. (Muckel 2008, p.20.)
There are several prohibitions under the Fiqh al-Muamalat, The first prohibition is the riba (interest), and this is fundamental. The definition, of riba is the amount payable of a loan for a specified period plus a specified value, i.e. interest on the loan. In our opinion, the first definition can be reconciled with 1+R., and the second definition with R. Or the exchange of assets that do not have an appropriate balance of value. The ban on riba therefore appears to have two dimensions. On the one hand, riba duyun, which arises from debt, credit, and on the other hand, riba buyu, which is based on the exchange of unequal items, that is, barter transactions. These include so-called ribawi elements, such as gold and silver representing money, as well as wheat, dates, etc., which may be the subject of transactions.

The next ban is gharar, which excludes the risk of Islamic transactions, which prevents unfair and unfair harm to the parties to the transaction. It manifests, for example, in the fact that during the transaction, if one of the parties suffers harm on the side of quantity or quality, the contract is void or can be contested. (Biermeier 2007, p. 11.) The prohibition is derived from an-Nisaa': 29 verses and the Hadith of the Prophet Muhammad's words communicated by Muslim. They distinguish between small and large ghahar, the small Gharar is yasir, and the large one is fahish. The prohibition of risk is reflected in the fundamental risk, risk management processes, risk management methods, religious risk (ar Ra'd: 11) and Takaful.

The third is the prohibition of speculation, maisir, which, unlike gharar (which is accepted to a small extent), is completely unacceptable under al-Maidah:90. (Steffens 2008, p. 7.) It should be noted that an Islamic transaction is only valid if it does not violate any prohibition and besides, it exists (mawjud), is allowed (halal), is valid (sahih) and has value (mutaqwwim). Therefore, it cannot be the subject of a transaction, for example, a dematerialised security. In addition, deals (haram) on certain products such as alcohol, tobacco, pornographic content, etc. are prohibited. (Ashrati 2008 p. 13.)

4.3. The value philosophy of Islamic economic law

Muamalat contains general principles (mabadi' ammah) and universal principles (qawaid kulliyyah) that can be interpreted using ijtihad. The basic principle is that care must be taken in transactions, which means requiring high care, which manifests itself in creative thinking and includes spirit and spiritual foresight. Islamic axiology, or value theory, seeks to research and qualify the essential problems of both existing and future reality. It should be noted that value categories have become the subjects and aspects of economic science and economic philosophy studies, as well as political science research and value sociological studies aimed at exploring individual, community and social value orientations. All economic systems, economic cultures and the global financial market have some kind of value-centeredness, even if in many cases they are diametrically different from each other. The importance of the value-theoretic approach, its essential theoretical contribution in the discussion of logical, ethical, aesthetic, social theoretical, economic, cultural philosophical, etc. problems is undeniable. (Kulcsár 1982, pp. 180-184.) If foresight and care do not characterize an economic transaction, it is considered a "gharar", a transaction the outcome of which is unknown, uncertain and thus prohibited. Similar is the batil transaction, which includes fraud, fraud, bribery, corruption, gambling or other illegal economic, financial activity or transaction.

According to Károly Böhm, there are two cumulative conditions for maintaining modern social and community relations: a) property; (b) and the existence of social institutions. (Böhm 2006, p.10.) Property can be the subject of an Islamic financial transaction and is only property, i.e. materialized. Between the moral dimensions of interpesonal relations, social and economic institutions provide the framework, such as the market (al-tasir). They create a "table of values" ("Werttafeln") that show the degrees, levels, rank and order in which differentiated values are used. (Baumgarten 1999, p.45.) Islam is similar in its value orientation to the value tables akhlaq, the code of virtues. The maslahah, which is one of Sharia's principles, prescribes the protection of such articulations of interests and values, taking into account the relationship between the individual and the state and with a series of prohibitions and obligations. For example, ethical conduct by trading partners is classified in the gharar class. The behaviour of market participants and the ethical behaviour of the environment are also of paramount importance, in connection with which the following prohibitions apply: riba (prohibition of interest and usury, for example al-Baqarah: 275), ghish (fraud), ihtikar (accumulation), zulm (injustice). In addition, reciprocity (al-taradi), striving for full implementation of the agreement (al-wafa'), striving to provide the best and responsible activity (ihsan), protection of property, criteria of equal distribution or shared responsibility, etc. must be present in all financial transactions.

We find it useful to highlight the work of Bódog Somló, especially his work entitled "On the theory of right law". (Somló 1914) In which he reflects for the first time on Franz List's idea that the criterion of moral correctness is the direction of actual development. The direction of development can be considered to be that which is common to all states and economies on a global level. Development provides the synthesis of what exists and what is to be created. Developing and correct are therefore coinciding concepts. Somló, however, did not accept List's approach. According to him, historical

development itself is neither right nor wrong. We must first assess as correct the goal towards which a trend is pointed, in order to determine the correctness of an institution, including economic financial market institutions, according to the trend of development. (Samu – Szilágyi 1998, p.264.) Furthermore, it rejects van Carker's claim that the goal of closing deficits and thus improving them is right. Thus, according to Somló, the correctness or incorrectness of a rule is a moral question. (Ádám 1999, p.116.) In other words, morality appears in economic regulators as a value, and indeed it should appear, just as it is found in religious systems such as Islamic finance and economic life, since they have a moral background. An obvious example is moral theology, such as the science of religion and Islamic law, which has accumulated countless volumes of literature throughout historical development. Therefore, akhlaq as the Islamic theology of virtues, morality and behavior is an immanent element of the Islamic economy, even if we think about the production and trade of halal products.

Finally, during the investigation, it must be stated that values are the product of human individual or collective evaluation and value assumption. That is, it can be argued that the subject of evaluation can be anything. But in particular, as a result of evaluation, the object of evaluation, the human being, appears, and for the human community it can receive a positive or negative rating. Furthermore, identification with value also expresses that value assumption, its existence and persistence necessarily implies a certain binding incentive towards those who acknowledge value, even if the bearer of value cannot be regarded as a characteristic norm. (Lozovanu 2008, pp. 64-65.)

All in all, and explicitly, a significant proportion of non-material values are carried by religious, moral, economic decency or other social norms, which may be fundamentally located outside the world of the economic system, or even form part of it in a more fortunate situation. In the Islamic economy, religious and moral values are clearly demonstrated. For example, Islamic finance and economic philosophy cannot do without the above-mentioned moral values and, being part of alternative economic models, form an ethically based system that focuses on man and his behavior and behavior. For example, in Malaysia, under the Islamic Banking Act of 1985 (a similar approach can be found in other Islamic countries engaged in Islamic farming, but also in the case of Islamic banks in Europe), there is a requirement for a general review of Islamic banking products, hence the requirement of a general review of Islamic type formal contracts, financial instruments used, deposits, management of investment accounts, financing services (whether housing financing or car financing), or commercial financing such as overdraft (ba'y), al-Inah, al-Murabahah, al-Musharakah are all value- and people-oriented. (Nauber-Kunath 2010 pp.76-81.) Venture capital investments, the Islamic stock market and investments follow the moral and religious rules of risk management enshrined in fiqh al-Muamalat. This determines the structure of Islamic finance.

5. Conclusion

As can be seen from the above, the Islamic economic system differs in its basic concepts, methods and paradigms from the economic, market, financial or banking system as understood in the traditional Western sense. In the modern world, however, it has become a significant phenomenon, and therefore in some areas it seriously competes with the conventional system. The aim of Islamic economics is to optimize the factors of production, to examine and apply wages, capital, and interest from a specific perspective. It is important to analyze the above and get to know fiqh al-Muamalat, because the obvious and observable Islamic financial and banking stability is mainly due to this particular approach. The discounting of many Islamic banking products, such as bay'salam, bay'mu'ajjal, and the comparison of stock exchange and financial market products, fiscal policy and resource allocation can bring us closer to reforming the conventional economy. Environmental and development strategies are also significant in the Islamic world's economy, which must be taken into account. Abdul Awwal Sarker also draws attention to the fact that in production processes and market management, the principal-agent problem almost always arises in the Western world because information asymmetry prevails. However, Islam and its valuables through fiqh al-muamalat can minimize the significance of the principal-agent problem. (Sarker 1999)

The theory of so-called alternative economics can also be seen as a response to neoliberal capitalism. Because neoliberal capitalism is an approach that "worships" the self-regulating mechanisms of the market, centered on utilitarianism, high profit, free competition and an approach to market acquisition. Its main concepts are Win-win-lose and dog eat dog concepts. Neo-liberar capitalism was dominant from the end of the seventies of the last century – parallel to the neoconservative turn in the USA and Great Britain – until the global economic crisis of 2008 (of which it can also be regarded as a direct cause), but since then it seems to be receding. Islamic finance can be classified as an alternative ethical economic theory because, according to alternative economics, there is a place for reciprocity in the market. According to the view, self-interest also includes the fulfillment of others, therefore we advance through virtues, and basic goods, so-called hardware goods, serve only as tools for achieving the common good as a value.

Thus, material goods are inferior to the public interest and social satisfaction. Sound moral norms, born and elaborated by the rational minds of society and man, provide a relative stabilization and standard to which one can draw. In a cost analysis, where the personnel and material conditions are determined, the opposing parties can also make decisions based on ethics. Based on this, the market is able to meet the requirements of sustainable development. (El Baghdadi 2011, pp. 24-28)

As final thoughts, we can draw parallels with the Christian perspective. In addition, personal virtues may also be included, as mentioned above in connection with Islamic axiology. For example, Sarolta Baritz cites honesty, trust, reliability, cooperation, respect, understanding and compassio: "Business as a vocation - utopia or reality?" in his study. Although not specifically in connection with Islamic economics, but one of the most prominent representatives of alternative and ecological economics meanings in Hungary, Sarolta Laura Baritz explains that a company always professes some values during its management, which are reflected in the company's market behavior, internal business world, etc., and these values can be, among others, environmental protection and consideration of human dignity, social responsibility and other similar (or diametrically different in some farming approaches). (Baritz 2003, pp. 54-55.) In Islam, this is the basis for transactions based on fiqh al-Muamalat. But it is also present in other religion-based economic systems, such as the Christian view, that the human being is at the center of economic transactions; its activities are aimed at serving the common good; calls for a balancing role for the state; demand and safeguard basic social values; and in the economy, promote the well-being of the public and the individual, as discussed in Papal Encyclical Rerum Novarum. (Rerum Novarum 1891).

In contrast to the neoclassical trend that prevailed before the 2008 crisis, which Korten considered the satisfaction of self-interest, maximum profit, competition, and human development as core values, as an increase in the value of goods consumed, the Islamic financial system and the fiqh that governs it can be described as much more efficient and viable, or even "sustainable". (Korten 1996, pp. 81-93.) Economic transactions are influenced by decisions according to business ethics, which is reflected in the external and internal aspects and methods of corporate governance. This is precisely why ethical behavior is one of the soft, non-buyable competitive advantages in the corporate-market sphere. (Csáth 2013, p.14.) The market participation of a religiously based bank or company, while its business and management activities are determined by the promotion of competitiveness.

In our view, precisely for this reason, the Islamic-type financial model will play a central role in the interests of the sustainable development of the world economy and humanity as a whole. Islamic banks are powerful market players in transnational operations, peoples and states. From the findings we can draw conclusions about the ethical management of economic operators operating on Islamic principles.

6. References

1. ÁDÁM Antal (1999): *Bevezetés a közjogtanba.* PTE-ÁJK, Pécs
2. ASHRATI, Mustafa (2008*): Islamic Banking. Wetvorstellungen – Finanzprudukte – Potenziale*. 1. Auflage. Frankfurt School Verlag, Frankfurt am Main
3. BARITZ Sarolta Laura (2003): *Az üzlet mint hivatás – utópia vagy realitás?* In. Kovász. VII. évf. 3-4. szám. Budapest, 2003. pp. 47-62.
4. BAUMGARTEN, Alexander Gottlieb (1999): *Esztétika.* transl.: Bolonyai Gábor., Atlantisz Kiadó, Budapest
5. BIERMEIER, Christoph (2007): *Islamische Investition und Finanzierung. Chancen schariakonformer Bankdienstleistleistungen für konventionelle Finanzinstitutionen.* GRIN Verlag, München
6. BÓKA János (2004): *Az iszlám jog alapjai.* In. BADÓ Attila – LOSS Sándor (szerk.): *Betekintés a jogrendszerek világába.* Szeged, 2004. (250-257.)
7. BÖHM Károly (2006): *Az ember és világa - philosophiai kutatások III. rész: Axiológia vagy értéktan.* Mikes International Alapítvány, Hága
8. CSÁTH Magdolna (2013): *Üzleti etika és versenyképesség.* in: FRANCSOVICS Anna (szerk.): Bizalom és etika a társadalmi gazdasági életben. Szimpózium. Budapest, 2013.
9. ECKE, Daniel (2012): *Islamic Banking: Grundlagen und Potenzial in Deutchland,* Hamburg, Diplomica Verlag ISBN: 978-3-8428-7008-6
10. EL-BAGHDADI, Houria (2011): *Islamic Banking – Eine Alternative zum konventionellen Bankwesen?* GRIN Verlag, Bochum
11. HASAN, Aznan (2011*) Fundamentals of Shariah in Islamic finance. Institute of Islamic Banking and Finance* Malaysia (IBFIM), Kuala Lumpur.
12. JALIL, Abdullaah – RAMLI, Asharaf M. – SHAHWAN, Syahidawati (2014) *The four introductory theories of Fiqh Muamalat.* Wisdom Publisher, Nilai – Negeri Sembilan
13. JANY János (2006): *Klasszikus iszlám jog - Egy jogi kultúra természetrajza.* Gondolat Kiadó, Budapest
14. KORTEN, David C. (1996): *Tőkés társaságok világuralma.* KAPU Kiadó, Budapest
15. KULCSÁR Kálmán (1982): *Gazdaság –Társadalom–Jog.* Közgazdasági és Jogi Kiadó, Budapest
16. LENGYEL Zsuzsa (2002): *Szociálpszichológia szöveggyűjtemény.* Osiris Kiadó, Budapest
17. LOZOVANU, Constantin (2008): *Filosofia dreptului – Curs de prelegeri.* U.T.M. Press. Chisinai
18. MUCKEL, Stefan (2008): *Der Islam im öffentlichen Recht des säkularen Verfassungsstaates.* Duncker & Humblot, Berlin
19. NAUBER, Udo – KUNATH, Peter (2010): *Immobilienfinanzierung vor dem Hintergrund des Islamic Banking.* GRIN Verlag, München
20. RERUM NOVARUM k. enciklika (1891): Róma, 1891. transl.: Prohászka Ottokár, SzIT, 1991
21. SAMU Mihály – SZILÁGYI Péter (1998): *Jogbölcselet.* Rejtjel Kiadó, Budapest
22. SARKER, Abdul Awwal (1999): *Islamic business contracts, agency problem and the theory of the islamic firm.* in.: International Journal of Islamic Financial Services Vol. 1 No.2. http://iaif.ir/images/khareji/articles/other/46.pdf Downloaded: 2023.05.15.
23. SOMLÓ Bódog (1914): *A helyes jog elméletéről*. Kolozsvár
24. STEFFENS, Thorsten (2008): *Islamic Finance*. GRIN Verlag, München
25. VISEGRÁDY Antal (1996): *Jogi alaptan.* JPTE ÁJK, Pécs
26. VISEGRÁDY Antal (2003*): Jog- és állambölcselet.* Dialóg Campus Kiadó, Budapest-Pécs

KATALIN PLÁNTEK, TIBOR BAREITH AND ANETT PARÁDI-DOLGOS: THE RESULTS OF THE FINANCIAL AWARENESS SURVEY OF THE HUNGARIAN POPULATION

Abstract
Households and businesses with a more developed financial culture are more likely to avoid financial decisions that are detrimental to them. If they do not take out unnecessarily expensive loans and strive to save, they also contribute to the stability of the financial system at the macroeconomic level. In this case, the state should place less emphasis on redistributive and stabilisation objectives, which can strengthen the country's competitiveness.
The population is faced with a diverse range of financial products. This can pose a serious threat to both the individual and the economy if financial literacy is inadequate. The knowledge gap between the lack of financial knowledge and the knowledge needed to safely use the abundant financial products can first of all undermine the financial resources and wealth of individuals and indirectly the savings of the national economy.

Keywords
financial awareness, financial culture, households, young people

Introduction

Finance and the attitude to finance is a daily phenomenon for everyone, which is why it is important to have knowledge in this area. Financial awareness and financial culture is one of the most researched areas of today, also in different disciplines (economics, psychology, sociology) (Zsótér et al., 2015). Much of the research on the subject has concluded that our financial culture is still not sufficiently (Horváthné-Kökény & Széles, 2014).
There are many definitions of financial culture, one of the most widely accepted being Atkinson's 2012 formulation: „A combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing" (Atkinson & Messy, 2012). The 2008 definition of the Hungarian National Bank (MNB) is similar: "The level of financial knowledge and skills that enables individuals to identify the basic financial information necessary to make informed and prudent decisions, and once acquired, to interpret and make decisions based on that information, assessing the possible future financial and other consequences of their decisions." (MNB, 2008). Balázsné (2013) says that there are parts of our financial culture that can be improved and parts that cannot. The areas that can be developed well are those that can be developed well through education and training, e.g. financial literacy. The parts that are difficult to develop are, for example, attitudes, values and habits.
The 2008 economic crisis highlighted the gaps in financial awareness (Klapper et al., 2012; Béres & Huzdik, 2012; Csiszárik-Kocsir & Varga, 2018). As in other countries of the world, the lack of financial literacy of the population has contributed to the severe consequences of the crisis in Hungary (Kovács & Szóka, 2020). The coronavirus epidemic and the economic changes since then have brought the situation of households to the fore once again (Sági & Papp, 2021). But people's needs and the financial market are constantly changing, so the demand for financial culture is growing (Habschick et al., 2007). However, the problem to be addressed is that financial markets are evolving faster than financial culture (Béres & Huzdik, 2012).

HUNGARIAN ASPECTS OF INTERNATIONAL SURVEYS

In 2015, Standard & Poor's conducted a global financial literacy survey. It looked at 4 main areas: risk diversification, inflation, interest rates, interest rate (Klappel et al., 2015). Over 150,000 people

aged 15 and over from more than 140 countries around the world were selected to take part in the survey. Within each area, survey participants were asked a number of questions. As a result of the survey, a respondent was assigned the adjective financial literacy if he/she knew at least three of the four concepts mentioned. The results of the respondents from the participating countries are illustrated in the map in Figure 1. Overall, at the global level, only 33% of adults are financially literate, i.e. only 1 in 3 adults know basic financial concepts. This means that billions of people are struggling to understand changes in the financial world. The highest scores are in Northern European countries, Germany, the Netherlands, the UK, Australia, Canada, the US and Israel. The worst scores were recorded by people in some South Asian countries. The survey results show that 45-54% of the Hungarian adult population is financially literate.

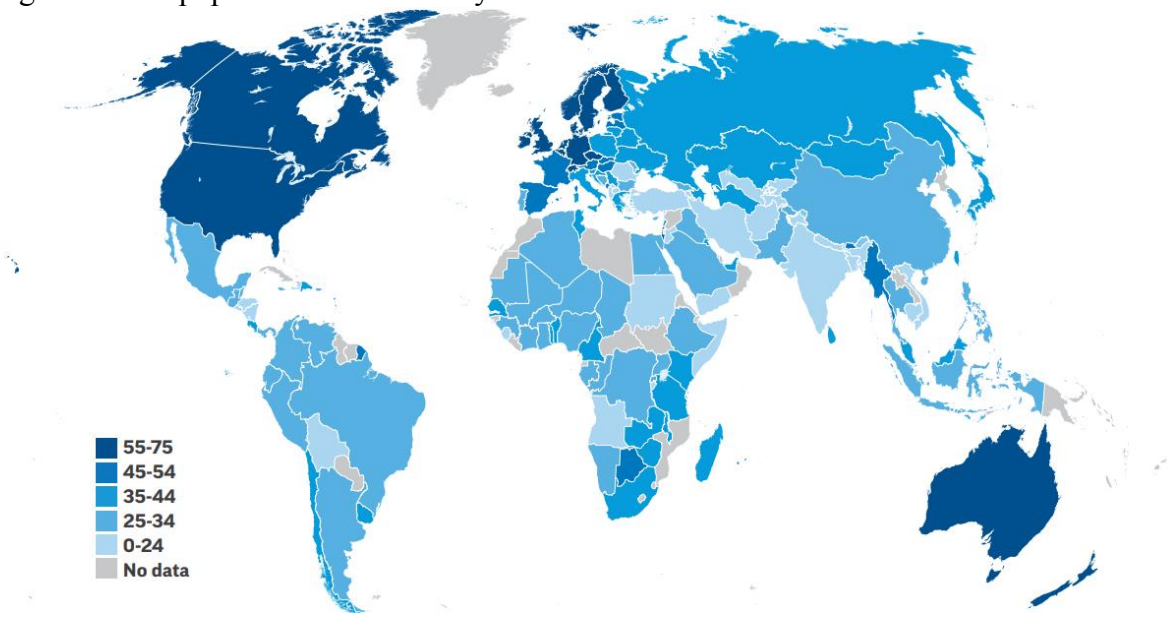

Figure 1: Percentage of adults with financial literacy
Source: Klapper et al., 2015

The research examined whether there is a relationship between GDP per capita and the financial literacy of the population. They found that only richer countries showed a significant correlation. This led the researchers to conclude that national level issues (e.g. education, consumer protection) have a greater influence on financial literacy.
The results show that financial literacy rates are lowest among people aged 65 and over. And among young people, countries where 15-year-old students also scored highly on the PISA mathematics test performed well. This suggests that a better understanding of finance requires mathematical knowledge. Overall, they found that lower educational attainment, women and the poor performed worse. In their 2020 research, Németh et al. also identified these social groups as the most vulnerable (Németh et al., 2020).
In the 2020 OECD (Organisation for Economic Cooperation and Development) survey, the results of the Hungarian population showed a mixed picture. The financial literacy score was used to compare the knowledge of the residents of the surveyed countries. The indicator is composed of three parts: financial knowledge, financial behaviour and financial attitude. A total of 21 points (7-9-5) can be achieved in each of the three parts. The average score of the countries surveyed is 12.7, which is far from the maximum score. Hungary scored 12.3 in this survey. Hong Kong scored best in the survey (14.8), but Slovenia (14.7), Austria (14.4) and Germany (13.9) also scored well, while the worst scores were achieved by the people of Italy (11.1), Romania (11.2) and Colombia (11.2). Financial well-being was also assessed. Five items were scored from 0 to 4, giving a maximum of 20 points. Hungary achieved an average score of 10.8, ranking 5th. The results showed a difference between male and female completers. Women scored higher on financial literacy, attitudes and behaviour, while men scored higher on knowledge and well-being. In terms of age, the middle-aged (30-59)

scored highest in each of these areas compared to the young (18-29) and the elderly (60-). Also performing better in all categories were those who use digital devices and those who have financial security for more than 3 months. (OECD, 2020)
Several international surveys have shown that the financial literacy of young people is very poor (OECD, 2020; Lusardi et al., 2010; de Bassa Scheresberg, 2013). There are many reasons for this. Because of their age, they have less experience. They are influenced by the patterns they see at home, from their parents (Kovács et al., 2021). It is therefore important that the topic is discussed within the family and not considered taboo, as is unfortunately still the case in many households today (Beck & Garris, 2019). There is little or no learning about finance in school. However, it is positive that young people know that they have a gap in their financial education and are concerned about their future (Mondres, 2019). They would like to participate in training courses to improve their knowledge, especially online (Beck & Garris, 2019).
In addition to international research, a number of national surveys have been carried out on the subject.

NATIONAL SURVEYS

In 2012, Dániel Béres and Katalin Huzdik examined financial culture at the macroeconomic level. Their analysis was based on data published by the Hungarian National Bank (MNB), the Hungarian Central Statistical Office (KSH) and EUROSTAT using descriptive statistics. For their research, they identified four indicators based on the literature: disposable income, savings, external liabilities and the demand for money in the economy. With regard to disposable income, they found a correlation that the higher the transfers, the lower the financial literacy. By transfers, we mean the various types of social income, e.g. family and unemployment benefits, pensions, social assistance, etc. For Hungarian households, this type of income accounts for more than 30% (KSH, 2023a and KSH, 2023b). Savings are an important indicator of long-term planning, self-care, security and profitability. Financial culture is more advanced the more complex financial products are chosen. Cash and bank deposits are the most widely used instruments among the Hungarian population. These highly liquid assets indicate lower financial culture. The role of debt is important for planning and risk management. In this case, the authors have correlated the level of financial culture with the level of late payments. They showed that loans that were more easily accessible to the population were less likely to be repaid. Foreign currency loans were also a significant item in this period. These are all typical of low financial literacy. Lusardi and Mitchell also conclude in their 2014 study that adults with higher financial literacy are less likely to default on their borrowed loans (Lusardi & Mitchell, 2014). The cash needs of the Hungarian economy are still high. High cash holdings have several disadvantages. The cost of producing cash is high and its role in the black economy is significant. Ambers who keep their savings in cash at home may lose out on significant profits. These are also typical of countries with low financial literacy, while cash-saving solutions are becoming more common in countries with advanced financial literacy. In Hungary, however, there is too much cash in circulation (Végső, 2020).

In 2014, Horváthné Annamária Kökény and Széles Zsuzsanna examined the savings habits of the Hungarian population. The survey was representative at county and settlement level, with a total of 4,106 households surveyed. The factor and cluster analyses carried out allowed them to classify households into four groups: self-savers, living for today, financially literate self-savers and non-financially literate self-savers. These groups were well separated as their responses were very different. The results show that for Hungarian households, security is the most important factor before making an investment, so they discuss decisions together. A weak relationship was found between per capita income and savings. Few of the participating households had savings for retirement. Households were found to be insufficiently aware of the financial products and services available to them and of the public subsidies and tax benefits they could claim. However, it is positive that they are not shying away from education, with 83% of them considering it important to improve their

financial literacy. Overall, since a significant part of the Hungarian adult population has not received any financial education (Horváthné & Széles, 2014), they are less likely to take advantage of various state benefits because they do not understand them.

Botos Katalin and her co-authors examined the financial culture and risk-taking of Hungarian households in the Central Great Plain in 2021. The survey was carried out in two parts among the inhabitants of 21 settlements and their related farms, with the participation of 2,905 households. The sample was representative by settlement type. The majority of respondents considered themselves rather poor, as confirmed by the monthly income data, which was below the national average. The reason given for this was the type of settlement and age, as the proportion of pensioners was higher than the national rate in terms of age. 39% of households surveyed still received their income in cash. A number of them also said that their money in the bank could be completely lost. Cross tabulation analysis showed a significant relationship between attitudes towards using bank cards and the form in which income was received. Among pensioners, cash was clearly the preferred method of payment. Internet banking was used by only 26.9% of survey respondents and the proportion of those with credit cards and foreign currency accounts was less than 10%. Of the monthly income, 20.5% of respondents were able to save - 14% of those living on a farm. The most common savings goals were to support their children and to live in old age. Differences were found between urban and farm dwellers. For urban residents, travel and leisure activities were popular, while farm dwellers would buy land or start a business. The most popular forms of savings among respondents were bank deposits (49.49%) and cash (26.23%). 39.4% of households surveyed had some form of credit, including 25.6% of those living on a farm. Most of these were loans for housing. 51% of the loans taken out were in euros or Swiss francs. 42.71% of households responded that they had a lot of problems repaying the loan. Banks (56.7%) and advertisements in the media (12.8%) were the most frequently cited sources of information before using financial products and services. Overall, it was found that there are encouraging signs of the presence of financial literacy among households in the region, but there is still room for improvement, especially in the case of farm households.

In a 2021 publication, Kovács Péter and his colleagues examined the financial culture of Hungarian secondary school students. In the course of the survey, a total of 104,758 people were interviewed online over a 10-year period from 2011 to 2020. Students were asked 10 questions about their financial attitudes and 30 questions to assess their real-world knowledge. The questionnaire covered the following 6 topics: general banking and financial knowledge; investments and savings; loans; working life; insurance and pensions; and general economic knowledge. The results of the research were as follows. At the same time, they are a generation that has no problem using computers and smartphones, so the internet is becoming increasingly important for them. A significant relationship was found between students who are not interested in finance and those who are less interested in finance, and they also performed less well on questions measuring their knowledge. Young people who planned ahead and who had seen and participated in family financial balance planning themselves performed better. These students attach importance to self-care and saving for retirement, with those who think they should save from their first salary standing out. On average, male respondents scored 6.72% higher on the survey - consistent with the literature that shows that men are more financially aware (Klapper et al., 2015; Chen & Volpe, 2002; Lusardi & Mitchell, 2011). There was no restriction on the type of secondary school the student attended. The results showed that students who attended a vocational high school performed better than those who attended a grammar school. As a result of a multi-step analysis of variance, the researchers showed that the use of economic and financial education can significantly reduce the financial literacy gap. They found that older students, aged around 18, performed better than 14-15 year olds (Kovács et al., 2021)

In the 2017 survey by Kovács and Kuruczleki, the Econventio test was not administered to high school students, but also to university students and adults participating in a cultural public employment programme. Their aim was to get a broader picture of knowledge and to compare the

results of different age groups. A total of 2,154 people took part in the survey. They were asked to answer 30 questions, with an average of 19 good answers (the average for secondary school students was 13 good answers). The best-performing questions were on bank cards, short- and long-term investment goals. The worst scores were on the topics of insurance and percentage calculation. A higher proportion of adults also answered well to questions on work, borrowing and retirement - this is because these are areas that secondary school students have not yet encountered in practice due to their age. Their attitudes were characterised by a higher level of caution. 71.8% of respondents said that, learning from previous cases, they would choose a fixed-rate loan over a variable-rate one. The advice of family and friends before making a decision is the most important (44.8%), but some would only make a decision based on their own opinion (22.8%) or the opinion of an independent financial adviser (21.6%). Overall, adults significantly outperform students. Deficiencies were found in the same areas, suggesting that the lack of financial education has an impact on adult decisions.

In a 2018 publication, Csiszárik-Kocsir Ágnes and Varga János investigated the financial awareness and socialisation of young people entering undergraduate university education. A total of 768 people from four universities were included in the survey, who were reached through an online questionnaire. The results show a mixed picture. Students are characterised by a fear of taking out a loan, presumably because of previous negative family experiences. They are sceptical about advertising and do not base their financial decisions on it, but seek the opinion of people who are important to them. Most of them say that they have seen their parents as a good role model for saving, which is why they try to save. What was a surprising finding was that students who had previously studied some form of financial education did not clearly perform better than students who had not. The chi-squared test showed that the educational attainment of parents and the way they behave in financial decisions has a significant impact on their children. Parental education was examined in more detail. For fathers, there was no clear evidence that the children of parents with higher educational attainment scored better on average than the children of fathers with lower educational attainment. In terms of mothers' education, it was clearly shown that children of those with at least a bsc degree had a higher average. Overall, the results suggest that in many cases financial socialisation can have a stronger impact than schooling.

In 2014, Huzdik and colleagues studied the financial culture and risk appetite of students in higher education. A total of 1,743 responses were received from students at two universities through an online questionnaire survey. For the evaluation, three indicators were created: the Financial Literacy Index (PTM), the Self-Image Index (ÉI) and the Risk Taking Index (KM). The calculation of the PTM shows the percentage of good answers to the questions asked. Its value can range between 0 and 1. Financial literacy is higher the closer the value of the indicator is to 1. The ÉI measures the difference between real and perceived knowledge, i.e. the extent to which the respondent perceives his/her own knowledge as realistic. The KM can be calculated in one of two ways: the level of risk-taking is either proportional to the real financial knowledge or to the perceived financial knowledge. The results of the Self-Image Index showed that 59% of students realistically assess their own financial knowledge, 30% overestimate and 11% underestimate. Over 70% of young people declared themselves risk averse - their real knowledge level showed the same result. It is concluded from the responses that their risk appetite does not increase as their real knowledge level increases. Overall, it was concluded that other, mainly social, factors than financial knowledge influence the risk-taking propensity of young people.

In 2015, Zsótér and colleagues also studied the financial attitudes and behaviour of young people. A total of 2,070 university students completed their online questionnaire. The sample had a higher proportion of students enrolled in economic education than the national level. Part of the questions concerned their attitudes. The other questions had specific good answers that measured the students' actual knowledge. The statements were grouped into four factors: awareness, attitude towards credit, risk taking and moral values. The cluster analysis performed resulted in 3 groups. The first cluster consisted of younger students with less independent income and living at home with their parents.

Their scores are better than those of the second cluster, but lag behind those of the third cluster. They had a more solid attitude. Younger students were also in the second cluster, but their scores were the lowest in the knowledge questions. Their preference was for short-term goals. The third cluster was made up of older students. They had higher knowledge scores, having studied economic subjects for several semesters. Most of the students with children in the family were in this group - this also affects their attitude to risk and security. They have higher per capita incomes and tend to live apart from their parents. Overall, students rate their own knowledge as medium, with an average score of 4.3 (on a scale of 1-7). According to the Self Image Index, 71.9% of students have a realistic perception of their own knowledge, 6.4% underestimate and 21.7% overestimate. Differences were found in the acquisition of information. Among younger people, relying on the experience of family and friends is the primary source, while among older people, advisers, online advertisements and their own experience are more important. 78.6% of respondents have some form of savings. The most common forms of savings were money kept at home, money held in a current account without being tied up and bank deposits with a maturity of less than one year. Corporate securities and insurance are not common among these students. 54.8% of respondents have had or currently have credit. The rate of default on repayments was low. Differences were found in the time span of savings. Older students tended to have longer-term goals in mind when making previous investments.

In 2022, Németh and his colleagues researched a little-studied area, the financial literacy of teachers. Most of the studies conclude that students' and young people's financial literacy is low, that the patterns they bring from home are not the best, and that financial education needs to be given more attention. The question arises: who provides this education? Do they have the right knowledge for the job? To answer this question, the Némeths used an online questionnaire survey of teachers and trainers. In the survey, 705 people were interviewed. The age of the respondents ranged from 24 to 72, with an average age of 50.5 years. In terms of gender, two thirds of respondents were female. There were respondents from all types of schools, from lower primary to higher education. In terms of subject specialisation, the sample included teachers of finance and economics, as well as teachers of real sciences and humanities. 86% of the respondents had savings. The most popular forms of savings were savings in current accounts without a deposit, government bonds and savings in savings accounts, but more people also held mutual funds and corporate bonds. They were asked how important they considered financial education to be. They were asked to rate their opinion on a Likert scale of 1 to 7. 90.9% of the respondents gave a rating of 5 or higher (59.5% rated it 7), meaning that they also think financial education is important. No correlation was found between the importance of financial education and the age of the instructors, the type of institution and the subjects taught. Most of them thought that training and self-development could make their work more effective. In terms of students' receptiveness, the teachers interviewed thought that 56% were interested, 42% were bored with financial education in class and 2% listened but showed no particular interest in the subject. Teachers scored higher on the Financial Awareness Index than university students measured earlier with the same index (also true for students in economics). The Self Image Index showed that the majority of teachers overestimate their own financial-economic knowledge. Both by self-report and by results, the majority of teachers can be described as risk-averse. 71.9% have not participated in any training. Those who did, achieved significantly better results.

The National Audit Office has carried out a survey of organisations participating in its financial literacy programme. The aim of the survey was to obtain an overall picture of the programmes implemented or under way and to use the results to develop a more precise national strategy. The survey was conducted with 63 participating organisations (e.g. banks, insurance companies, consumer protection, individuals, etc.) in 2015. Up to the period under review, 40 surveys on this topic had been carried out and the results were processed. Most of the financial education programmes target primary and secondary school students and adults aged 25-64. Financial literacy, transfer of knowledge and preparation for responsible decision-making were the main objectives of the programmes surveyed. The most frequent topics covered in the training programmes were individual

and family budgeting and financial self-awareness and awareness. Most of the trainings were short (a few hours) and took the form of traditional education and lectures. 74% of the training courses were delivered by professionals with a degree in economics or finance. The majority of respondents measure the satisfaction of the participants of the training and then incorporate the lessons learned into their future programmes. Overall, although there are training courses to improve financial literacy, the format is not appropriate (e.g. short in duration but too much in terms of material) (Németh et al., 2016).

In addition to the above-mentioned research, the surveys in Table 1 also refer to the financial awareness of the Hungarian population:

Table1: Other surveys on the financial awareness of the Hungarian population

Authors	Title	Year	Data and methodology	Results
Zsótér Boglárka – Németh Erzsébet – Luksander Alexandra	The impact of changes in the socio-economic environment on financial culture - A comparison of OECD research results from 2010 and 2015	2017	OECD questionnaire survey, 1.003 persons from Hungary in 2010 and 1.000 persons in 2015	In 2010, there was still a sense of caution due to the economic crisis, but by 2015, there were negative changes. Faith in banks and financial advisors has declined, and people are now making decisions based more on their own intuition and knowledge. Fewer families were budgeting and the number of savers had also fallen. Fewer were struggling with financial problems, and if they were, they were more likely to be behind on paying their bills than repaying their loans. Financial knowledge has been shown to have declined, with attitudes shifting towards the less knowledgeable.
Németh Erzsébet – Zsótér Boglárka – Béres Dániel	Financial vulnerability characteristics of the Hungarian population the OECD 2018 data from the OECD	2020	OECD 2018 survey of a representative sample of 1001 people	Higher incomes do not increase financial awareness, but they do reduce vulnerability. Financially vulnerable people cannot control their needs and spending. Their knowledge is low and they are vulnerable. They do not budget. Their daily life is characterised by anxiety and fear, and their vision of the future is not very positive.
Baranyi Aranka – Bencsik Márta – Csernák József	Survey of the population's attitudes towards saving based on a specific survey	2021	Survey of 151 households	A strong relationship was found between perceptions of banking services and educational attainment. Some groups are so sceptical that they do not even use the simplest banking products. The more sophisticated financial products are also used by few of those with higher education.
Földi Kata – Szatmári Judit – Szakács Attila	Financial awareness and credit card usage survey 2017	2017	interviews with 4 key experts and an online questionnaire survey with 113 respondents	Experts say credit card users are becoming more aware, but there is still room for improvement. In their experience, younger people are more open to new products. Credit card holders

				surveyed use credit cards most often to cover their monthly expenses and for unexpected expenses. When applying, they look at the monthly interest rate, the annual card fee and the interest-free period. They consider financial education important, but feel that it is not provided at an adequate level in schools.
Szabonya Réka	Competences in finance in the field of financial literacy - population survey experiences	2021	representative questionnaire survey	Customers look to their own bank as their primary source of information before investing, but when borrowing, they will assess more than one bank's offer. Respondents scored best on data protection and worst on savings when asked about financial competences. When measuring digital literacy (e.g. internet banking, online payments, etc.), only 30% of the answers were correct.
Csiszárik-Kocsir Ágnes	The relationship between retention banking products and financial awareness	2019	online questionnaire survey with 3.962 participants	The most important factor, according to customers, is the services related to bank accounts and credit cards. Credit cards and personal loans are not popular among respondents (especially for Generation Y and Z) due to lack of previous experience and lack of precise knowledge of the products. The least preferred service is the safe deposit box service - a service that is hardly known. Even more popular than innovative fintech companies are banks. Lack of basic financial knowledge makes it difficult to understand newer products and services.
Németh Erzsébet – Deák-Zsótér Boglárka	The effectiveness of training in finance and economics	2023	online questionnaire, involving 705 teachers and lecturers	More than two thirds of the teachers surveyed had not attended any training. Most of them develop their knowledge independently, using books and online resources. Teachers who have attended training have scored better on

				knowledge tests, rate their own knowledge higher and are less risk-taking. The proportion of savers is high, but most of them keep their money in their current account without any deposit. According to teachers who have attended training courses, there are cases where it is worth taking out a loan, but those who have not attended were reluctant. Those who have attended training are more aware and confident.
Csiszárik-Kocsir Ágnes – Varga János	Perceptions of the importance of financial literacy and the relationship between previous financial education and the results of a questionnaire survey	2022	Questionnaire with 6,803 respondents	According to respondents, learning financial literacy is important to make better use of the opportunities available. The least important reason for learning financial education was to increase their wealth. Those who had studied finance earlier had a more realistic view of the practical applications of financial skills and were more informed in their decisions.
Fellner Zita – Marosi Anna	No longer haunted by the past? The impact of foreign currency exposure on banking confidence and financial awareness	2022	MNB representative public opinion survey with 1,001 respondents	Foreign currency exposure does not negatively affect confidence in the banking system. For those affected, knowledge has improved in the basic knowledge domain. A more cautious attitude is not evident in their behaviour and attitudes.
Garai-Fodor Mónika – Csiszárik-Kocsir Ágnes	The validity of value-based consumer behaviour models for the financial awareness of Generation Z and Y	2018	Questionnaire survey of 3,736 young people from Generation Z and Y	Decisions made in managing money reveal the basic elements of value-based consumer behaviour. The generations studied do not form a homogeneous group, either in terms of their perception of the value of money or in terms of the way they handle money. They need to be addressed in different ways in order to develop their financial knowledge and awareness.

Source: own editing based on surveys, 2023

SUMMARY, CONCLUSIONS

To achieve an advanced financial culture, actors need to work together. Strong action is needed from the regulatory side, involving the various financial institutions, and coordinating the activities of parents and schools. This is why education should give priority to the development of financial literacy and the transfer of relevant financial knowledge. Ensuring this should be a public task and objective. Financial education should be started as early as possible, so that by the time students leave school and have to make independent financial decisions, they have a sound basis for making financial decisions. The earlier they start financial education, the more financially aware adults they can become. Thanks to strong family influences, a family where parents are financially aware can set a good example for their children. The next generation can then have a stronger foundation, which can only be enhanced by a good quality education. Fortunately, the government has recognised this. As a result, a number of programmes, publications and regulations have appeared in recent years that can help to improve the financial literacy of the population. The public is open to them, they just need to find the right channels and methods to access them. Unfortunately, the financial awareness of the Hungarian population is quite low. Several international and national surveys have proven this. Both households and students and young people need to improve their knowledge. Fortunately, there are teachers and trainers with the right level of knowledge from whom financial literacy can be acquired. Government measures have led to financial education being increasingly introduced in schools, and a number of training courses are also available. So all the possibilities are there for us to become a more financially aware nation.

REFERENCES

1. Atkinson, A., Messy, F. (2012). A pénzügyi kultúra mérése: Az OECD / Nemzetközi Pénzügyi Képzési Hálózata (INFE) kísérleti kutatásának eredményei. OECD Pénzügyi, Biztosítási és Magánnyugdíjpénztári Műhelytanulmányok, 15, OECD Publishing, 2012, https://www.oecd-ilibrary.org/finance-and-investment/measuring-financial-literacy_5k9csfs90fr4-en
2. Balázsné Lendvai, M. (2013). A bankmarketing szerepe a pénzügyi kultúra fejlesztésében. Doktori Ph.D. értekezés, Nyugat-Magyarországi Egyetem, Sopron, http://ilex.efe.hu/PhD/ktk/balazsnelendvai/disszertacio.pdf
3. Baranyi, A., Bencsik, M., Csernák, J. (2021): A lakosság megtakarítási attitűdjének vizsgálata egy konkrét felmérés alapján. Vállalkozásfejlesztés a XXI. században 2021/I., 6. https://kgk.uni-obuda.hu/sites/default/files/I.%20k%C3%B6tet.pdf#page=6
4. Beck, J. J., Garris, R. O. (2019). Managing Personal Finance Literacy in the United States: A Case Study. Education Sciences, 9(2), p. 129, https://doi.org/10.3390/educsci9020129
5. Béres, D., Huzdik, K. (2012). A pénzügyi kultúra megjelenése makrogazdasági szinten. Pénzügyi Szemle, 3, 322-336. https://www.penzugyiszemle.hu/upload/documents/322-336-beres-huzdikpdf_20170827102913_20.pdf
6. Botos K., Botos J., Béres D., Csernák J., Németh E. (2012). Pénzügyi kultúra és kockázatvállalás a közép-alföldi háztartásokban. Pénzügyi Szemle, 57(3), 291–309. p https://www.penzugyiszemle.hu/upload/documents/291-309-botos-es-tsai36pdf_20170827102538_65.pdf
7. Chen, H., & Volpe, R. P. (2002). Gender differences in personal financial literacy among college students. Financial services review, 11(3), 289-307. https://www.researchgate.net/publication/285358406_Gender_Differences_in_Personal_Financial_Literacy_Among_College_Students
8. Csiszárik-Kocsir Á., Varga J. (2018). A felsőoktatásba belépő magyar fiatalok pénzügyi tudatosságának és pénzügyi szocializációjának vizsgálata. Vállalkozásfejlesztés a XXI.

században, VIII/1., 42-57. http://kgk.uni-obuda.hu/sites/default/files/42_VF2018_VF_2018_1.pdf
9. Csiszárik-Kocsir, Á., Varga, J. (2022). János, V. A pénzügyi ismeretek fontosságának megítélése és a korábbi pénzügyi oktatásban való részvétel kapcsolata egy kérdőíves kutatás eredményei alapján. Vállalkozásfejlesztés a XXI. században, 2022/2, 79-90. https://kgk.uni-obuda.hu/sites/default/files/VF2022/VF_2022_II/VF_2022_II_10.pdf
10. de Bassa Scheresberg, C. (2013). Financial literacy and financial behavior among young adults: Evidence and implications. Numeracy, 6(2), 5. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=dea05d2baa277d154d92ce8d5cbcaa41d99f058f
11. Garai-Fodor M., Csiszárik-Kocsir Á. (2018). Értékrendalapú fogyasztói magatartásmodellek érvényessége a Z-és Y-generáció pénzügyi tudatossága esetén. Pénzügyi Szemle, 63(4), 518. https://www.penzugyiszemle.hu/upload/documents/garai-csiszarik-2018-4-mpdf_20190117150644_11.pdf
12. Fellner, Z., & Marosi, A. (2022). Már nem kísért a múlt? A devizahiteles érintettség hatása a bankrendszeri bizalomra és a pénz-ügyi tudatosságra. HITELINTÉZETI SZEMLE, 21(2), 37-65. https://hitelintezetiszemle.mnb.hu/letoltes/hsz-21-2-t2-fellner-marosi.pdf
13. Földi, K., Szatmári, J., & Szakács, A. (2017). Pénzügyi tudatosság és hitelkártya használati szokások kutatása 2017-ben= Qualitate and A Quantitative Investigation of Using Habits in Case of Credit Cards and Financial Consciousness in 2017. GRADUS, 4(2), 551-556. http://real.mtak.hu/109835/1/2017_ECO_013_Foldi.pdf
14. Habschick, M. S.– Britta, E. J. (2007): Survey of Financial Literacy Schemes in the EU27: EversJung
15. Horváthné K. A., Széles Zs. (2014). Mi befolyásolja a hazai lakosság megtakarítási döntéseit? Pénzügyi Szemle, 59(4), 457. https://www.penzugyiszemle.hu/upload/documents/horvath-szeles-2014-4pdf_20170820130952_41.pdf
16. Huzdik K., Béres D., Németh E. (2014). Pénzügyi kultúra versus kockázatvállalás empirikus vizsgálata a felsőoktatásban tanulóknál. Pénzügyi Szemle, 59(4), 476–488 p. https://www.penzugyiszemle.hu/upload/documents/huzdik-beres-nemeth-2014-4pdf_20170820131148_80.pdf
17. Klapper, L. – Lusardi, A. – Panos, G. A. (2012): Financial Literacy and the Financial Crisis. Policy Research Working Paper. Washington, The World Bank
18. Klapper, L. F., Lusardi, A., van Oudheusden, P. (2015). Financial Literacy Around the World: Insights from the Standard & Poor's Ratings Services Global Financial Literacy Survey. https://gflec.org/wp-content/uploads/2015/11/Finlit_paper_16_F2_singles.pdf
19. Kovács, P., & Kuruczleki, É. (2017). A magyar lakosság pénzügyi kultúrája [Financial literacy in Hungary]. http://publicatio.bibl.u-szeged.hu/21520/1/Amagyarlakossagpenzugyikulturaja.pdf
20. Kovács, P., Kuruczleki, É., Rácz, T. A., & Lipták, L. (2021). A magyar középiskolások pénzügyi kultúrájának vizsgálata az elmúlt 10 évben Econventio-teszt alapján. PÉNZÜGYI SZEMLE/PUBLIC FINANCE QUARTERLY (1963-), 66(2), 179-198. DOI: https://www.penzugyiszemle.hu/upload/pdf/penzugyi_szemle_magyar/2021_2_szam/Kov%C3%A1cs-et-al_21_2_M.pdf
21. Kovács, T., Szóka, K. (2020). A pénzügyi kultúra és pénzügyi tudatosság helyzete. XIV. Soproni Pénzügyi Napok Konferenciakötet, 2020 http://publicatio.uni-sopron.hu/1969/7/SPN_2020_Konferenciakotet_pp.104-112.KovacsTamas-SzokaKaroly.pdf
22. Központi Statisztikai Hivatal (2023a): Egy főre jutó bruttó társadalmi és egyéb jövedelmek régiók és településtípus szerint [forint/fő/év] https://www.ksh.hu/stadat_files/jov/hu/jov0044.html

23. Központi Statisztikai Hivatal (2023b): Egy főre jutó bruttó munkajövedelem régió és településtípus szerint [forint/fő/év] https://www.ksh.hu/stadat_files/jov/hu/jov0043.html
24. Lusardi, A., Mitchell, O. S. (2011). Financial literacy around the world: an overview. Journal of pension economics & finance, 10(4), 497-508. DOI: https://doi.org/10.1017/S1474747211000448
25. Lusardi, A., Mitchell O. S., (2014). "The Economic Importance of Financial Literacy: Theory and Evidence," Journal of Economic Literature, American Economic Association, 52(1), 5-44 p. https://www.aeaweb.org/articles?id=10.1257/jel.52.1.5
26. Lusardi, A., Mitchell, O. S., & Curto, V. (2010). Financial literacy among the young. Journal of consumer affairs, 44(2), 358-380. https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1745-6606.2010.01173.x
27. Magyar Nemzeti Bank (2008): Együttműködési megállapodás a pénzügyi kultúra fejlesztés területén a PSZÁF és az MNB között. www.mnb.hu/letoltes/0415mnbpszafmegallpodas-penzugyi-kultura-fejleszte.pdf
28. Mondres, T. (2019). How Generation Z is Changing Financial Services. ABA Banking Journal, 111(1), p. 24 https://www.proquest.com/docview/2159925599?pq-origsite=gscholar&fromopenview=true
29. Németh, E., Béres, D., Huzdik, K., Zsótér, B., & Mészáros, A. (2022). Tanárok pénzügyi kultúrája. Pénzügyi Szemle/Public Finance Quarterly-Journal of Public Finance, 67(1), 7-32. https://www.penzugyiszemle.hu/upload/pdf/penzugyi_szemle_magyar/2022_1_szam/Nemeth_et_al_2022_1.pdf
30. Németh, E., Jakovác, K., Mészáros, A., Kollár, P., & Várpalotai, V. (2016). Pénzügyi kultúra fejlesztési programok felmérése. http://real.mtak.hu/50551/1/penzugyi_kult_fejl_programok.pdf
31. Németh E., Zsótér B., Béres D. (2020): A pénzügyi sérülékenység jellemzői a magyar lakosság körében az OECD 2018-as adatainak tükrében. Pénzügyi Szemle, 65(2). pp. 281-308. DOI: https://www.penzugyiszemle.hu/upload/documents/nemethe-zsoterb-beresd-20-2-mpdf_20200706104940_55.pdf
32. OECD (2020): OECD/INFE 2020 International Survey of Adult Financial Literacy https://www.oecd.org/financial/education/oecd-infe-2020-international-survey-of-adult-financial-literacy.pdf
33. Sági J., Papp E. (2021). Pénzügyi tudatosság – Fókuszban a megtakarítási és befektetési szokások. Fordulópontok és gazdasági növekedés Közép-Európában, Aposztróf Kiadó, 2021, 117-129. https://www.aposztrof.hu/images/stories/ebook/Fordulopontok_es_gazdasagi_novekedes-full.pdf#page=119
34. Szabonya, R. (2021). Kompetenciák a pénzügyek területén–lakossági felmérés tapasztalatai. PÉNZÜGYI SZEMLE/PUBLIC FINANCE QUARTERLY, 66(2), 235-253. https://www.penzugyiszemle.hu/upload/pdf/penzugyi_szemle_magyar/2021_2_szam/Szobonya_21_2_M.pdf
35. Zsótér B., Béres D., Németh E. (2015). A magyar fiatalok jellemzése pénzügyi attitűdjeik és magatartásuk mentén - Vizsgálat a felsőoktatásban tanulók pénzügyi attitűdjeiről és magatartásáról. Vezetéstudomány, XLVI. évf. 6. szám, 70-80. http://unipub.lib.uni-corvinus.hu/1981/1/vt2015n6p70.pdf
36. Zsótér, B., Németh, E., & Luksander, A. (2017). A társadalmi-gazdasági környezet változásának hatása a pénzügyi kultúrára: Az OECD 2010-es és 2015-ös kutatási eredményeinek összehasonlítása. PÉNZÜGYI SZEMLE/PUBLIC FINANCE QUARTERLY, 62(2), 251-266. http://real.mtak.hu/56965/1/Zsoter_Nemet_Luksander_2017_2_M_u.pdf

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BÍRÓ BÍBORKA ESZTER, BÍRÓ BORÓKA JÚLIA:
AGRICULTURE AND FOOD INDUSTRY IN THE TIME OF CRISIS. THE FINANCIAL ANALYSIS OF BUNGE LTD.

Abstract

The aim of present paper is to give a brief insight into the most basic impacts of the COVID-19 and the Russia–Ukraine war on the agriculture and food industry. Afterwards it analyzes the financial-economic situation of Bunge Ltd, one of the largest companies of the agriculture sector at global level, listed at the New York Stock Exchange.

In the case study part, we discuss the most important indicators related to the liquidity, profitability, efficiency, solvency and the market indicators of the mentioned enterprise. The source of the data used are the quarterly and annual reports of the company. The analysis contains the financial data of the last five years from 2018 to 2022, period that encompasses pre- and post Covid years and also the year the war broke out. Finally we allow an insight into the development of capital market indicators, paying special attention to the stock price, which also showed varying degrees of volatility due to the importance of the industry but also due to the often irrational behavior of the capital market actors.

Keywords: *agriculture, food industry, crisis, financial analysis*

Introduction

The global health crisis had devastating impacts on each of the economic industries, both in direct way and through the introduction of necessary measures to curb the spread of the COVID-19, impacts that can be detected nowadays as well, as the economy has not yet regained its' precovid status, impacts that are also being felt by the agriculture and food sector. What is more, as a conflict between two major agricultural powers, the Russia-Ukraine war deepened the anyway not so simple situation of the economy as a whole and of the agriculture and food industry. However, as we can observe in this research this is not the most affected sector, especially not in the first round and immediately.

1. Material and Methods

Regarding the structure of present paper, in the next subchapter it describes the global situation of the agriculture and food industry using important scientific articles and global reports from the field. The presentation pays special attention to the situation of the sector in times of crisis such as COVID-19 and Russia-Ukraine war.

The second part of the research uses the methodology of financial analysis, using the data from income statements and balance sheets of the chosen company (Bunge Ltd.) for the 2018-2022 time period.

Five groups of financial indicators are calculated, plotted and evaluated, as follows: liquidity indicators, profitability indicators, efficiency indicators, solvency indicators and market indicators.

2. The global situation of agriculture and food industry

During the last three decades, Russian and Ukrainian agriculture outputs and food commodities exports have increased significantly, making the region the world's breadbasket. The two countries are now among the world's top producers of various agricultural products, mainly cereals and

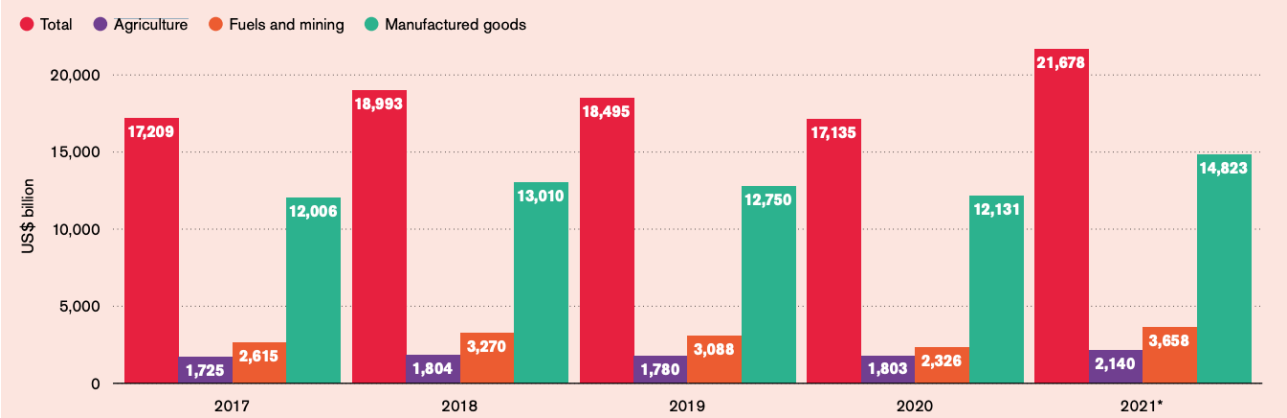
sunflower oil. Together, in 2020, they account for 72.7% of global trade in sunflower oil and seeds and 34.1% of global trade in wheat. (UNCTAD, 2020).

According to Food and Agriculture Organization of the United Nations (FAO), the war in Ukraine affects a region of significant importance for global food security and nutrition. As the situation drags on, there is great uncertainty surrounding Ukraine's ability to harvest and trade in current and future agricultural seasons. From a trade perspective, the looming risk of fragmentation of global food and agricultural markets poses an additional threat to world food security. (FAO, 2022)

The above cited document of the FAO highlights that the outbreak of the COVID-19 pandemic in early 2020 showed how a robust and well-integrated global agri-food system is testing countries to meet unprecedented challenges. The global trade in food and agricultural products has indeed proven to be extremely resilient to disruptions caused by the epidemic. The disruptions were striking but usually short-lived, proving that countries are stronger when they work together (FAO, 2022).

Such shocking events underline the need for breakthrough research, a deeper understanding of trade networks, and better approaches to integrating and promoting well-functioning food and agricultural markets. Onthe other hand the restrictive measures of COVID-19 such as the lockdown have highlighted that domestic trade and short supply chains play a very important role in the sector.

Figure 1: Merchandise exports by major product groups (in billion USD)



Source: WTO, 2022

As shown at Figure 1, fuel and mining products rose by 57% in 2021 due to a hike in energy prices and a rebound in demand, while exports of manufactured goods grew by 22% in 2021 after a decline of 5% in 2020. The export of agricultural products show the slightest increase in 2021, rising by 19%, the possible explanation of which stays in the fact that agricultural exports remained resilient in 2020 despite the pandemic.

This last statement logically leads to the following question: how resilient is global agricultural and food sector to shocks in the system? To answer this question, we need to take into account several issues.

The outbreak of the COVID-19 in 2020 and 2021 tested the resilience of the food and agricultural trade network. The pandemic and the measures taken by governments around the world to contain it were a simultaneous shock to all aspects of the agri-food industry system. This shock affected demand, supply, logistics, and trade in food and agricultural products and their production inputs. On average, and despite multiple challenges, the food and agricultural trade network proved to be highly resilient to shocks. Indeed, the only visible impact at the global level was the brief disruption of trade

at the start of the pandemic and when worldwide movement restrictions were imposed between March and April 2020 (Arita et al, 2022).

In a country, domestic food production shocks, such as those resulting from extreme weather conditions or geopolitical crises, can be effectively cushioned by adjusting marketed quantities, ensuring food security (Cottrell et al, 2019). This way, shocks specific to countries or regions can be partially canceled out at the global level. Trade is therefore a potentially powerful engine for smoothing out fluctuations in supply worldwide and, as a result, reducing the volatility of prices. However, there is also concern that, as import dependence increases, greater connectivity between countries through trade may serve to transmit negative shocks and increase vulnerability rather than contributing to resilience. (Remans et al, 2014; Sartori, Schiavo, 2015).

The effects on importing countries may be exacerbated and lead to self-perpetuating trade disruptions if other countries in the network respond by imposing export restrictions or other measures, further exacerbating price increases (Torreggiani et al, 2018). However, countries that are highly dependent on food and agricultural imports from a few major trading partners are more vulnerable to a shock to one of their partners than countries that are more connected and can more easily source food from elsewhere. (Kummu et al., 2020).

At the global level, the sensitivity of countries to foreign trade shocks depends on many factors. An important factor is the structure of the trade network. If a few large players dominate the network and many other countries connect to these nodes but are not interconnected, shocks to these large players can easily spread throughout the network and possibly be amplified by global value chains. The system is distributed when all (or many) countries in the network are connected with many trading partners. (Acemoglu, Tahbaz-Salehi, 2015).

Food and agricultural trade networks can be highly concentrated for several reasons. Geographic proximity plays a core role. A traditional trade concern, with few comparative advantages, due to policies, trade costs, and natural resource endowments that combine to allow some countries to participate in trade more than others. (FAO, 2022)

Overall, for all food and agricultural products, the resilience of exports to major shocks is more offset by increased imports from other countries than at the individual product level. For a single product, such as wheat, only a few countries have a comparative advantage and only a few countries are major exporters, suggesting that the rest of the network is highly dependent on these key exporters. (Karakoc, Konar, 2021). As mentioned at the beginning of present chapter, Ukraine and Russia represent more than one third of the global trade in wheat. This is why the current situation leaves traces in the specific industry.

3. Finanacial analysis of Bunge Ltd

According to *globaldata.com* Bunge Ltd is one of the top 10 agricultural products companies in the world in 2021 by revenue (globaldata, 2021). Bunge Ltd is an agribusiness and food enterprise that purchases, stores, transports and sells food and ingredients, edible oils, milling products and fertilizers. The portfolio of its products includes oil seeds, vegetable oils, protein meals, packaged and bulk oils, shortenings, margarine and mayonnaise.

The company produces and sells wheat flour, dry milled corn products, bakery mixes, milled rice products, sugar, and ethanol. It also generates electricity from burning of sugarcane bagasse and resells it to third-party users and local grids. The company sells to livestock producers, animal feed manufacturers, snack food producers, wheat and corn millers, food service distributors, restaurant

chains, food processing, bakery confectioners and food service companies, corn and oilseed processors.

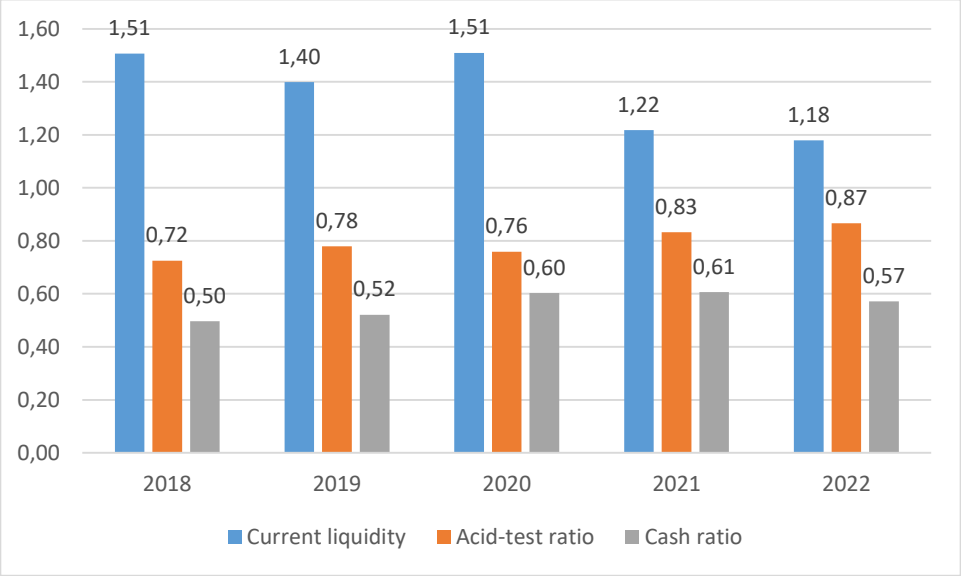
The firm is headquartered in the US but it has business operations spanning worldwide (Bunge, 2023). These are the main reasons why we decided to carry out the financial analysis of the Bunge Ltd. company as it is suitable to depict the situation of a market-leader company in the field of agriculture and food industry and through the results of it we can conclude useful informatoin regarding other enterprises from the industry and the industry itself.

3.1 Liquidity analysis

Liquidity ratios are those important group of financial metrics that determine the ability of a company to pay its' current obligations without any external source.

The current ratio measures a company's ability to pay current, or short-term, liabilities (debts and payables) with its current, or short-term, assets, such as cash, inventory, and receivables The quick ratio indicates the company's ability to instantly use its near-cash assets (assets that can be converted quickly to cash) to pay down its current liabilities, which is why it is also called acid-test ratio. (Investopedia, 2023). The cash ratio uses as base the cash of the company so it measures the proportion of actual cash the firm has to immediately pay off its' current liabilities.

Figure 2: Liquidity situation of Bunge Ltd.



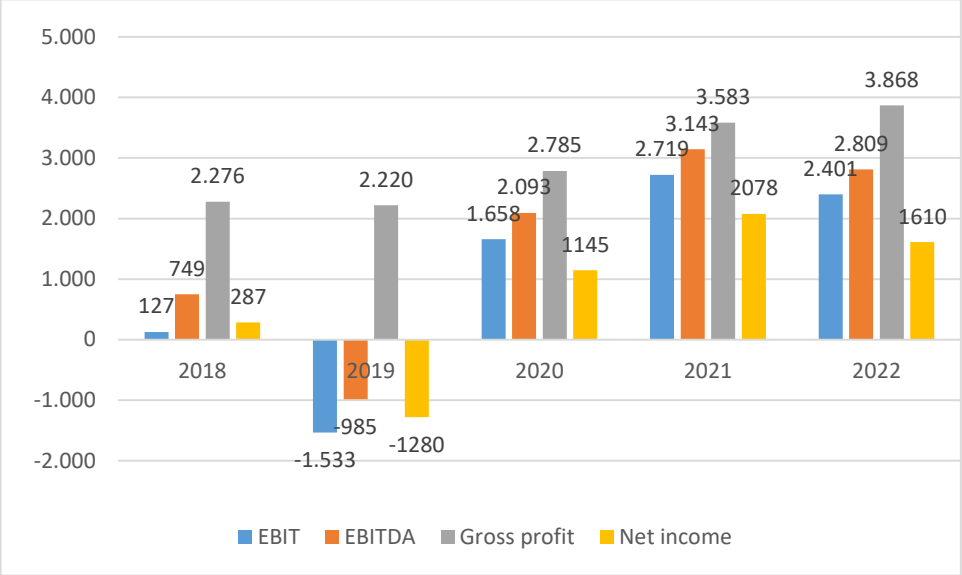
Source: own edition based on Bunge Ltd. data

The current ratios of Bunge Ltd. are in the [1; 1,5] interval which means that the company is technically liquid, but it could face financial challenges if the market conditions change in a negative way. The acid test ratio has its' values under the treshold of 1, which means that the firm is short on liquid assets to pay its' current debt obligations and should, therefore, be treated with caution. However, the fact that this globally known and working company has almost the same values during the analysed time period gives less of a concern because it seems to be sustainable this way.

3.2 Profitability analysis

The profitability analysis of Bunge Ltd. is carried out and presented via different types of profit metric, such as EBIT, EBITDA, gross profit and net income. Moreover, ratios such as ROE, ROA, ROIC and ROS are calculated based on EBIT and on net income as well.

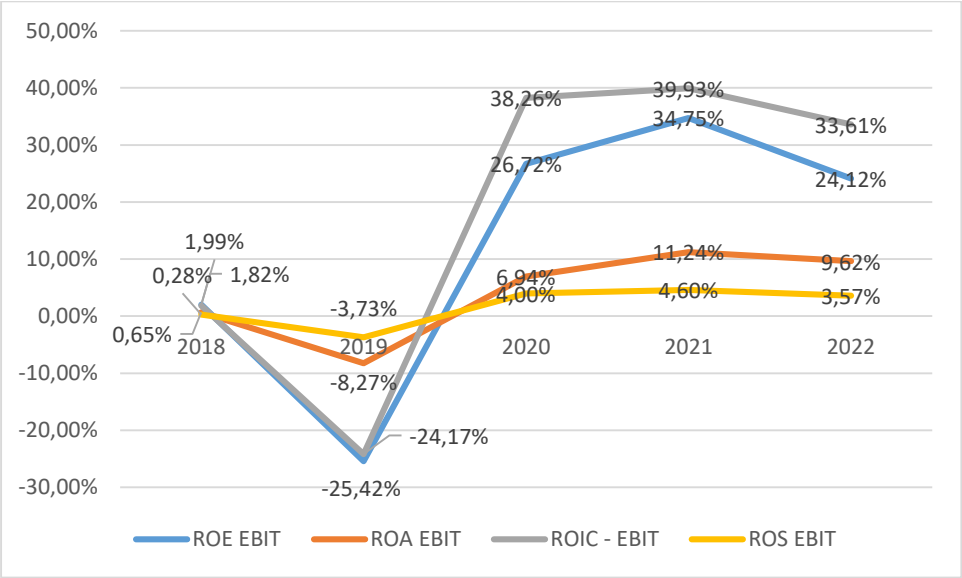
Figure 3 : EBIT, EBITDA, gross profit and net income of Bunge Ltd. (in millions of USD)



Source: own edition based on Bunge Ltd. data

As Figure 3 shows, the gross profit of the company shows a constant increase with a slight decrease in 2019. The other profit metrics are on a rising trajectory, except the 2019 year when they show negative values due to the highly increased operating expenses. Examined in more detail, we can conclude that the outstanding value of operating expenses in 2019 (3117 millions of USD) is mainly caused by the peak height of the impairment charges of 1825 millions dollar. The fact that the value of EBIT is lower than the net income in 2019 is caused by the negative interest expenses.

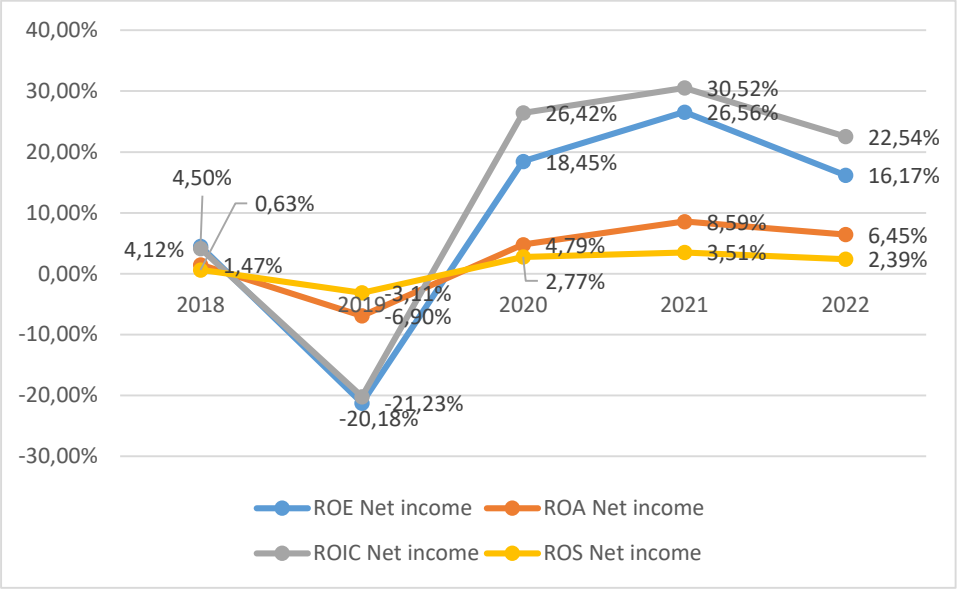
Figure 4: EBIT based ROE, ROA, ROIC and ROS indicators of Bunge Ltd.



Source: own edition based on Bunge Ltd. data

Figues 4 and 5 show the good profitability situation of the firm except the above already mentioned year (2019). As we can see, starting from 2019 there is an improvement in profitability, which the company can more or less maintain. Therefore we cannot identify any negative effect of the COVID-19 pandemic, ont he contrary, the indicators in 2020 and 2021 outperform that of 2019. This can be explained by the characteristic of the industry as food and agriculture is not the sector which was directly and immediately negatively affected by the pandemic like the sector of tourism for instance.

Figure 5: Net income based ROE, ROA, ROIC and ROS indicators of Bunge Ltd



Source: own edition based on Bunge Ltd. data

If we take into account the average ROE value of the agriculture sector published by Damodaran, the value of which is 23,65%[6] (based on net income), we can see that Bunge Ltd. exceeded the industry average in 2021, remaining below this value for the rest of the examined years of the period.

3.3 Efficiency analysis

Regarding the efficiency analysis of the chosen company rotation time indicators, ATO, CCC, the per employee revenue and EBIT were calculated.

Table 1. Rotation time indicators (expressed in days)

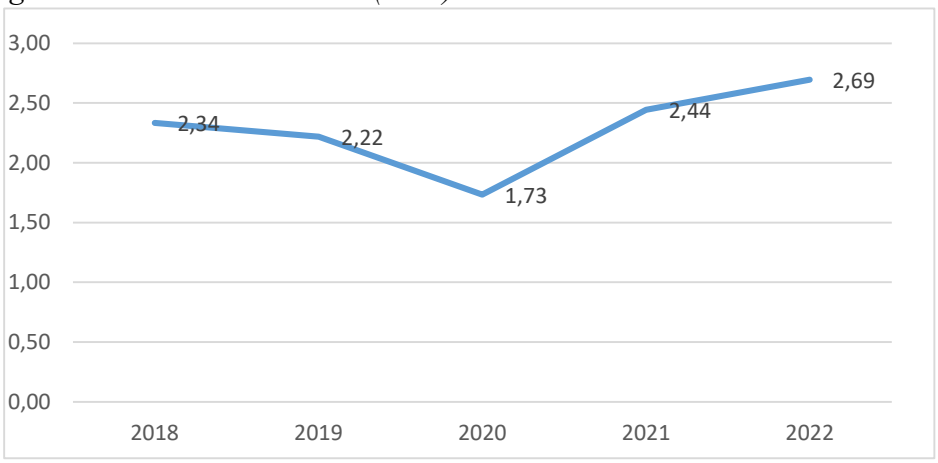
	2018	**2019**	**2020**	**2021**	**2022**
Inventories rotation time	46,85	45,34	69,15	53,65	45,84
Accounts receivable rotation time	13,06	15,13	15,14	13,03	15,36
Accounts payable rotation time	27,94	25,21	23,24	26,22	23,81

Source: own edition based on Bunge Ltd. data

Taking into account the rotation time indicators we can see that in 2020 there was a really sharp increase in the rotation time of the inventories compared to previous years. This could be as the result of the COVID pandemic, yet the correction was made already next year, by 2022 reaching the same value as in 2019. It is important to mention that the rotation time of the accounts receivable is much shorter during the whole time period than the rotation time of accounts payable which is beneficial for the company.

[6] https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/fundgr.html

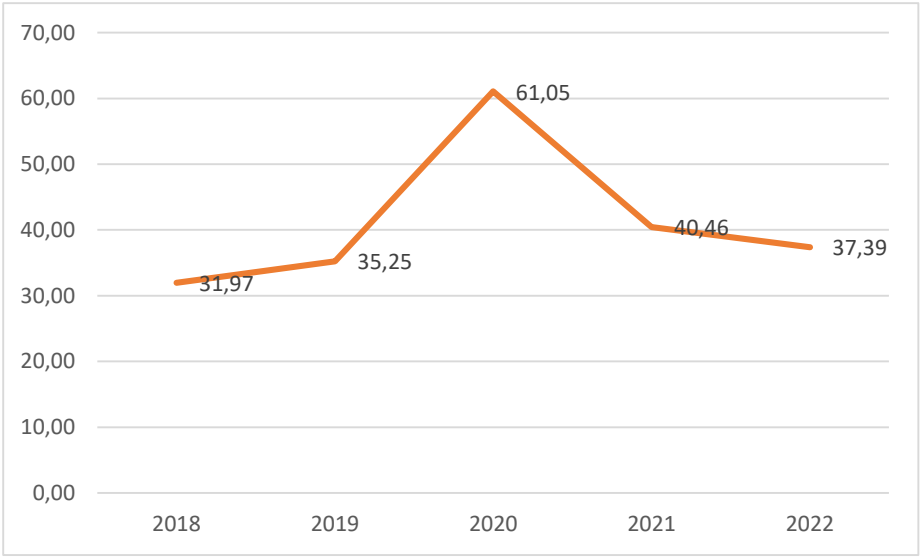
Figure 6. Asset turnover ratio (ATO)



Source: own edition based on Bunge Ltd. data

The ATO indicator is way higher than 1, exceeding even 2 except for the year 2019 which means that the firm is generating sufficient revenue to justify the existance of its' assets in the balance sheet. What is more, with these values even more assets should be procured.

Figure 7: Cash conversion Cycle (days)

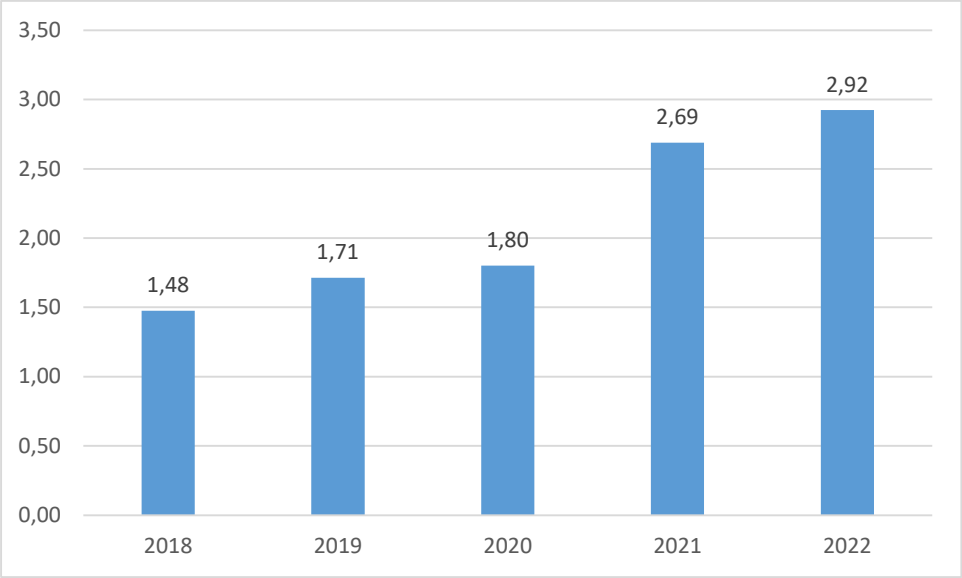


Source: own edition based on Bunge Ltd. data

The cash conversion cycle measures the time expressed in days that it takes for the company to convert its' money tied up in inventories and other resources into cash flow via sales. The CCC is measured by deducting the payment deferral period made to suppliers from the total of inventory conversion period and receivables collection period (Yucel, Kurt, 2002).

The CCC values of the company are acceptable as the majority of them is included in the [31,40] interval. An outstandingly high value is detected in 2020, when CCC almost doubled its' previous values. This can also be the effect of the pandemic.
The last set of indicators within the efficiency metrics is the per employee measurments. More precisely the yearly revenues and yearly EBIT are calculated per employee.

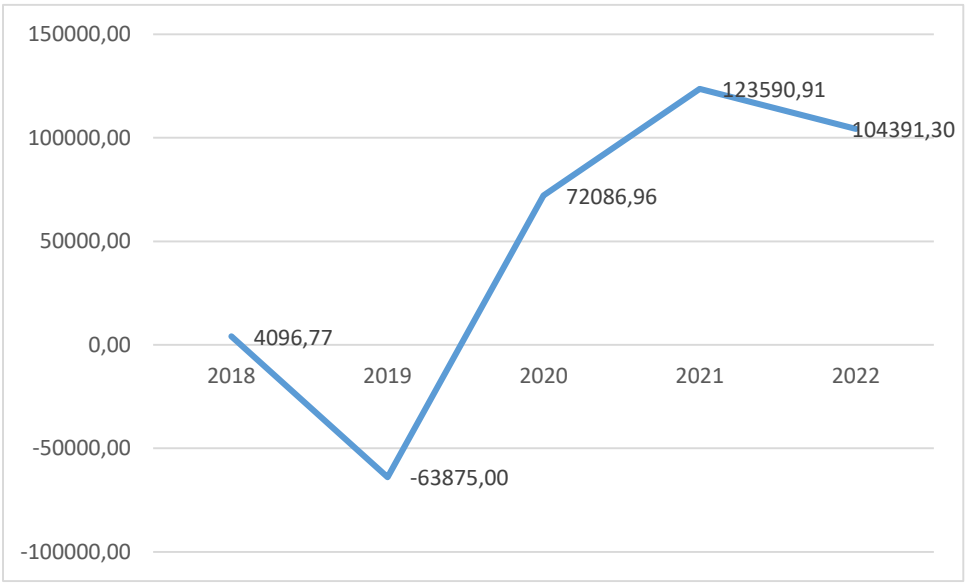
Figure 8: Revenue per employee (in millions of USD)



Source: own edition based on Bunge Ltd. data

As Figure 8 shows, the per employee revenue values are on a constant grow path, which is the result of two factors: ont he one hand, the revenue increased from 45743 millions of USD in 2018 to 67232 millions of USD in 2022, while the number of employees decreased from 31000 in 2018 to 23000 in 2022.

Figure 9: EBIT per employee (in USD)



Source: own edition based on Bunge Ltd. data

The per employee EBIT follows the tendency of the EBIT indicator in terms of the direction of the changes, but its extent is less pronounced due to the decrease in the number of employees, which serves as a projection basis for the indicator

3.4 Solvency indicators

In terms of solvency indicators the equity to asset ratios and in connection with it, the debt to equity ratios are calculated for the five years of the analysed period.

Table 2: Equity to Asset ratio

	2018	2019	2020	2021	2022
Equity to Asset	**32,56%**	**32,53%**	**25,98%**	**32,34%**	**39,89%**
Equity (millions USD)	6.378	6.030	6.205	7.825	9.956
Total Assets (millions USD)	19.590	18.538	23.886	24.199	24.956

Source: own edition based on Bunge Ltd. data

The equity to asset ratios as shown in Table 2 have fairly low values, meaning that one third, and in 2020 even one quarter of the total assets is financed by foreign capital. The lowest value of 2020 should be again a pandemic effect, as it is caused by the sharp increase with 66,6% of the current liabilities from 6595 millions of USD in 2019 to 10985 millions of USD in 2020.

Generally speaking, these equity of asset ratios should be a matter of concern, yet taking into account the past, the size, the position in the industry of the analysed company we can consider them acceptable all the more that the value increased starting from 2020, reaching almost 40% in 2022.

Table 3: Debt to equity ratio

	2018	2019	2020	2021	2022
Debt to equity ratio	**2,07**	**2,06**	**2,84**	**2,08**	**1,50**
Debt (millions of USD)	13.212	12.424	17.594	16.281	14.898
Equity (millions of USD)	6.378	6.030	6.205	7.825	9.956

Source: own edition based on Bunge Ltd. data

The global D/E ratio according to Damodaran in the agriculture sector is 46,44%[7], which is significantly exceeded by the values of the firm in review.

The debt to equity ratio confirms the information content carried by the previous indicator as it shows in Table 3 that the volume of current and non-current liabilities represented double of the equity in most of the years under review. The positive tendency can be seen in the fact that the dept to equity ratio decreased to 1,5 in 2022.

3.5 Market indicators

Among the market indicators the most important are calculated and presented: EPS, P/E, DIVY, stock price and capitalization.

Table 4: Earnings pet share

	2018	2019	2020	2021	2022
EPS (USD)	**2,05**	**-9,14**	**8,81**	**14,84**	**11,50**
Net income (millions of USD)	287	-1.280	1.145	2.078	1.610
Number of shares (million)	140	140	130	140	140

Source: own edition based on Bunge Ltd. data

[7] https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datacurrent.html#capstru

The price earnings ratio indicates the money amount an investor can expect to invest in a company in order to receive 1 monetary unit of that company's earnings. In the 2018-1021 period the EPS indicator increased with the exception of year 2019 when according to the above mentioned (at the profitability subcshapter) the net income of the company was negative due to the highly increased operating expenses. A decrease is observable in 2022 which is in accordance with those presented at Figures 3 and 5 as the net income decreased from 2021 to 2022, while the number of shares remaind unchanged.

Table 5: Price earnings ratio

	2018	**2019**	**2020**	**2021**	**2022**
P/E	**26,19**	**-6,23**	**7,42**	**6,33**	**8,67**
Price(USD)	53,68	57	65,34	94	99,66
EPS	2,050	-9,143	8,808	14,843	11,500

Source: own edition based on Bunge Ltd. data

According to investing.com the industry average P/E is 17,64[8] and as we can see, the Bunge Ltd. shares in 2022 showed a value of less than half of the average. This could mean that the stock is underpriced, therefore suitable for investment. However it is highly recommended not to make an investing decision based only to the P/E ratio.

Table 6: Dividend yield

	2018	**2019**	**2020**	**2021**	**2022**
DIVY	**0,93%**	**0,88%**	**0,77%**	**0,56%**	**0,63%**
DPS (USD)	0,5	0,5	0,5	0,525	0,625
Price (USD)	53,68	57	65,34	94	99,66

Source: own edition based on Bunge Ltd. data

The dividend yield of the firm gradually fell as the dividend per share value did not change significantly while the prices rose. The only exeption is characteristic for 2022 when the per share dividend increased with 19% from 0,525$/share to 0,625$/share, while the stock price increased with 5,95% from 94$ to 99,66$.

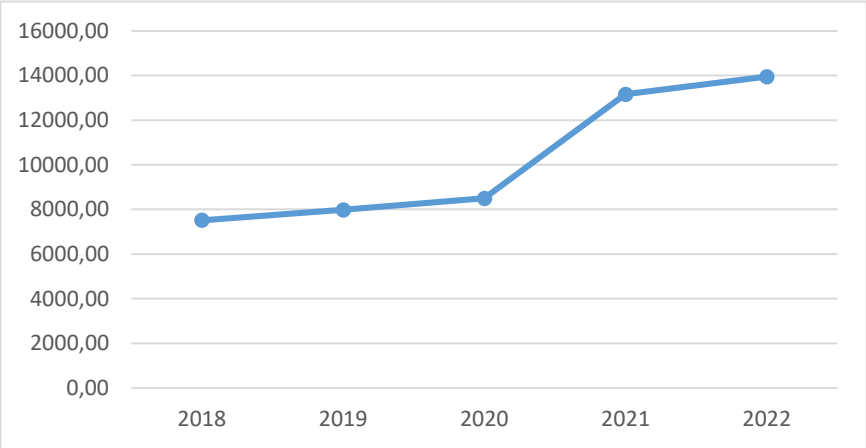
Figure 10: The price of Bunge Ltd. stocks

[8] https://www.investing.com/equities/bunge-ratios

Source: Google finance

The yearly average stock prices (visible at tables 5 and 6) show a clear year-on-year growth, while the truth is that within the year the stock price volatility was high. A significant downfall is related to the oubreak of the COVID-19 pandemic due to which the stock price was 31,78$ in 20.03.2020, while the average stock price in 2020 was 65,34$ as the market quickly corrected and stock prices began to rise.

Figure 11: Capitalization of the Bunge Ltd. (in millions of USD)



Source: own edition based on Bunge Ltd. data

Figuer 11 shows the evolution of capitalization of the company. According to Damodaran, the change in aggregate market capitalization at global level from 2019 to 2022 was 48,33%[9] in the agriculture sector. In the case of Bunge Ltd. this value is over exceeded as the change in capitalization from 2019 to 2022 was 74,84% (the value of 7980 millions of USD in 2019 increased to 13952,4 millions of USD in 2022).

4. Conclusions

In summary we can identify two kinds of effects that the different crisis situations have as a consequence: on the one hand, the outbreak of the COVID-19 pandemic in early 2020 showed how a robust and well-integrated global agri-food system is testing countries to meet unprecedented challenges; on the other hand the restrictive measures of COVID-19 such as the lockdown have highlighted that domestic trade and short supply chains play a very important role in the sector.

For all food and agricultural products, the resilience of exports to major shocks is more offset by increased imports from other countries than at the individual product level. For a single product, such as wheat, only a few countries have a comparative advantage and only a few countries are major exporters, suggesting that the rest of the network is highly dependent on these key exporters. (Karakoc, Konar, 2021). Ukraine and Russia represent more than one third of the global trade in wheat, this is why the current situation leaves traces in the specific industry.

Regarding the case study part, some important observations can be made:

The liquidity ratios of the reviewed enterprise are in the [1; 1,5] interval which means that the company is technically liquid, but it could face financial challenges if the market conditions change in a negative way. However, the fact that this globally known and working company has almost the same values during the analysed time period gives less of a concern because it seems to be sustainable this way.

[9] https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datacurrent.html#capstru

Regarding the profitability it can be observed that the gross profit of the company shows a constant increase with a slight decrease in 2019. The other profit metrics are on a rising trajectory, except the 2019 year when they show negative values due to the highly increased operating expenses. If we take into account the average ROE value of the agriculture sector published by Damodaran, the value of which is 23,65% (based on net income), we can see that Bunge Ltd. exceeded the industry average in 2021, remaining below this value for the rest of the examined years of the period.

The efficiency analysis shows that in 2020 there was a really sharp increase in the rotation time of the inventories compared to previous years. This could be as the result of the COVID pandemic, yet the correction was made already next year, by 2022 reaching the same value as in 2019. What is more, the ATO indicator is way higher than 1, exceeding even 2 except for the year 2019 which means that the firm is generating sufficient revenue to justify the existance of its' assets in the balance sheet.

Among the solvency indicators, the equity to asset ratios have fairly low values, meaning that one third, and in 2020 even one quarter of the total assets is financed by foreign capital, yet the value increased starting from 2020, reaching almost 40% in 2022.

One of the most common used market indicators is the P/E ratio. The industry average P/E in agriculture is 17,64 and, the Bunge Ltd. shares in 2022 showed a value of less than half of the average. This could mean that the stock is underpriced, therefore suitable for investment.

In order to be able to see the impact of the war even more, it is necessary to examine further years, although a slight decline is already visible in most indicator groups in the year 2022 compared to 2021.

References

Acemoglu, D., Ozdaglar, A. & Tahbaz-Salehi, A. (2015). Networks, shocks, and systemic risk. Working Paper 20931. *National Bureau of Economic Research*

Arita, S., Grant, J., Sydow, S. & Beckman, J. (2022), Has global agricultural trade been resilient under coronavirus (COVID-19)? Findings from an econometric assessment of 2020. *Food Policy*

https://bunge.com/ (accessed at 20.03.2023)

https://companiesmarketcap.com/bunge/shares-outstanding/

Cottrell, R.S., Nash, K.L., Halpern, B.S., Remenyi, T.A., Corney, S.P., Fleming, A., Fulton, E.A. et al (2019), *Food production shocks across land and sea. Nature Sustainability*

Damodaran Online, https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/fundgr.html (accessed at 30.04.2023)

https://www.investing.com/equities/bunge-historical-data

FAO (2022), The state of agricultural commodity markets, https://www.fao.org/3/cc0471en/cc0471en.pdf (accessed at 27.04.2023)

https://finance.yahoo.com/quote/BG/history?period1=1546214400&period2=1672444800&interval=1d&filter=history&frequency=1d&includeAdjustedClose=true

https://www.globaldata.com/companies/top-companies-by-sector/agriculture-forestry/global-agricultural-products-companies-by-revenue/ (accessed at 27.03.2023)

Karakoc, D.B. & Konar, M. (2021), A complex network framework for the efficiency and resilience trade-off in global food trade. *Environmental Research Letters*

Kummu, M., Kinnunen, P., Lehikoinen, E., Porkka, M., Queiroz, C., Röös, E., Troell, M. et al. (2020), Interplay of trade and food system resilience: Gains on supply diversity over time at the cost of trade independency. *Global Food Security*

Remans, R., Wood, S.A., Saha, N., Anderman, T.L. & DeFries, R.S. (2014), Measuring nutritional diversity of national food supplies. *Global Food Security*

Sartori, M. & Schiavo, S. (2015), Connected we stand: A network perspective on trade and global food security. *Food policy*

Torreggiani, S., Mangioni, G., Puma, M.J. & Fagiolo, G. (2018), Identifying the community structure of the food-trade international multi-network. *Environmental Research Letters*

UNCTAD, The Impact on Trade and Development of the War in Ukraine. https://unctad.org/system/files/official-document/osginf2022d1_en.pdf (accessed at 20.04.2023)

WTO, World Trade Statistical Review (2022), https://www.wto.org/english/res_e/booksp_e/wtsr_2022_e.pdf (accessed at 29.04.2023)

Yucel, T., & Kurt, G. (2002). Cash conversion cycle, cash management and profitability: An empirical study on the ISE traded companies. *The ISE Review*

ANITA TANGL, BERNADETT BRINGYE, ISTVAN VAJNA: LEAN TOOLS IN CORPORATE INVESTMENT DECISIONS

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Abstract
Investment decisions are created by various economic situations, which can be the sale of a company or corporate acquisition, the acquisition of company's' securities or shares. The basic tool of investment decisions is the company assessment, what focuses on the financial. In the practice there are some other factors what can influence the company's value. Our research uses new tools to support investment decisions, these are the lean tools. Knowing the hidden company performance of the highest possible production or service capacity identified by lean management can make investment decisions more certain. The study proved that using the lean tools can radically change the final decision. The research basis is a corporate acquisition.

Key words: investment decisions, lean tools, VSM, financial performance

1. INTRODUCTION

The increase the number of business organizations, the money available on the financial markets can facilitate or inhibit the corporate investments. The need for investment decisions is created by various economic situations.
The basic and classic tool for investment decision-making is company assessment, or enterprise valuation. The company valuation methodology for investment decisions is generally based on accounting and financial data, which includes ratio calculations from the financial reports and the cash-flow. Risks are usually explored in the evaluation of the investment, so in most cases it focuses on tax, financial and legal risks.
The investment is an activity when the investor spends money and capital into an asset or a company with the expectation of generating revenue or profit in the future. An investment should be as purchasing stocks, bonds, real estate, other assets or it can be a corporate acquisition as well.
All investment has risks because the returns on an investment are uncertain, and it can be affected by various economic, political, human and other factors. The investor must consider its objectives, risk tolerance and other factors what influence the investment decision.
In the practice there are different types of investments e.g.:

- Ownership investments – stocks, buildings, business capital
- Lending investments – bonds, deposits
- Cash equivalents investment – saving accounts
- Funds
- Other investments – commodities (Bernstein 2012)

Our research focus is the ownership investment. The sample what we use it is a kind of capital investment: acquisition of a company. The acquisitions can focus on stock purchase or merge the companies.
The acquisition of a company has many risks and advantages as well. Before the final decision it is necessary to do some investigation to assess its financial, legal and operational status. This investigation should include the review of financial statements (financial risks, balance sheet, income statement, cash-flow statement, liquidity) contracts and the other relevant information (Tanner 2014).
In many literatures on company acquisition focuses on the financial and legal aspects only (Chandrashekar – Vishwanath 2008), (Ghauri – Hassan 2014), (Miller – Segall 2017), (Lessambo

2021). Acquisition of a company sometimes cerates joint venture or a new company. In the European Union there is a regulation for mergers in the European Union (Celli, et al. 2021).
In a broader sense, evaluation aspects originating from non-financial processes can play a big role in investment decisions. Taking these aspects into account is particularly important when the investment transaction is the sale or acquiring of companies. Factors that consider not only accounting and financial point of view can be the business environment, the industry analysis and the investigation of competitiveness and opportunities.
Our research uses a new tool to support investment decisions, it is the lean management. Lean tools and methods are suitable for reducing or eliminating wastes in production and service processes. Eliminating wastes provides an opportunity for faster processes, reduction of used resources and higher output (yield and sales revenue). We present the lean tools and methods that can support the bargaining position of sellers or investors as well. Such is the Value Stream Mapping (VSM), as a quantitative methodology that shows the bottlenecks in the material and information flow during the total lead time. Knowing the characteristics of each product family, production/activity planning and economy can be rationalized with Pareto analysis. A tool for increasing performance and the stability is the professional application of 5S. The tools of preserving and developing knowledge are the standardization of work and the standard creation.
When acquiring and selling businesses, both the buyer and the seller can have benefit from the hidden corporate performance identified by lean management. The hidden corporate performance from the seller point of view can increase the selling price and for the buyer, it may carry a hidden reserve for the future.
Research questions:
1. Are lean tools suitable for supporting investment decisions?
2. Which lean tools are suitable to support investment decisions?

2. MATERIAL AND METHODS

2.1. Material

The company evaluation is based on lean principles. In our case study is a food factory. The inputs are animal frozen meat, fat, spices, liquids, smoke, etc., that are processed by machines and human resources. The finish product is transported to marketplaces contracted. In this article the objective evaluation of the company is to measure the ability, the speed and quality to produce the variations of meat products. To measure the potential productivity was used lean approach.
Data collection sources:

1. on site direct data and information collection from the production (gemba) including interview with workers,
2. production documentations,
3. historical data collection and analysis from the company files, books, accounting system and reports.

The onsite data collection includes the data from VSM data collection sheets, 5S audit, TPM checklist, interview with workers and CEOs, shift leader, maintenance leader.

2.2. Methods

The research uses the lean management and its tools for completing the case study, as used methods. The lean tools and quality improvement methods eliminate the wastes form the processes, and they have financial effect as well.
The origin of Process- and quality development is the Toyota Production System (TPS). Many believe that the key to Toyota's success is the efficiency of the TPS system, but TPS is "only" a part of the whole process in the customer-to-customer life cycle (Liker 2021). Based on the TPS, a complete management system was developed what is called: Total Management System (TMS). The elements

of Toyota's Total Management System are the next: Toyota Management System (enterprise management, financial accounting, management accounting, analysis) Toyota Development System (pull system, cost analysis, plan revision), Toyota Total Production System (production plan, quality management, production and process planning), Toyota Marketing and Sales System (product and brand, product plan, sales plan, internal organization, external organization).

2.2.1. Lean

The lean philosophy based on the elements and methodology of the Toyota Production System and it has a great importance nowadays. Lean is a philosophy that reduces the lead time between a customer's order and the fulfilment of products or services by eliminating all forms of waste (Bell 2006). Through lean manufacturing, companies can reduce costs, cycle times, and unnecessary non-value-added activities, resulting in a more competitive, flexible, and market-oriented company. The lean methodology and management can be used for a wide variety of activities: food industry, agriculture, services, IT, administrative processes, financial sector etc.
The basic goal of the lean is: eliminate the wastes from processes. To achieve the basic goal there are five basic principles (their order is fixed): 1. identify the value, 2. map the processes, 3. create the flow, 4. introduce the pull system, 5. continuous perfection (Kovács 2017). By the lean we can eliminate the wastes and create a transparent system. As the result of lean tools the company can carry out its activities efficiently at the place of value creation (Figure 1).

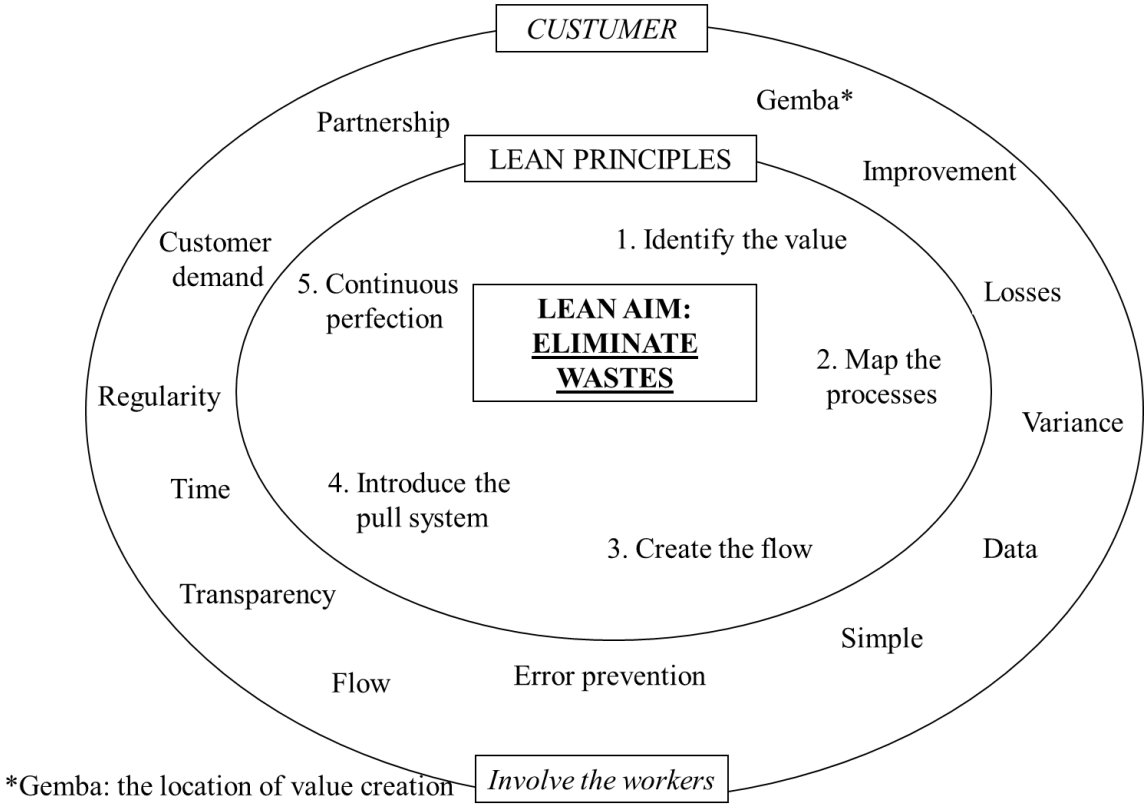

Figure 1. Lean system
Source: (Tangl, et al. 2022, p.31.)

If we follow the lean principles we have the information about the value, where and when is it created, and we can find the production or service bottlenecks. Finally, we can create an efficient production and service flow what is directed by the customer demand.

2.2.2. The 5S

The 5S method was developed in Japan and it is spread throughout the world due to its effectiveness. It began to be used in the Japanese automobile industry, and not only productivity, but also the cohesive force and employee morale increased. 5S is the international language of productivity; its global spread is mainly due to multinational companies.
In a work environment comprehensively organized by 5S, there are no unnecessary items; everything is where it is used, i.e. in the most appropriate place.
5S is made from the first letters of five Japanese words in their correct Japanese order.
1S: Seiri - Removing unnecessary things from the workplace and process. The workplace will be transparent.
2S: Seiton - Arranging the things as they needed, according to the most efficient use. The items (e.g. materials) are easily accessible and usable.
3S: Seiso - Cleaning the workplace and objects, control all information.
4S: Seiketsu - Workplace organization and maintaining at a high level. Standardization.
5S: Shitsuke - Training employees to follow the basic principles of the system on their own (Osada 1991).
5S is strongly related with the visual management and controlling the basic productivity processes on the shopfloor. Without 5S it is difficult to see the abnormalities and make in-time the required actions. Enhance common decision taking and teamwork, too.

2.2.3. Value Stream Mapping

The process includes of successive and clearly separable steps, and in case of complex processes, they are mostly built on each other, and they can be parallel and branched. Every process has a start and ends, has input and output, even the simplest action. The elements of all production and service processes are the man, material, machine, method (4M), and they used in the given space and time. The way of used resources (4M) is perhaps one of the most significant differences in companies.
The aim of the lean is eliminating the wastes from the processes. The basic tool of the wastes analysis and elimination is the Value Stream Mapping (VSM) (Rother – Shook 2012). The wastes do not generate value-added, they increase the losses and expenses.
The tool for exploring the non-value-added processes is the identification of value streams. Due to the value stream mapping activity we can prepare the Current State Map.
The purpose of VSM is to map bottlenecks in production and service. The VSM groups and quantifies value-added and non-value-added processes, and their ratio. VSM provides numerical data for taking quality improvement steps what can influence the financial performance of the entity.
The Current State Map shows the current processes. After determining the development opportunities, the Future State Map is prepared. The Future State Map includes the developed process and the optimal state considering the given circumstances (Ovidu 2022).
In practice there are typically three levels of value stream in an organization (Tapping, et al. 2002):

1. Level 1: The product or service value stream at “macro”. This level is concerned with the overall process of creating and delivering a product or service to customers. It includes all the activities required to design, production, and deliver the product or service.
2. Level 2: The process value stream “micro”. This level is concerned with the specific processes that make up the product or service value stream. It includes all the individual steps required to complete each process, from raw material procurement to final delivery.
3. Level 3: The operational value stream. The “kaizen” level**.** This level is concerned with the daily operations of the organization. It includes all the activities required to manage the production processes, such as scheduling, quality control, and maintenance (Figure 2).

The number and definition of value stream levels can vary, depending on the context and industry. However, the three-level framework described above is a common and useful way to think about

value streams in an organization in practice. The lead time and the final result of the company is defined by the slowest process in the value stream.

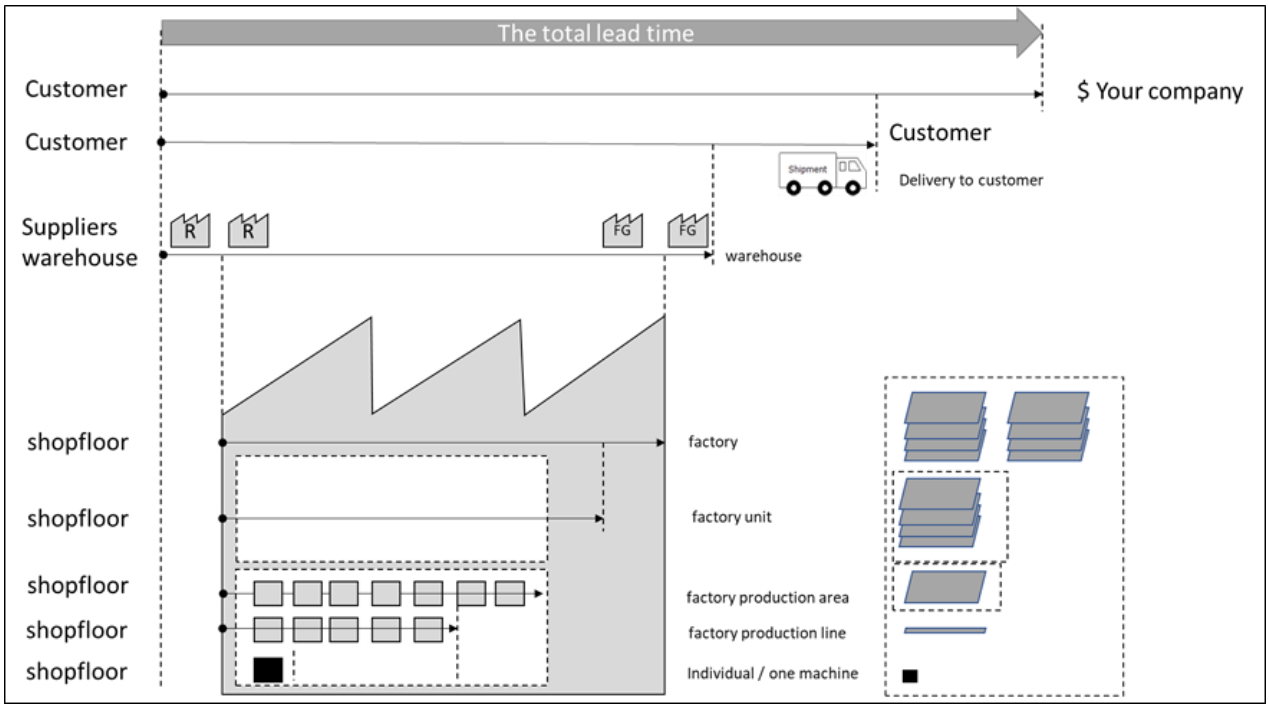

Figure 2. Three levels of value stream in an organization
Source: own research

The natural output of a product and financial results of a company depends on several components relationship in the value stream. From lean manufacturing aspect – there are three kinds of flow's:

- the flow of material,
- flow of information and
- flow of money.

The effectiveness of the company lays on the speed, quality of the flow during the whole process. Measuring the productivity on different levels will give different results (Figure 2).
There are other process mapping tools and techniques: flowchart, tree diagram, Kawakit Jiro diagram, Design Structure Matrix (DSM), Multi Domain Matrix (MDM), Mindmap, Matrix Diagram, PERT (Program Evaluation and Review Technique). Each process mapping tool has its place and role in company processes. The advantage of VSM, compared to the other tools and methods is that it contains the information with measured actual data.

3. RESULTS AND DISCUSSION

The aim of this research to prove that the lean tools are suitable and can give relevant information for decision making, including the acquisition of a company.
We use lean manufacturing approach and standards for audit and data collection on the gemba. Gemba is the Japanese word for the real place where value creation is performed and the place where also non-value-added activities are done. The on-site action took three days, and it was based on TPS methods like VSM (Value Stream Mapping), 5S, Visual management.

3.1. The roadmap of lean evaluation

The evaluation process is shown in the Figure 3, what was 6 days long + "Day0".

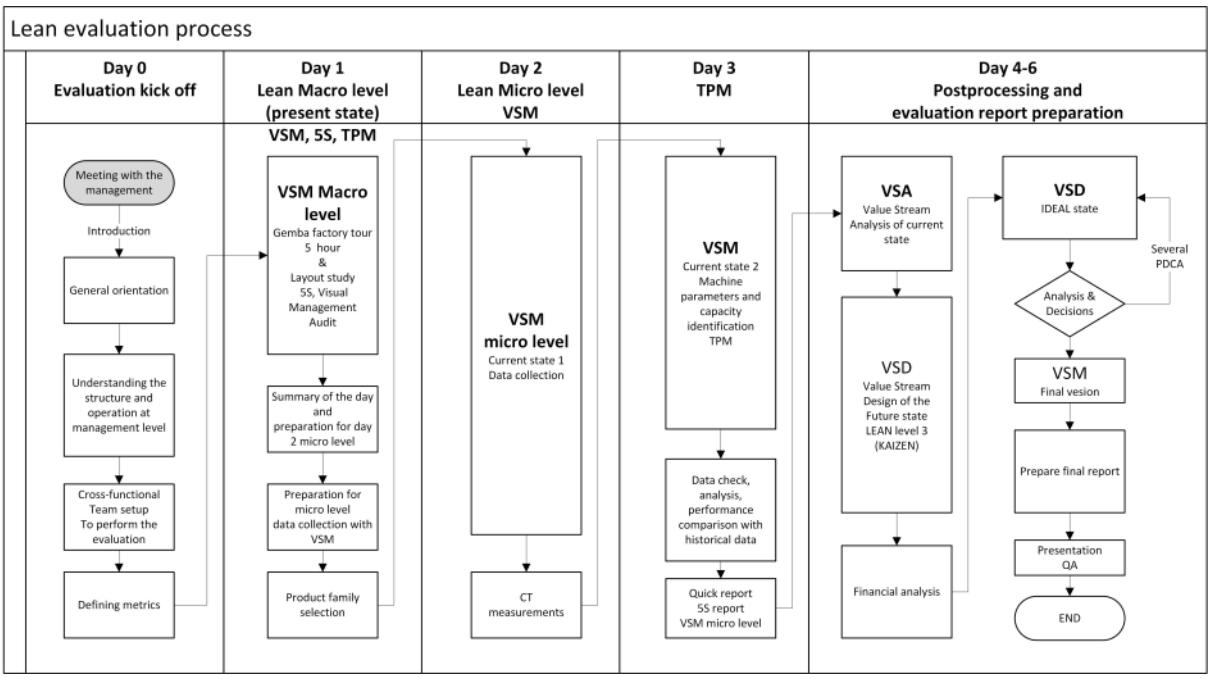

Figure 3. The lean evaluation processes roadmap
Source: own research

The "Day0" was considered kick-off and preparation phase in the evaluation.
On the "Day1" there was a detailed group plant tour on lean macro level following the material flow, entering all every facility, buildings and rooms including auxiliary buildings for auxiliary processes like cold storage rooms, heat center, powerhouse, maintenance hall and canteen as well. The goal was to understand the whole process and environment of production. The VSM was focusing on the transformation phases, where the operation times can be measured and reduced. The long technological processes as fermentation or maturation process were taken as "fix" time.
It was used rapid assessment lean standards to get the big picture including 5S Audit with 100 point evaluation. Radar chart was prepared, too. The team members were the managing director, production manager, maintenance manager, quality manager, production assistant, and logistic planning representative.
"Day2" was performed the detailed observations and measurements, as direct observation of processes collecting data with lean standards. The gemba walk was executed conform the material flow, from raw material direction to final packaging of finished goods (FG). The data collection included also taking pictures and video recording.
"Day3" continued the "Day2" data collection extended by total productive maintenance point of view to identify the machine performance in tons/hour.
"Day 4-6" was used for evaluation of collected data. The aim of Value Stream Analysis (VSA) is to find the bottlenecks and wastes in processes and designing the potential future state with the existing resources. The Value Stream Design (VSD) was used for making proposal for process improvement. The evaluation method continued with detailed data analysis as Pareto for product quantity of the product families. VSA of current data is useful for and finding bottlenecks in the process.

3.2. Macro level VSM

At macro level was identified 14 main steps in production of the selected product family. This generates the 71% of the annual yield. The other two product families differ at the micro level technology and are low runners. The micro level chart VSM visualization and discussion is not the subject of this article. The effect on final evaluation is discussed. The macro level chart starts from the first physical operation when raw material enters in the 1st process the shredders (M10). The waiting time of materials in refrigerators were identified in the material handling documentations.

The administrative processes are directly related to the production processes such as the documentation and labeling are part of the macro processes (Table 1). The key performance indicator (KPI) for production and VSM measurements was the weight measurement. The capacities were measured in kg/hours. Based on these data it was possible to determine the bottleneck in all value stream.

Table 1. Productivity of macro processes

No	MACRO PROCESS	kg/hour
1	M10 Shredding raw materials 1	720
2	M20 Shredding raw materials 2	600
3	M30 Kuttering	1080
4	M40 Filling dry goods filling machine 1	300
5	M50 Pork intestine product	600
6	M60 Artificial gut product over ¤40 caliber	600
7	M70 Artificial gut product over ¤90 caliber	960
8	M80 Smoking process	1320
9	M90 Heat treatment	360
10	M100 Pork intestine product	480
11	M110 Artificial intestines over 50D	480
12	M 120 Artificial intestine above 90D caliber	480
13	M130 packaging 1, packaging 2	720
14	M140 Foil welding packer	1800

Source: own research

Measuring the capacity can be seen that is highly unbalanced of the production flow on macro level during 450 min production on the main product family. Only one product family can be produced at a time or in a shift. There is no line or process balancing activities.

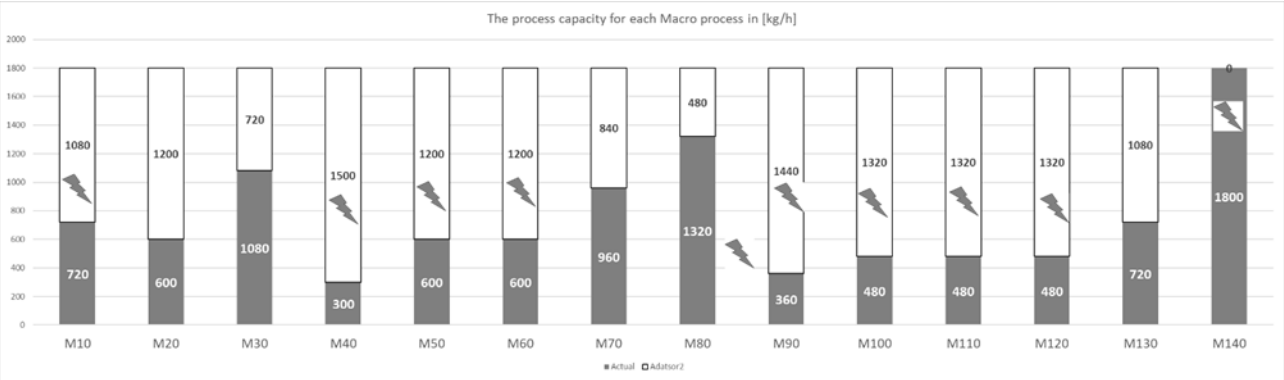

Figure 4. Productivity of macro processes
Source: own research

The Figure 4. shows the difference between potential capacities in kg/hour. The “lightning” arrows show major bottlenecks in/between processes. M40-M70 are the two filling machines; they are used for different products and the processes do not follow each other (but they are the part of the macro VSM).

The collecting data is visualized in Current Value Steam Map (Figure 5).

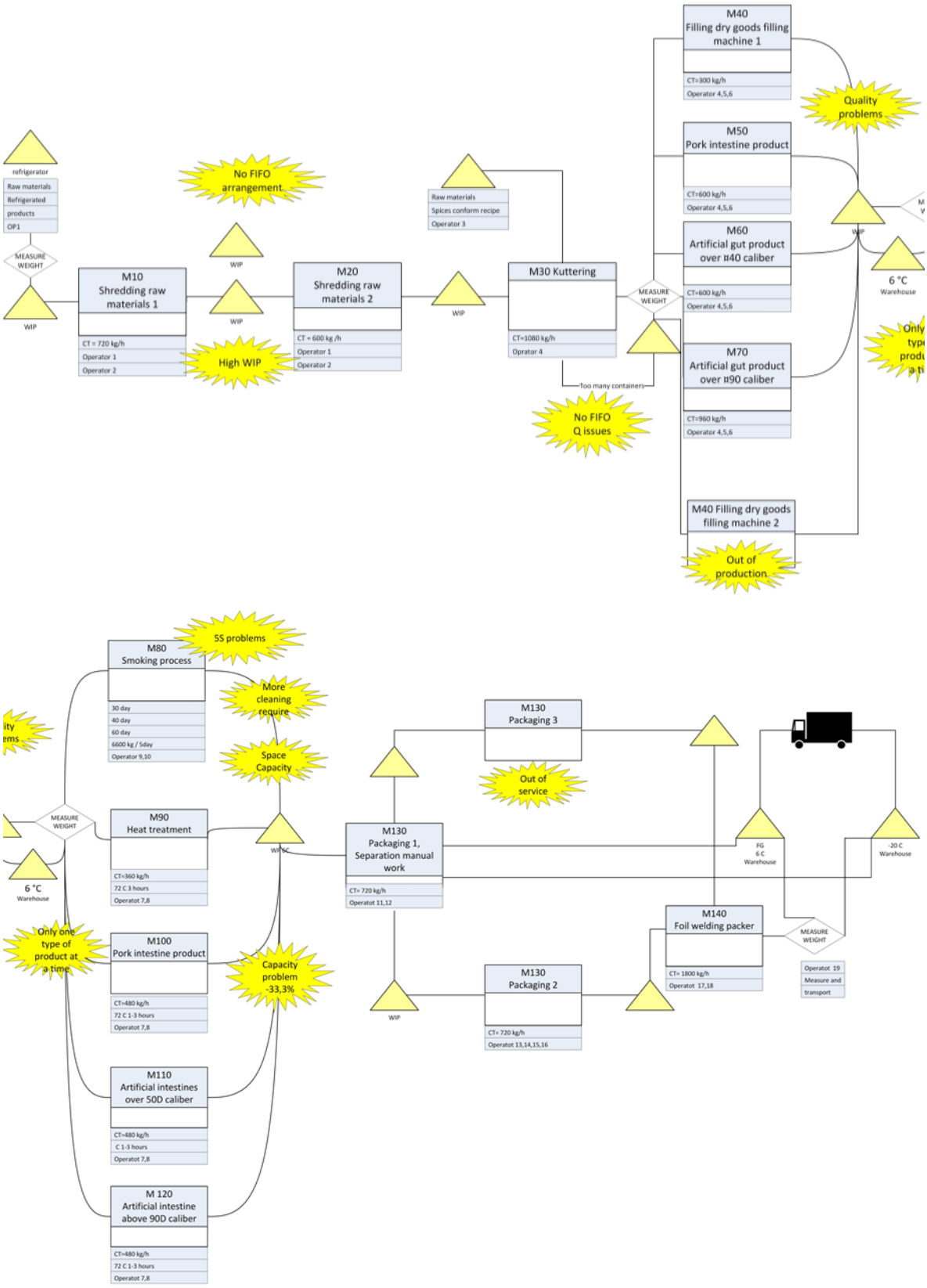

Figure 5. Current Value Stream Map
Source: own research

The biggest bottleneck is the capacity because of rework at M40, and there is no structured just reactive maintenance.

Identified problems by macro VSM survey are the next:

M10	The shredder machine1 broke down after 2 hours.
M20	The shredder 2(S2) machine took the shredder machine 1 (S1) operation when breakdown is, but the processing time was doubled.
M10, M19	S2 machine has lower CT and also C/O must be done when S1 breakdown.
M10, M20	The S1 and S2 machines are not arranged in flow the material transportation take the longest way. There is no coupled manufacturing in the company.
M30	The second Kutter machine2 was out of order
M40	2nd filling line was not operating. The 50% of potential capacity of filling process is lost
M40	(even if there was no customer order). Is required personnel development and changing the layout and introducing the structured problem solving.
M40	During the survey after every 120 cycle 60-100 seconds fail out.
M40	The weight measure document is not filled out with data. TQC and SPC should help the production quality control.
M40	The date is not correctly set on machine.
M40	Pressurized air was leaking in the filling station and generates quality problem and cost
M40	Compared to the 11250 kg / day "ideal" potential capacity only 38% was reached on the end of the day
M70	This means that the rework ratio is high around (20-25%) and the availability of personnel is lower than 90% and the machine performance below 90%.
M80	Smoking chambers space is bottleneck too because the following processes are much slower like from M90 to M140 and the production stacks because of waiting. There is no extra space to store.
M80	The smoking time is also bottleneck if there are different takt time driven products 30, 40,60 days, therefore the space occupied in the room is unbalanced.
M80	No visualization map is used outside the smoking chambers so the work in process location it is known only by the personnel who actually was on service or generates search time
M90-M120	Capacity problem and wastes. Products awaiting heat treatment must always be transferred from the plastic container to metal containers suitable for heat treatment and vice-versa.
M90-M120	Some heat treatment machines do not have SOP.
	One heat treatment machine was out of order this means -33% capacity loss and lead time increase.
M130	Packaging machine 3 was not operating, this means capacity loss. It is used if the packaging machine break down, they move to line 2. This is maintenance and management task too.
M all	No OEE vision for production.
M all	There is only one mechanical and one electric maintenance stuff and there are part time employed. This also decreases the OEE by availability rate decrease.
M all	Manual handwritten non-standard text or data markings and information can cause quality issues.
M all	No 5S for the dismounted machine parts.
M90	Some electrical boxes were open. Danger of injury.

3.3. Plant layout and productivity relationship

The arrangement and orientation of machines in the layout of the factory define the transportation flow. The layout of the production is not optimized regarding the distances between the machines and processes. The transportation distances and time are direct correlated. The transportation waste is implemented in the production processes that consumes time resources and reduce output.

The "traditional" mentality of the leaders whose thinking is mainly financial thinking they can't see the waste and the improvement opportunities. The values measured financially are created on the micro level what define the results.

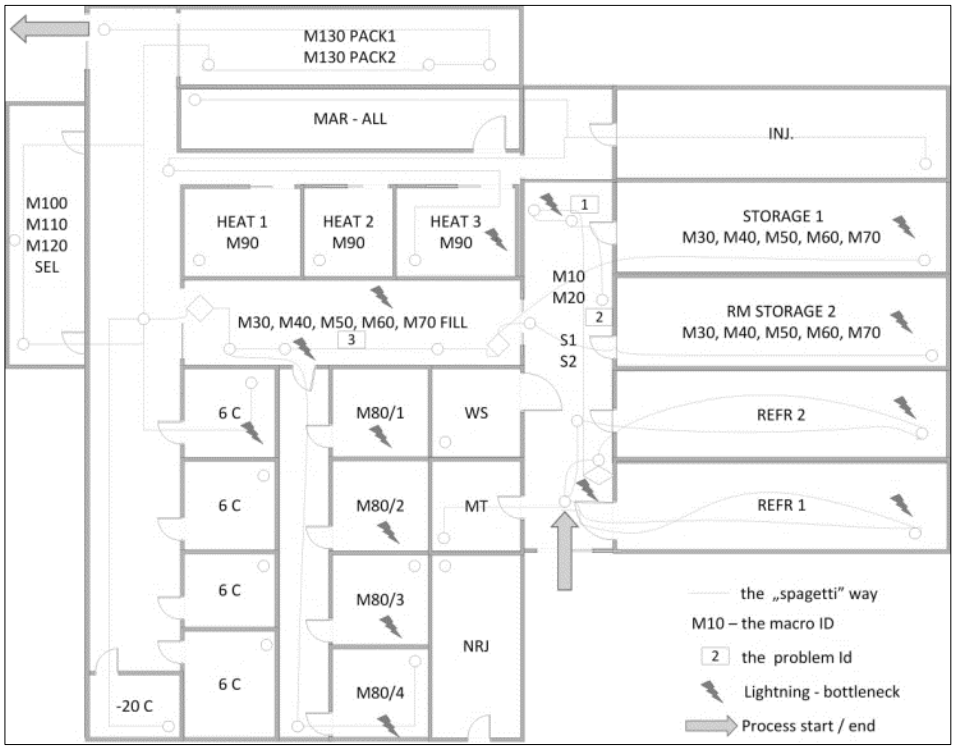

Figure 6. Current production layout
Source: own research

The Figure 6. shows the location of the macro processes. The thin lines visualize a part of the huge spaghetti diagram distance of 28 km during a shift. This means around additional 4.5-5 hours loss that decrease the workers' productivity as well. This is a typical waste what does not add value just increases the variable cost and manufacturing overhead. The production flow is not visualized it causes the increase of searching time. Additionally, there are separated and isolated production areas by rigid walls. It is not transparent, and it obstructs the communication and the information. If danger or production abnormalities occur also there is a time loss and lead lime increase.

3.4. The 5S Audit

The productivity improvement's basic is the 5S, what influences the efficiency. As first impression we had a positive impact regarding cleanliness and relative order. There was healthy factory smell, what is essential at food companies. The 100 points 5S audit results are shown on Figure 7. The total 100 points has 5 sections, each "S" maximum point is 20. The 5S activity level, out of cleaning/cleanliness (3S) must be improved.

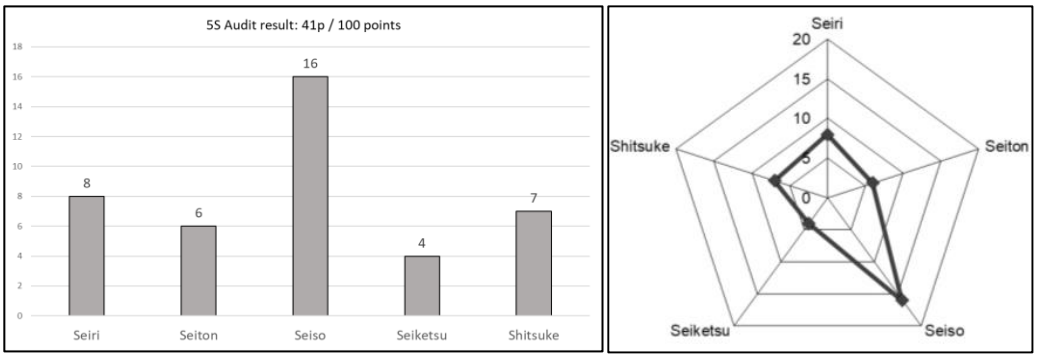

Figure 7. The 5S audit results
Source: own research

The 1S and 2S (8 and 6 points out of 20-20) level shows that the necessary production items are not available in the right amount of quantity or at the right time. This generates search and it is due to the low level of visual management. The minimum and maximum levels of materials, boxes are not defined. The visual marking should help in replenishment actions for the internal logistics and operators. Places for unused production items are not defined as well.
The production is not speaking with data. It would be useful some information about the actual production level on shop floor. No floor visualizations or color markings to drive the operators in production. Everything is managed by shift leader and in between operators with verbal information.
The visualization of the machines is at low level. There is no any machine operating KPI like OEE (Overall Equipment Efficiency). Only the maintenance book is available, the back-checking is impossible because they do not register it regularly. The start/stop buttons and some operating switches are visualized just in the case of original engraved. The machines runtime is not known and exists only reactive maintenance and planned maintenance once a year. There is lean concept for machine maintenance like autonomous maintenance, planned maintenance, quality maintenance, teaching machine operation, structured problem solving, and early equipment management.
The standardization (4S) is on low level. The audit measured only 4 points from 20. There are not prepared standards for production to help operators in their actions. There is no cross-functional matrix and just 15-20% of workers can replace other jobs. If someone fails, another operator is asked to come into the shift. There is no scrap % visualization and not calculated just the work in process falls down on the floor.

3.5. Results

The previous part includes the company analysis by lean tools. The basic problem is a decision on acquisition of a company or selling a company. The study expands the financial information with production performance and the future possibilities.
The lean tools and methods biggest advantage is that they are “speaking” with process data, shows the current state, and it makes possible to plan the future variations.
The macro VSM analysis shows there are two major bottlenecks during the production process of the material flow: filling (M40-M70) and heat treatment (M90-M120) processes (see Figure 4. before). The lowest capacity on a certain product family is the filling machine capacity M40, it is 300 kg/hour. The expected capacity is 960 kg/hour.
During the survey the machine capacity was set for 945 kg/hour, the total output at the end of the shift was only 4275 kg. The difference between target capacity 7087 kg/day (450 min) and actual 4275 kg is 2812 kg. The productivity in this case is only 60.32%. This is also due to several micro-stops generated by the process fluctuation. The machine setup was done by “empirical” experience of operators, not by using standards. Despite that this is a semi-automatic filling machine human presence was 100% at the value-added point. Operator “helped” the machine keeping his hand on the filling tube to reduce the production failure. This causes quality losses; the filling fails and generates rework by refilling the final product as raw material again. The scrap is not recorded and weighted at all. The actual production status cannot be followed and there is no regular sample weighting during the filling process.
The machines are overused, and not maintained in time, as the digital warning alarmed on screen. If the filling machine break down must move everything to filling line2 and setup the production to continue the work. This takes 30-90 minutes in every case including cleaning, changeover of parts, setup, trial and run. It is a lost time and performance.
The missing 2812 kg from the expected product means it a lost performance now. From the other point of view, it is 39.68% potential performance in the production. Using the lean tools in the future this 39.68% can turn to value.

At the survey time the financial performance of company was very low and fluctuated. At the financial calculation we started from the actual data. There is a high amount of current liabilities (28.8% of total owners' equity plus liabilities), and very low amount of current assets (8.1% of total assets). It means the company's liquidity is very poor. If we assume that from the lost 39.68 % performance, we can turn only 35% to increase the actual production the financial calculations are the next (assuming, there is no other changes in economic circumstances). The company sales revenue increases by 35% in a year. The collection rate of the receivables is 85%. Using this information, the company current ratio increases by 140%, the quick ratio increases by 165% and the absolute liquidity or cash ratio increases by 580%.
Based on the calculations we can find a relationship between the company's financial situation and the VSM data. If there is a low effectiveness of the production or service processes the company cannot realize the revenue. The assets include fewer current assets what can cause liquidity problems. By using the lean tools this ratio becomes better.

4. CONCLUSIONS

The main aim of the study is to give useful information for investor's decision making.
Initially the company's owners planned to sell the company. There was an investor who invited financial expert only, to calculate the company's value. The company from financial point of view is weak and it decreased the selling price. One of the owner's was curious to find out the real production potential before taking the final decision not only by the financial point of view.
The lean management tools used for the study proved that they are suitable to evaluate the process efficiency and in this way the value creation can be followed and managed towards the targets. The collected data are natural, but they can be converted to financial data. The facts form the study make a clearer and objective picture about the current and possible future situation.
Company's owners did their own decision: not sold the company, because they convinced about real value what they own and what is the way to keep and grow the company's performance in the future. Without lean approach a company value can be over evaluated or underestimated.

REFERENCES

1. BELL, Steve, 2006. *Lean enterprise systems.* Hoboken, New Jersey: John Wiley & Sons, Inc.
2. BERNSTEIN, William J., 2012. *The Four Pillars of Investing*, *Lessons for Building a Winning Portfolio*. United Kingdom: McGraw-Hill Education
3. CELLI, Ricardo – PEETERS, Christian – FRANK, Steve – NOGUES Philippe, 2021. *Corporate Acquisitions and Mergers in the European Union.* The Netherlands: Wolters Kluwer
4. CHANDRASHEKAR, Krishnamurti – VISHWANATH, Sr., 2008. *Mergers, Acquisitions and Corporate Restructuring*. SAGE Publications
5. GHAURI, Pervez N. – HASSAN, Ibne, 2014. *Evaluating Companies for Mergers and Acquisitions.* United Kingdom: Emerald Group Publishing Limited
6. KOVÁCS Zoltán, 2017. *A termelő és szolgáltató rendszerek fejleszésének főbb irányai [Main directions of development of production and service systems]* Budapest: Akadémiai Kiadó Zrt.
7. LESSAMBO, Felix, 2021. *U.S. Mergers and Acquisitions:Legal and Financial Aspects* Switzerland: Springer International Publishing
8. LIKER John, 2021. *The Toyota way*. New York: McGraw– Hill
9. MILLER, Edwin L. - SEGALL, Lewis. N., 2017. *Mergers and Acquisitions: A Step-by-Step Legal and Practical Guide*. Garmany: John Wiley & Sons Inc.
10. OSADA, Takashi, 1991. *The 5S's: Five Keys to a Total Quality Environment.* Tokyo: Asian Productivity Organization

11. OVIDU, Contras, 2022. *Untangling with Value Stream Mapping.* New-York: Taylor & Francis
12. ROTHER, Mike – SHOOK, John, 2012. *Tanulj meg látni - Az értékfolyamat-térképezés szerepe az értékteremtésben és a veszteség kiküszöbölésében[Learn to see - The role of value chain mapping in creating value and eliminating loss]* Veszprém: LEI Magyarországi Egyesülete
13. TANGL Anita – VÖRÖS Gyula – ZELENKA Józsefné – DESALEGN Goshu Deresa – VAJNA István, 2022. *The improvement technics and tools of accounting processes. Economics & Working Capital,* (2022. 3-4.) 30-41, London, WCTC Ltd. p. 31.
14. TANNER, Andy, 2014. *The Stock Market Cash Flow: Four Pillars of Investing for Thriving in Todays Markets.* RDA Press, LLC.
15. TAPPING, Don – LUYSTER, Tom – SHUKER Tom, 2002. *Value Stream Management.* New- York: Productivity Press

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Session 2: Capital market, corporate finance and financial analysis.
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SZENTESI IBOLYA:
NEW WAYS OF SHOWING AND ANALYSING CHANGES IN INCOME AND ASSETS THROUGH THE ADOPTION OF INTERNATIONAL ACCOUNTING STANDARDS

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Hungary is an attractive destination for working capital even in the midst of unfavorable global political and economic processes. It is important for investors to continuously monitor the income-generating capacity, efficiency, and growth of assets of enterprises. Accounting as an information system provides adequate data for the analysis of economic processes and the preparation of decisions. In order to have a reliable and real picture of management, it is necessary to concentrate on two areas of accounting work: on the one hand, on the precise recording of economic events, and on the other hand, on the appropriate evaluation of assets and resources, income and expenses.
It is a fact that some elements of the Hungarian accounting system differ from the requirements of international accounting standards. The differences can be seen in the case of the valuation rules, so according to the Hungarian system, income is shown based on different principles and assets are valued differently. The owners, who in many cases are not accounting specialists, want to receive analyses that are understandable to them and based on real processes, so that they can make the right decision.
The question is whether the Hungarian accounting system or the IFRS provides more accurate information. In my article, among the many differences, I am examining what differences are caused by the application of the time value of money, which is not used in the Hungarian system, according to international standards. Whether the data provided by IFRS is more reliable than the one according to Hungarian accounting rules.
Key words: foreign capital, real value, IFRS, time factor

1. Introduction

In Hungary, the application of IFRS standards is still in its infancy. There might be two reasons for this: on the one hand, few people choose to use IFRS for their separate reports because they are not well known and there are few professionals who are familiar with them. The number of companies applying IFRS is minimal, around 200. Another reason for the low take-up is that the methodology is not widespread among economic operators and thus there is less demand for it from investors in Hungary. Clearly, a change of attitude is also needed if they want to switch from Hungarian accounting to international accounting (SZAK-ma 2018.) There could be several purposes for applying IFRS. For example: the parent company expects its subsidiary to report on an IFRS basis so that it does not have to prepare its accounts in two different formats, or when entering an international market or raising international capital, investors can interpret and evaluate the company's data correctly. For this, as Szirmai et al (2019) have written, a uniform accounting system and accounting language that is accepted and used worldwide is essential. Rózsa (2015) also stresses that this need has been amplified by cross-border business relationships.
If we compare the two reporting formats, we can conclude that the Hungarian Accounting Act (HAA) prefers statutory accounting, while IFRS tries to capture the substance of the economic event in its principles-based system. The managers of companies applying IFRS have more responsibilities in accounting and record-keeping, so they need to be more familiar with international accounting principles and their inherent possibilities.
In this paper, I will cover several important areas: the role of the decommissioning provision in cost, its modifying role in profit or loss recognition, its impact on income and cash flow. I also examine what it means when there is a considerable financing component in a sales contract. I also discuss the

impact of sales with a right of return on profit or loss / income and the balance sheet. I use model examples to point out the differences between accounting under the Hungarian and IFRS standards.

2. *Overview*

The globalising world has not left the field of accounting unaffected either. The expansion of corporate relationships and cross-border activities increasingly require that those seeking investment become able to assess their market opportunities on a common basis. However, financial statements prepared under different national accounting rules are difficult to compare. The need for uniformity has led to the parallel existence of two major accounting systems: US GAAP, the accounting system of the United States, and IFRS, the international financial reporting standards and interpretations applied in the European Union. Although the two systems are trying to converge, the process is hindered by the fact that the basis of US GAAP is Anglo-Saxon law, whereas European countries are based on continental law.

Hungary is a member of the European Union, so there are currently two simultaneous regulatory systems in the country: the Act C of 2000 on Accounting and IFRSs. In Hungary, prior to 2016, only some of the listed companies and companies with an international parent company background prepared their financial statements under IFRS. Nevertheless, legislative changes have made IFRS mandatory/optional for more and more entities, even at the level of separate financial statements. This new pathway has been opened by the 138/2015 government decision (VI. 12.), which aims at the widespread domestic adoption of IFRS. The table 1 briefly summarises for whom IFRS is now mandatory, optional and who are not allowed to apply IFRS in the preparation of their annual reports. If a company opts for applying IFRS, it can carry out the transition in several steps. It must notify the NTCA (National Tax and Customs Administration), the HCSO (Hungarian Central Statistical Office) and, if necessary, the MNB (the central bank of Hungary) no later than 30 days before the date of transition. The notification must be accompanied by an IFRS-certified auditor's report on the company's IFRS preparedness. The company must prepare a capital reconciliation table and address the impact of IFRS adoption on local business tax and corporate income tax. Not only adequate human resources, but also an adequate technical, IT environment is necessary for implementation. The transitional period may take several years, for example, for a large company, but a minimum of one year is certainly needed. The transition requires several adjustments to be made to assets and liabilities in the balance sheet: some assets and liabilities need to be added to the balance sheet, while others need to be deleted or reclassified. Also, adjustment-related is the application of IFRS valuation rules, where there may be significant differences between HAA and IFRS.

Hungarian accounting has recently adopted and incorporated IFRS into HAA in multiple areas. Such examples are the accounting of investment executions, the offsetting of revenues and costs/expenses. The income statement and balance sheet applicable from the 2016 business year can be considered a significant change. However, there are still a few differences between the two accounting methods and regulations.

Table 1. Regulation of the IFRS application in Act C of 2000 on Accounting

Mandatory	• EEA listed companies, • Credit institutions and financial undertakings subject to equivalent prudential regulation.
Optional	• An undertaking whose direct or indirect parent company prepares its consolidated annual accounts under IFRS, • Insurance company, • a financial undertaking, a payment institution, an electronic money issuing institution, an investment firm, a central securities depository, a central counterparty, a stock exchange, an occupational pension provider, a money market intermediary and an insurance intermediary under IFRS

	consolidated financial statements on the basis of a parent company decision, and a fund and fund manager subject to the law on collective investment schemes and their managers and amending certain financial laws, supervised by the MNB, • companies subject to audit (Section 155), • a Hungarian branch of a foreign-based company.
Not allowed	• an entrepreneur managing state or municipal assets, • a non-profit company, • a mutual insurance association under the Act on Insurance Activities, • pension fund, health fund and self-help fund.

Source: own compilation based on Section 9/A. of Act C of 2000 on Accounting in force

In Hungarian accounting, assets are generally valued at cost, whereas IFRS provides several options. Table 2 classifies the valuation principles into assets and liabilities based on the changes in the inventory and the determination of balance sheet value. The valuation method chosen for the financial statements influences the income statement and the cash flow statement, as well. Cost is the amount paid or consideration given to acquire an asset, or the cost incurred during construction.

Table 2.: Valuation methods

Description/valuation method	Assets	Liabilities	Keyword
For entry into inventory			
cost	Amount paid or consideration given for acquisition	Amount paid or consideration given for assumption, value of goods received	Actual value
For entry into inventory and a later date			
Present value	Discounted present value of future cash receipts expected to be generated by the asset	Present value of cash outflows expected to be required to settle the obligation	Discounted value
Balance sheet value			
Fair value	Cost of acquisition at a given time. Received price of an asset on sales.	The price of an obligation at a given time.	Value at a given time
Net realisable value	Selling price at a given time	Price at a due date under known circumstances at a given time.	Expected inflow or outflow

Source: Rózsa Ildikó: International Accounting I. 2016., 19. p.

Hungarian accounting has a similar interpretation, the difference lies in the costs or expenses that can be recognised at cost. The other values are not so clear and precisely determined as they reflect the uncertainties associated with the amount and timing of cash flows related to assets and the effect of the time value of money. For example, present value is an income-oriented approach in which future amounts are converted into a single, that is discounted value. Fair value is a market approach, which shows what one would receive for an asset on sale or what one would pay for a liability at the time of valuation (IFRS 13). This method is only simple if the market price of the asset is known, and the

market is active. The net realisable value is an estimated selling price that in fact determines whether or not an impairment loss should be recognised for the asset.
In this article, I will deal with the determination of cost, the recording of assets and liabilities, and the valuation of revenues. I will model the cost of a tangible asset under Hungarian and international accounting rules, and the impact of expenses arising from its use on income. By means of respective examples I will also show the difference in the cost of inventories if deferred payment is used and the difference in the return liability on sale.

3. Results and conclusions

Property, plant and equipment are recorded at cost on recognition. The cost of an item of property, plant and equipment may include a provision for decommissioning, which is the estimated cost of dismantling, removing and restoring the site (IAS 37). If the effect of the time value of money is significant, this amount is recognised in present value. In the example, the cost of a production machine is HUF 500 million, its useful life is 10 years, and depreciation is calculated on a straight-line basis. Due to environmental impact of machine use the expected cost of decommissioning, removal and site clearance is HUF 70 million. Table 3 shows the differences between the two accounting methods and their impact on the balance sheet value and profit and loss.
Table 3. Impact of decommissioning provision

Name	Balance sheet value in thousand HUF		Annual expenses, in thousands HUF			
Years	Hungarian accounting	IFRS	Hungarian accounting	IFRS	IFRS decommissioning provision adjustment	Total annual expenses
1	450 000	496 878	50 000	55 209	1 561	56 770
2	400 000	441 670	50 000	55 209	1 610	56 819
3	350 000	386 461	50 000	55 209	1 659	56 868
4	300 000	331 252	50 000	55 209	1 708	56 917
5	250 000	276 044	50 000	55 209	1 757	56 966
6	200 000	220 835	50 000	55 209	1 813	57 022
7	150 000	165 626	50 000	55 209	1 862	57 071
8	100 000	110 417	50 000	55 209	1 925	57 134
9	50 000	55 209	50 000	55 209	1 981	57 190
10	0	0	0 000	55 209	2 037	57 246
total			500 000	552 087	17 913	570 000

Source: own calculations and compilation

According to Hungarian accounting, the cost value will be HUF 500 million and the planned depreciation will be HUF 50 million per year during useful life, and after use HUF 70 million per year for restoration, which will be expensed. In contrast, a business under IFRS accounting recognises a decommissioning provision at cost.
It classifies the time value of money as significant and uses a discounted present value - the basic assumption is that the discount rate is 3%/year throughout -, calculated as:
$PV = C * DF_{\%;n}$; *PV = 70 000 thousand HUF* $* DF_{3\%;10}$= 70 000 thousand HUF * 0,7441 = 52 087 thousand HUF
According to IAS 16 and IAS 37, the discounted provision will be part of the cost value, which will increase to HUF 552 087 thousand. The recognition of depreciation will also change the result, but this amount is not the same as under Hungarian accounting, it is HUF 52 209 thousand per year. The annual amount of the decommissioning obligation recognised at the cost of the tangible asset varies due to the change in the discount factor, its time value of money, in the example it increases, but there may also be cases where it decreases. The adjustment is treated as a financial operations expense

against the provision. There will be a difference in the balance sheet value under Hungarian accounting and IFRS. Under IFRS the provision is continuously created, which has a present value of HUF 70 million in year 10, and when decommissioning is done, this provision is used without affecting the result. The HUF 70 million is spread over the period of use, whereas in Hungarian accounting it is recognised as a lump sum upon completion.
Additionally, it is worth considering what happens if we apply a revaluation model after recognition in the example. In this case, the carrying amount of property, plant and equipment will be its fair value minus the accumulated depreciation recognised up to that point. Two methods can be applied: the net and gross method. The former is based on the book value, while the latter considers the ratio of gross value to accumulated depreciation. In both cases, the so-called Other Comprehensive Income (OCI) is applied. This income category adjusts the current year's result by the revaluation difference. In Hungarian accounting, for revaluation to fair value, value adjustment is used in the case of property, plant and equipment. In these cases, a valuation reserve is recognised on the liability side of the balance sheet to maintain the balance sheet equalisation.
However, the revaluation itself will not change the amount of recognised depreciation, because this will still be based on the earlier cost.
The second comparative model deals with the effect of deferred payments on cost. An enterprise purchases a significant amount of materials from its partner. Because of the size of the payment, the firm receives an offer: if it pays immediately, the purchase price will be 100,000 thousand HUF, if it only pays a year later, it will be 110,000 thousand HUF. The transaction takes place on 1 July.
The difference between the two prices is the interest content (Table 4).
The firm will only use the material stock concerned in the first month of next year. The firm chooses deferred payment. Let us examine how the choice of deferred payment affects the value of the stock, the assets and the profit and loss.
The extra HUF 10 000 000 due to the deferred payment is included in the purchase price in Hungarian accounting, therefore, it has no impact on the result at the time of acquisition. It will only appear when the material is used, as material cost. However, international accounting records this difference as a financial operations expense in the profit and loss account, so it immediately reflects the effect of deferred payment. The duration of the deferred payment - since the deferred payment covers two years, its effect must be split - is halved in our example. Half is recognised this year and half the next year.

Table 4. Deferred payment

Name	**Under Hungarian accounting rules, in thousand HUF**	**Under IFRS rules, in thousand HUF**
Cost	110 000	100 000
Balance sheet value at year-end	110 000	100 000
Cost of materials for the year	0	0
Cost of financial operations	0	5 000
Total expenditure	0	5 000
Data for the following year		
Opening balance sheet value	110 000	100 000
Cost of materials	110 000	100 000
Cost of financial operations	0	5 000
Total expenditure	110 000	105 000
Closing balance sheet value	0	0

Source: Own calculations and compilation

A specific case of revenue recognition is sales with a right of return. In this case, the entity should recognise it as a liability, which must be repaid to the buyer in part or in whole (Madarasine et al. 2019). In the example, an enterprise sells 1 000 inventory items on 31 December at a price of HUF 15 000 per item under a 3-month buyback obligation. The cost value of the asset is 10 000 HUF/pc. The stock totalled 1500 pcs before the sale. Experience shows that customers return 5% of the assets.

Table 5. Sales with a right of return

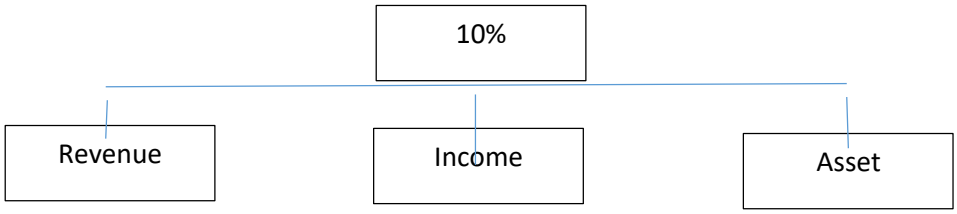
Name	Under Hungarian accounting rules	Under IFRS rules
Revenue, in thousand HUF	15 000 000	14 250 000
COGS, in thousand HUF	10 000 000	9 500 000
Gross profit on sales, in thousand HUF	5 000 000	4 750 000
Stock value at year-end, in thousand HUF	5 000 000	5 500 000
Quantity at year-end, pcs	500 pcs	550 pcs

Source: own calculations and compilation

Table 5 clearly shows the differences in accounting. The amount return obligation must be considered in the turnover. Let us examine how sales affect the profit for the year under the Hungarian and IFRS rules. The result will not be the same as in Hungarian accounting. In addition to the decrease in turnover, the COGS will also be lower. Overall, it will reduce the result. And the result is reduced by the margin corresponding to the return. In Hungarian accounting, this event is record when the return takes place, not at the time of sale.

I would like to show one more significant difference in my presentation of the spirit of international accounting standards. The Hungarian accounting rules define the figures for the entire enterprise as a whole, irrespective of the proportion of sub-areas within the enterprise. Different products per unit or the different geo-economic environment may result in differing profitability. Capital investors need to know the profitability and financial - asset situation by segment to make their decisions. IFRS 8 operating segments is a specific presentation of balance sheet and income statement items.

This, however, requires that an entity establishes the recognition criteria and applies them consistently. Segments are created by activity and geographical area. For a segment to be reportable, at least one of three thresholds must be met, that is, it needs to amount to or exceed 10%. The final condition is the 75% limit: At least 75% of the revenue of the entity's must be included in the reportable segments. (Beke 2014) It will then be examined whether this reaches 75% of the consolidated revenue of the company. The thresholds are shown in Figure 1.



Source: Madarasiné Szirmai A. – Kovács D. – Mohl G.: International Accounting Knowledge 2019, 124. p.

Figure 1: Reportable segment definition

Goal of segments to provide investors with more detailed information about a company's past performance and risks. The IFRS 8 standard helps users of financial statements to determine which of the company's several business activities are profitable or unprofitable. This is provided by IFRS, but not by Hungarian financial accounting at system level. This is another argument showing that IFRS well and better serves the information needs of equity investors.

4. *Summary*

Under the current Hungarian Accounting Act, assets and liabilities, and thus revenues and expenses, income, assets and cash flow, are valued differently from IFRS. In my article, I have examined which method gives a true and fair view.

The HAA does not provide at all for the inclusion of restoration and decommissioning costs in the cost. For this reason, there is a significant difference in the accounting for depreciation and the result, the cash flow.

The HAA also does not consider the effect of deferred payments, neither at cost nor at sales. In the model presented, we can see that under IFRS the difference due to deferred payment is immediately recognised in the cost of financial operations, and thus in the income statement.

Sales with a right of return modify the revenue and the COGS recognised by the estimated return rate. The Hungarian Accounting Act does of course deal with returned goods, but not in advance; it adjusts the customer invoice, revenue and COGS ex post.

The three examples have demonstrated that IFRS reflects the real assets situation better than Hungarian accounting. The reason for this is that it presents economic events by their content, based on standards.

References

BEKE Jenő
2014 *Nemzetközi Számvitel* (International Accounting) Akadémiai Kiadó Zrt., Budapest

MADARASINÉ SZIRMAI Andrea – KOVÁCS Dániel Máté – MOHL Gergely
2019 *Nemzetközi Számviteli Ismeretek* (International Accounting Knowledge) Perfekt, Budapest.

RÓZSA Ildikó
2016 *Nemzetközi számvitel I.* (International accounting I.) Hessyn Informatikai és Oktatási Kft., Budapest.

SZAK-ma
2018 *Szemléletváltást igényel az IFRS-re történő áttérés.* (The transition to IFRS requires a change of attitude) *SZAK-ma,* 2018. 09. 20.
http://szak-ma.hu/ifrs/szemleletvaltast-igenyel-az-ifrs-ekre-torteno-atteres-interju-rako-agnessel-101835 download date: 2023. 04.20.

2000. évi C. Sztv. és módosításai

138/2015. (VI.12.)
Kormány határozat a nemzetközi pénzügyi beszámolási standardok egyedi beszámolási célokra történő hazai alkalmazására (Government decision on the domestic application of international financial reporting standards for individual reporting purposes)

IFRS 8 Operating system
https://www.ifrs.org/issued-standards/list-of-standards/ifrs-8-operating-segments/
download date: 2023. 04.20.

IFRS 13 Fair value measurement
https://www.ifrs.org/issued-standards/list-of-standards/ifrs-13-fair-value-measurement/
download date: 2023. 04.20.

IFRS 15 Revenue from contracts with customers
https://www.ifrs.org/issued-standards/list-of-standards/ifrs-15-revenue-from-contracts-with-customers/
download date: 2023. 04.20.

IFRS 16 Leases
https://www.ifrs.org/issued-standards/list-of-standards/ifrs-16-leases/
download date: 2023. 04.20.

IAS 37 Provisions, Contingent Liabilities and Contingent Assets
https://www.ifrs.org/supporting-implementation/supporting-materials-by-ifrs-standards/ias-37/
download date: 2023. 04.20.

MANAGEMENT SECTION

TÍMEA ANTAL:
FIRST STEPS - COMPLIANCE AND ARTIFICIAL INTELLIGENCE

Introduction

The key social and economic trends for the third decade of the 21st century are sustainability and digital transformation. The primary resource of digitalisation is the ever-increasing amount of data, the measurement, management and use of which represents legal, technological, economic and even social challenges. A technological revolution is taking place in the form of digitalisation, automation and robotisation. As a consequence, all aspects of our life need to be transformed; complex problems require complex solutions.

In this paper, the relationship between compliance[10] and AI will be presented, embedded in a brief summary of technological trends. Furthermore, the EU regulatory environment for AI will also be analysed. I argue that both areas are key and that several interconnections can be identified between them. My hypothesis is that compliance and the use of AI are essential for resilient corporate operations.

Keywords: technology trends - resilient enterprises, artificial intelligence, compliance

1. Trends in technology and related challenges

The sectors and organisations based on artificial intelligence have grown into a multi-billion industry in the past decade. It is present in many sectors, including finance, healthcare and transport, agriculture, logistics and commerce. Meanwhile, the concept of artificial intelligence is evolving organically, with ethical guidelines and legal regulation following the technology boom. Organizations and businesses are adopting risk management and auditing processes to ensure that their processes are up to the challenge and can remain resilient and competitive.
According to data of Statista[11], for example, in 2021, the estimated data traffic on the internet per minute was:

- YouTube: 500 hours of content uploaded;
- Email: 197.6 million emails sent;
- Online shopping: 1.6 million dollars spent;
- Messenger/ WhatsApp: 69 million messages sent;
- TikTok: 5 000 downloads;
- LinkedIn: 9,132 new connections made.

Reality is constantly being digitally mapped; the physical world is gradually being complemented by a virtual reality. In this process, the amount of data produced and stored is doubling at an accelerating rate. According to IDC analysis, in 2018 alone, 33 ZB (zetabytes) of data were generated, by 2025 this volume is likely to reach 175 ZB, which is more than five times the current level (1 ZB = 1021 Byte)[12] .

[10] Concept: 'That is, compliance is a kind of norm conformity within an organisation, whether it is a legal or an organisational code of ethics.' (Dr. István Ambrus, Dr. Kitti Mezei, Dr. Erzsébet Molnár: Explanation of the Laws of Compliance I, General and Criminal Compliance, p. 22)

[11] https://www.statista.com/chart/25443/estimated-amount-of-data-created-on-the-internet-in-one-minute/, downloaded 30/11/2022.

[12] David Reinsel – John Gantz – John Rydning: The Digitization of the World From Edge to Core, International Data Corporation White paper, November 2018, https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf , p. 6, downloaded 28/11/2020.

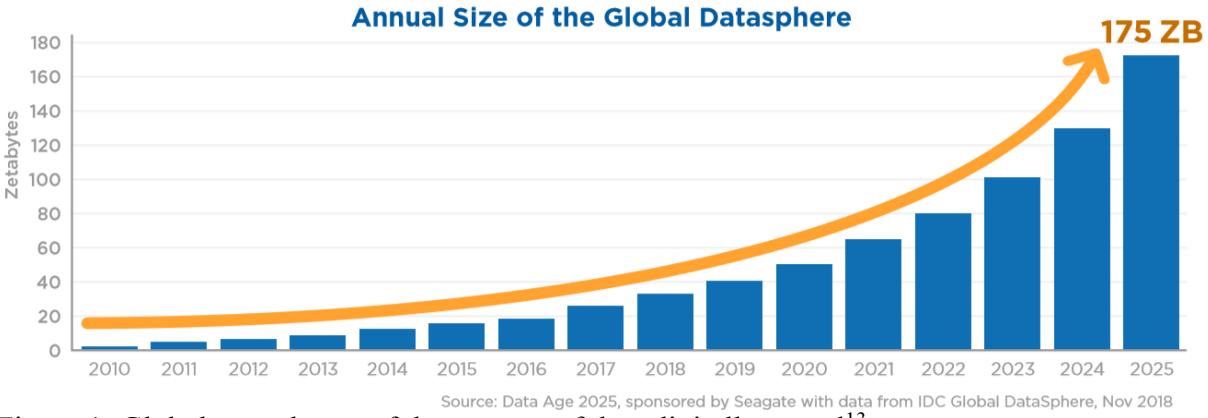


Figure 1: Global growth rate of the amount of data digitally stored[13]

Emerging global technology trends that will serve as a basis for development directions in the coming years include:

Big data: refers to the vast databases created, stored and processed by digital technology, as a result of which information can be captured and processed in a way that enables organisations to plan their processes more accurately. Artificial intelligence enables, inter alia, the processing of databases and support decision-making.

Internet of Things (IoT) & the unstoppable spread of predictive analytics: the communication between devices and machines allows these devices to transmit temperature data to data warehouses, for example.

Blockchain: decentralised, tamper-proof database, record-keeping systems are limited mainly to digital recording and payment solutions, however in the fields of digital identification and traceability systems in supply chain are now also increasingly use blockchain technology.

Fog computing: the main difference between fog computing and cloud computing is that the cloud is the centralised system, while the fog is the distributed decentralised infrastructure. Therefore, fog computing is the intermediary between hardware and remote servers. With the new technologies (IoT, AI), part of the processing is done in the "fog" with local resources, and the remaining part of processing takes place in the cloud.

Robotic Process Automation (RPA): the automation of repetitive tasks with long lead-time. It results in the replacement of human resources in some areas.

5G: a 5th generation wireless network that will not only provide superfast internet access, but will also reform the IoT, thus significantly changing the direction of economic and technological development.

AI - Machine Learning: perhaps the most dominant branch of artificial intelligence is machine learning, which handles systems that can generate knowledge from experience. In practice, this means that it recognises/defines patterns based on past examples and is able to make generalisations and decisions based on them.

[13] David Reinsel – John Gantz – John Rydning: The Digitization of the World From Edge to Core, International Data Corporation White paper, November 2018, https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf, p.6, downloaded 28/11/2020.

I4.0: The term refers to the fourth industrial revolution, which is the increasing intertwining of information technology and automation; it is a framework of interconnected parts with different technologies at their core, increasingly able to complement or replace human labour.

These trends impose significant and complex challenges, while data are constantly regenerated, providing ammunition for the further development of artificial intelligence, while the technology itself is in a constant development. Technology trends are far ahead of the regulatory environment. Citizens are increasingly demanding digital solutions, carrying them "in their pockets". Organisations are challenged to restructure their organisations in response to digital transformation.

2. Interconnections: compliance – artificial intelligence

The OECD has defined 5 key principles for the responsible management of AI, which I consider as a framework: inclusive growth, sustainable development and well-being; human-centred values and fairness; transparency and explainability; robustness, security and safety; accountability[14] . I highlight the last principle, which is the need to ensure that AI systems operate in an accountable and appropriate manner, i.e. processes must be designed, implemented and monitored that are properly regulated and documented, ensuring that risks are identified and managed. Ethical, legal regulations as well as the security, accountability and transparency levels for governments, businesses and society must be adapted to these principles. In the context of accountability, I see compliance as an option that can be an effective means of enforcing this basic principle.
The underlying reasons why I believe it is necessary to establish a strong link between AI and compliance are as follows:

- Both areas are "products" of the past 50 years.
- They are necessary to meet the challenges of modern times.
- As a management tool, they can contribute to sustainable, resilient business operations, can create more efficient internal operations; and can increase service levels and result-orientation.
- There has been a lot of research into the definition of the terms. There is no single, universally accepted definition in the literature.
- Their uniform legal regulation is immature.
- Standards play an important role.
- Moral - ethical considerations must be taken into account.
- Risk management is at the heart of them.
- Businesses still see them as a novelty.
- They require learning and knowledge application skills both at individual and organisational level.
- There is a need for openness and support from company management.
- Security and trust considerations are essential in their use.
- In the short term, they require a greater financial investment, but can give businesses a competitive advantage in the long term.
- Good practices need to be identified and analysed.

3. Relevant documents of EU regulation of artificial intelligence

The European Union has been working for years on the development of AI regulatory framework. The most relevant ones for this paper are presented below.

[14] OECD (2019), "Recommendation of the Council on Artificial Intelligence", https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449#mainText , accessed 24.04.2023.

Investing in smart, innovative and sustainable industry - A renewed industrial policy strategy for the European Union[15]
The document underlines that artificial intelligence is an important tool to prepare industry for the digital age and that digitisation will define the future of industry. It also highlights that the integration of smart technologies into industrial processes will contribute to the expansion of service elements.

European Parliament Recommendation to the Commission on civil law rules on robotics[16]
The Recommendation sets out general principles for the development of robotics and artificial intelligence for civilian use. It highlights the importance of measures to support small and medium-sized enterprises and innovative start-ups in the robotics sector that create new market segments or use robots. In the context of ethical principles, it stresses the need for risk analysis and proposes the establishment of a clear, strict and effective ethical framework for the development, design, production, use and modification of robots. In my view, a significant achievement of the document is that it proposes a framework in the form of a charter consisting of a code of conduct for robotics engineers, of a code for research ethics committees when reviewing robotics protocols and of model licences for designers and users.

European Council conclusions EUCO 14/17[17]
The European Council, in its conclusions proposes to develop a European model for artificial intelligence. It states that defining a future-oriented regulatory framework, establishing a common approach to cybersecurity, acting swiftly to address emerging trends, inter alia, are essential successfully build a Digital Europe.

EU Declaration on Cooperation on Artificial Intelligence[18]
The signatories agreed to work together to create an appropriate legal and ethical framework, building on the fundamental rights and values of the EU. With the Declaration, the main aim of the member states was to establish continuous cooperation and common approach.

Artificial Intelligence for Europe[19]
In 2018, the European Commission defined Artificial intelligence as systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals.
The aim of the Strategy is to strengthen the EU's technological and industrial capacities and to harness artificial intelligence across the economy, to prepare for the socio-economic changes that AI will bring, and to provide an appropriate ethical and legal framework, based on the values of the Union and in line with the EU Charter of Fundamental Rights. The need to develop draft ethic guidelines for AI; to reflect on the suitability of some established rules on safety and civil law questions on

[15] European Commission: Investing in a smart, innovative and sustainable Industry - A renewed EU Industrial Policy Strategy. COM/2017/0479 final. https://eur-lex.europa.eu/legal-content/HU/TXT/?uri=CELEX:52017DC0479 , downloaded 28.12.2022.
[16] European Parliament: report 27.1.2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL)). https://eur-lex.europa.eu/legal-content/HU/TXT/PDF/?uri=CELEX:52017IP0051&from=EN, accessed 28.12.2022.
[17] European Council Conclusions EUCO 14/17 https://www.consilium.europa.eu/media/21607/19-euco-final-conclusions-hu.pdf, downloaded 02.01.2023.
[18] European Commission: EU Declaration on Cooperation on Artificial Intelligence https://ec.europa.eu/jrc/communities/en/node/1286/document/eu-declaration-cooperation-artificial-intelligence, downloaded 02.01.2023.
[19] European Commission: Communication from the Commission to European Parliament, European Council, the Council, the European Economic and Social Committee, the Committee of the Regions on Artificial Intelligence for Europe, Brussels, 25.4.2018 COM(2018) 237 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A237%3AFIN , downloaded on 02.01.2022.

liability. It also stresses the importance of the legal framework for product liability and data protection.

High Level Expert Group on Artificial Intelligence - Ethical Guidelines for Trusted Artificial Intelligence[20]

There are three basic elements of trustworthy AI that must be met throughout the lifecycle of the system:

- legality, i.e. it must comply with the legislation in force,
- ethicality, i.e. the requirement to ensure compliance with ethical principles,
- technical robustness and social stability.
- The Ethical Guidelines set out an approach to compliance with ethical principles based on fundamental rights (respect for human autonomy, prevention of harm, fairness, explicability).

It defined seven key requirements that trustworthy AI systems must meet:

- Human agency and oversight,
- Technical robustness and safety
- Privacy and data governance
- Transparency
- Diversity, non-discrimination and fairness
- Environmental and societal well-being
- Accountability.

These requirements are subject to a continuous process of technical and non-technical testing and react to shortcomings in order to demonstrate their necessity and effectiveness.

Digital Europe Strategy[21]

The main aim of the Strategy is to support the digital transformation of the European economy and society and to bring the benefits of this to European citizens and businesses. Artificial intelligence is identified as a specific objective in Article 5: Artificial Intelligence shall pursue the following operational objectives:

a) build up and strengthen core artificial intelligence capacities in the Union, including data resources and libraries of algorithms in compliance with data protection legislation;

b) make those capacities accessible to all businesses and public administrations;

c) reinforce and network existing artificial intelligence testing and experimentation facilities in Member States.

A coordinated plan on artificial intelligence[22]

The main aim is to maximise the impact of investment at EU and national level, and to promote synergies and cooperation across the European Union. The plan promotes the development of a sound MI that meets both European ethical values and citizens' expectations.

White Paper on Artificial Intelligence: a European approach to excellence and trust[23]

The White Paper aims to create a legal environment that is conducive to innovation and to reduce risks. It is the first document to set out a possible legal framework for the development and use of

[20] High Level Expert Group on Artificial Intelligence - Ethical Guidelines for Trusted Artificial Intelligence https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai, downloaded 02.01.2023.

[21] European Commission: Regulation of the European Parliament and of the Council establishing the Digital Europe programme for the period 2021-2027 COM(2018) 434 final, 2018/0227(COD) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A434%3AFIN, downloaded on 2023.01.03.

[22] European Parliament: Artificial intelligence - Conclusions on the coordinated plan on artificial intelligence 6177/19 https://data.consilium.europa.eu/doc/document/ST-6177-2019-INIT/en/pdf , downloaded on 03.01.2023.

[23] European Commission: White Paper On Artificial Intelligence - A European approach to excellence and trust https://eur-lex.europa.eu/legal-content/HU/ALL/?uri=CELEX:52020DC0065 , downloaded on 04.01.2023.

artificial intelligence. It underlines that the EU legislation remains in principle fully applicable irrespective of the involvement of AI. However, it is important to assess whether it can be enforced adequately to address the risks that AI systems create, or whether adjustments are needed to specific legal instruments. The basic principle is that the new regulatory framework for AI must be effective and safe, which can be enforced through a risk-based approach. In the Commission's view, an AI application should in principle be considered high risk if it meets both cumulative criteria:

- The AI application is employed in a sector where, given the characteristics of the activities typically undertaken, significant risks can be expected to occur.
- The AI application in the sector in question is used in such a manner that significant risks are likely to arise.

The White Paper identified the main elements of the requirements for high-risk AI applications:

- training data;
- data and record-keeping;
- information to be provided;
- robustness and accuracy;
- human oversight;
- specific requirements for certain particular AI applications.

To verify and ensure the requirements, an objective, prior conformity assessment is necessary, which may include testing, verification or certification procedures. It would make conformity assessment mandatory for all operators, require monitoring by national authorities and ensure effective judicial redress.

Proposal for a Regulation of the European Parliament and of the Council on the establishment of harmonised rules concerning artificial intelligence (AI legislation) and amending certain Union legislative acts[24]

The draft EU regulation was published in 2021 and is expected to be mandatory from 2025. The draft regulation is a major milestone in the regulation of artificial intelligence. It sets out a complex regulatory environment and allows for significant fines of up to 6% of global turnover.

Article 1 of Title I of the draft regulation defines the subject matter, which includes

- harmonised rules for the placing on the market, the putting into service and the use of artificial intelligence systems (‘AI systems’) in the Union;
- prohibitions on certain artificial intelligence practices;
- specific requirements for high-risk MI systems and obligations for operators of such systems;
- harmonised transparency rules for AI systems intended to interact with natural persons, for emotion recognition systems and biometric categorisation systems, and for AI systems used to generate or manipulate image, audio or video content;
- rules on market monitoring and market surveillance.

Article 2 regulates the scope:

- providers placing on the market or putting into service AI systems in the Union, irrespective of whether those providers are established within the Union or in a third country;
- users of the AI systems located within the EU;
- providers and users of AI systems that are located in a third country, where the output produced by the system is used in the Union.
- The draft regulation defines artificial intelligence systems as software. Software,
- that is developed with one or more of the techniques and approaches listed in Annex I and,

[24] Proposal for a Regulation of the European Parliament and of the Council on the establishment of harmonised rules for Artificial Intelligence and amending certain Union legislative acts https://eur-lex.europa.eu/legal-content/HU/TXT/?uri=CELEX%3A52021PC0206 , downloaded on 10.01.2023.

- can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with.

The draft regulation provides detailed definitions in Title I.
Title II summarises prohibited AI practices. The regulation follows a risk-based approach, differentiating between uses of AI that create an unacceptable risk, a high risk, and low or minimal risk. Title III sets out rules for high-risk AI systems, and Title IV concerns certain AI systems to take account of the specific risks of manipulation they pose. Title V contributes to the objective to create a legal framework that is innovation-friendly, future-proof and resilient to disruption. Governance and implementation rules are set out in Titles VI to VIII. Title IX establishes the framework for the creation of codes of conduct.
EU legislation is still taking shape. But it is already clear that risk management is the basis for the draft regulation. Compliance as a tool ensures that risks are defined, assessed and evaluated with a view to preventing, mitigating and eliminating adverse effects.

4. Closing words that are not final words

Digital, technological trends have become an integral part of everyday life, while legislation tends to only follow suit. Digital changes can bring efficiency and effectiveness gains, but they also bear risks, as they are fast and transformative. Artificial intelligence and compliance can be seen as assets that contribute to the development of companies; both areas being important components of the digital ecosystem. By no means represent limitations or "just risks"; AI and compliance are challenges that can even generate a competitive advantage for businesses, given the right legal and organisational framework.
Based on the documents examined it can be concluded that the European Union's aim is to ensure trustworthy artificial intelligence. It aims to promote the development and use of ethical, risk-based and safe AI, where humans remain the determining factor. And the draft regulation, created in 2021, responds to the concerns that have been raised in recent years.
This paper is intended to be thought-provoking. I have touched upon several issues, but many have not yet been examined. My hypothesis is that compliance as a tool may be suitable for the accountable use of AI. Its practical implementation, both vertically and horizontally, requires further investigation.

List of literature and sources

5. Dr. AMBRUS István, Dr. MEZEI Kitti, Dr. MOLNÁR Erzsébet: Explanation of compliance legislation I., General and criminal compliance , Wolters Kluwer, 2021
6. Clara JENIK: A Minute on the Internet in 2021, https://www.statista.com/chart/25443/estimated-amount-of-data-created-on-the-internet-in-one-minute/, downloaded 30/11/2022.
7. David REINSEL – John GANTZ – John RYDNING: The Digitization of the World From Edge to Core, International Data Corporation White paper, November 2018, https://www.seagate.com/files/www-content/our-story/trends/files/idc-seagate-dataage-whitepaper.pdf, downloaded 28/11/2020.

8. European Commission: Investing in a smart, innovative and sustainable Industry - A renewed EU Industrial Policy Strategy. COM/2017/0479 final. https://eur-lex.europa.eu/legal-content/HU/TXT/?uri=CELEX:52017DC0479 , downloaded: 28.12.2022.
9. European Parliament: report 27.1.2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INLhttps://eur-lex.europa.eu/legal-content/HU/TXT/PDF/?uri=CELEX:52017IP0051&from=EN, downloaded: 28.12.2022.

10. European Council conclusions EUCO 14/17 https://www.consilium.europa.eu/media/21607/19-euco-final-conclusions-hu.pdf, downloaded on 02.01.2023.
11. European Commission: EU Declaration on Cooperation on Artificial Intelligence https://ec.europa.eu/jrc/communities/en/node/1286/document/eu-declaration-cooperation-artificial-intelligence, downloaded 02.01.2023.
12. European Commission: Communication from the Commission to European Parliament, European Council, the Council, the European Economic and Social Committee, the Committee of the Regions on Artificial Intelligence for Europe, Brussels, 25.4.2018 COM(2018) 237 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A237%3AFIN , downloaded on 02.01.2022.
13. High Level Expert Group on Artificial Intelligence - Ethical Guidelines for Trusted Artificial Intelligence https://digital-strategy.ec.europa.eu/en/library/ethics-guidelines-trustworthy-ai, downloaded 02.01.2023.
14. European Commission: Regulation of the European Parliament and of the Council establishing the Digital Europe
15. programme for the period 2021-2027 COM(2018) 434 final, 2018/0227(COD) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A434%3AFIN, downloaded on 2023.01.03.
16. European Parliament:Artificial intelligence - Conclusions on the coordinated plan on artificial intelligence 6177/19 https://data.consilium.europa.eu/doc/document/ST-6177-2019-INIT/en/pdf, downloaded on 03.01.2023.
17. European Commission:White Paper On Artificial Intelligence - A European approach to excellence and trust https://eur-lex.europa.eu/legal-content/HU/ALL/?uri=CELEX:52020DC0065, downloaded on 04.01.2023.
18. Proposal for a Regulation of the European Parliament and of the Council on the establishment of harmonised rules for Artificial Intelligence and amending certain Union legislative acts https://eur-lex.europa.eu/legal-content/HU/TXT/?uri=CELEX%3A52021PC0206, downloaded on 10.01.2023.

19. OECD (2019), "Recommendation of the Council on Artificial Intelligence", https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449#mainText, downloaded 24.04.2023.
20. OECD (2023), "Advancing accountability in AI: Governing and managing risks throughout the lifecycle for trustworthy AI", OECD Digital Economy Papers, No. 349, OECD Publishing, Paris, https://doi.org/10.1787/2448f04b-en., downloaded 20.04.2023.

TÍMEA ANTAL:
PLAN-DO-CHECK-ACT IN THE CONTEXT OF COMPLIANCE

Today, the resilience of organisations is a "hot topic". There is a lot of research on different management tools, but the study of compliance management and compliance as a security management tool still remains a relatively untapped area. The topic is "hyper-interdisciplinary" (economics-law-informatics-organization and management science) and it is gaining in importance as a result of experience and knowledge of business practice. In my article, I present the concept and tasks of compliance in a risk-based approach in the context of the three lines of defence, but also taking into account the practical functioning of compliance. Controls are not static, the logic of continuous improvement must prevail in control activities, therefore I consider it important to analyse the relationship between the whistleblowing directive and anticorruption, compliance management, and whistleblowing standards and I will also present good examples for practical operation.
Keywords: compliance, risk management, resilient operation, security

1. *Why is compliance a current and relevant issue?*

On average, companies lose 5% of their revenue to fraud, causing total losses of more than $3.6 billion, with an average loss of $8,300 per month and an average of 1 year to detect a fraud case[25] . According to the report, the application rate of the following five anti-fraud controls has increased by an average of 13% over the past 10 years in 2022:

- Hotline 70%
- Fraud training to employees 61 %
- Anti-Fraud Policy 60 %
- Fraud prevention training for managers, executives 59 %
- Fraud risk assessments 46%.

2. *Introduction to compliance: conceptual issues with a legal focus*

In the 21st century, the adaptability and resilience of companies is a key criterion for long-term success, as they constantly face challenges, including the rise of information and communication technologies (ICT), the management of the ever-growing data accumulated in the course of their activities, the organisation of work, the development of human resources capabilities, and the adaptation to a changing environment. Responses to challenges do not come about by themselves or for their own sake. Ideally, they are embedded in organisational flexibility, i.e. the ability to adapt as quickly as possible to new situations, to identify new threats, manage risks and prepare for new challenges, and to become a conscious change agent. Flexible organisations not only react quickly to new situations, but also seek to be part of change, to influence it and turn it to their advantage; they aim to take on challenges, partner with third parties and learn from all experiences. A tailor-made solution is needed to find a solution for quality risk management processes as part of the corporate strategy, weighing up the effort and cost inputs.

Compliance can become a tool for effective strategic risk management and promote a higher level of security. Compliance management is applied in many sectors (e.g. finance, ICT, environment, human resources protection, health care, pharmaceuticals). The concept of compliance can be defined in short : meeting legal requirement. The table below presents the approaches in parallel with a description of the content of compliance (what to comply with).

[25] Association of Certified Fraud Examiners: Occupational Fraud 2022: A Report to the Nations, https://acfepublic.s3.us-west-2.amazonaws.com/2022+Report+to+the+Nations.pdf, downloaded 28.04.2023., 2110 cases in 133 countries and 23 industries.

Author	Compliance definition	Compliance with what?
Georg Gösswein	Operating in accordance with the law.[26]	Legislation.
Mónika Balogh	"Compliance with and operation in accordance with all applicable rules and requirements (legal and otherwise)." [27]	Legislation, other rules, requirements.
Dennis Bock	"In the most general sense, compliance is - from an organisational perspective - an umbrella term for measures to demonstrate compliance with the law, to achieve behaviour that is in accordance with legal requirements, internal rules or other recommendations to be followed."[28]	Legislation, internal rules, recommendations.
Thomas Rotsch	"Compliance (...) is defined as the operation of businesses in compliance with the law in force, which is a characteristic of areas where complex and complicated regulation requires the application of preventive measures by "experts" to demonstrate compliance."[29]	Legislation.
Dr. István Ambrus, Dr. Kitti Mezei, Dr. Erzsébet Molnár	"In other words, compliance is a kind of conformity to standards within an organisation, be it legal or organisational ethical rules."[30]	Legislation, internal rules ethical norms, international standards, standards.

Table 1: Compliance definitions, author's own editing

On the basis of the above, it can be concluded that compliance is, on the one hand, compliance with the law, and on the other hand, compliance with other external regulations, internal rules, unwritten (ethical) rules, soft law, market conventions, international standards. The next level of compliance is the creation of a separate organisational unit or function/position, while the most complex approach is the creation of a compliance culture, whereby the entire organisation's strategy is driven by compliance throughout the organisation. Effective compliance is both an organisational function and a culture within the organisation.

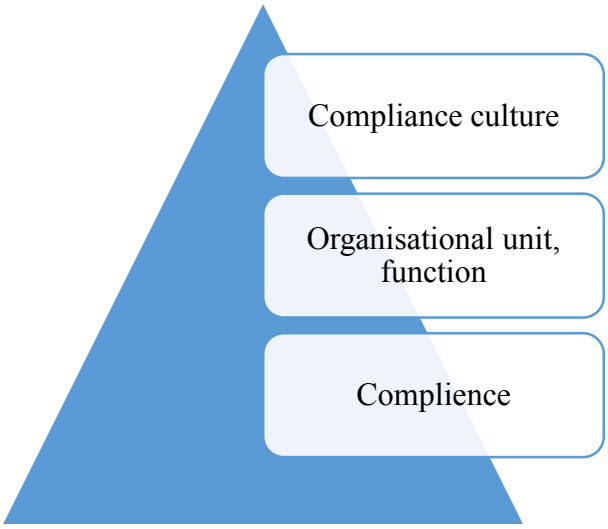
[26] Gösswein, Georg: Mediation als Weg aus dem Compiance-Dilemma, Die Mediation 2017/2, A mediation als a compliance dilemmas aus dem Compiance-Dilemmas aus dem Compiance-Dilemmas (translated by Erika Csemáné Váradi - Judit Jacsó), AKV European Review, 2017/1, pp. 122-127

[27] Monika Balogh: A labor compliance audit, Wolters Kluwer, Budapest, 2015, p. 15

[28] Bock, Dennis: Criminal Law Aspects of the Compliance Discussion - § 130 OWiG as a Central Norm of Criminal Compliance, ZIS 2009/2, 293. page

[29] Rotsch, Thomas: 4th Compliance, in: Achenbach, Hans/Ransiek, Andreas: Handbuch Wirtschaftsstrafrecht, 3rd edition, C.F. Müller, Heidelberg, 2012, p. 47

[30] Dr. István Ambrus, Dr. Kitti Mezei, Dr. Erzsébet Molnár: Explanation of compliance legislation I., General and criminal compliance, page 22



1. Figure The concept of compliance (own editing)

3. Risk-based protection system

Risk management is the basis of an effective and efficient compliance system, i.e. the risky operational and activity areas of the organisation must be mapped. In line with Jacsó's categorisation, compliance risks include legal, regulatory or other official sanction, financial loss, reputational damage, loss of trust[31] . The compliance function aims to identify, mitigate and manage compliance risks.

Compliance is not an effective control tool on its own, but is part of a more complex control framework comprising of three lines of defence. Based on the Institute of Internal Auditors' concept of three lines of defence[32], the first line of defence is the departments responsible for ensuring business operations and carrying out operational tasks. The second line of defence includes compliance units with compliance and risk expertise proactively monitoring risk factors and supporting the first line of defence. A key compliance area the achievement of risk management objectives such as: compliance with laws, regulations and the definition of acceptable ethical conduct, supporting internal governance, information and technology security, sustainability and quality assurance.

The first two lines of defence can only perform their functions effectively if they are both based on a risk-based approach at organisational level. The third line is independent of the first and second lines, with a reactive role for internal control linked to risk. The governing body of the organisation oversees compliance with legal, regulatory and ethical requirements, taking into account compliance aspects, while the management ensures that these are put into practice. The work of the entire organisation is supported by external assurance providers such as auditors. The compliance function therefore performs both control and support functions:

- identifying and managing risks and conflicts of interest;
- support the proper functioning of the organisation;
- taking measures and making proposals to address shortcomings;
- spread awareness of compliance at internal, organisational level;
- reporting to senior management;
- preventing corruption;
- managing conflicts of interest;

[31] Judit Jacsó: Money laundering compliance in the domestic and European dimension in the light of social innovation. Miskolc Legal Review, 2019/2/1, no. 397 page

[32] The Institute of Internal Auditors: The IIA's three lines model, An update of the Three Lines of Defence, https://www.theiia.org/globalassets/site/about-us/advocacy/three-lines-model-updated.pdf, retrieved 25/04/2023.

- respecting restrictions on the flow of information;
- preventing market manipulation (insider trading, unfair exchange rate manipulation);
- combating money laundering and financing of terrorism;
- preventing external and internal fraud;
- confidentiality and data protection (commercial, banking, securities and insurance confidentiality, protection of personal data),
- ensure transparent operation;
- ensuring fair treatment of customers, complaint handling activities;
- maintaining reputation and goodwill;
- carry out checks;
- liaising with the authorities.

4. Compliance in practice: main challenges and benefits

The aim is to prevent compliance risks in the organisation, and in order to achieve this, controls must not be static, but must be based on the logic of continuous improvement, based on the principle of plan - do - check - act. In other words: first plan what to do, then carry out the task and check the result, then intervene to do it better next time and start the whole process again.

Senior management must be committed to compliance[33] and set an example to the organisation. The principle of accountability must be enforced, and integrity and transparency must be ensured towards the members of the organisation. It is recommended that a compliance officer or office be designated to carry out compliance-related tasks, with a wide range of responsibilities and functional independence. Ideally, the compliance officer should have ICT and business expertise. One of his/her main tasks is to provide compliance advice that is aligned with the business strategy. He/she is responsible to develop compliance policies and the processes to enable their application and enforcement. Educating staff, even partners, and keeping them informed about the compliance program can make compliance "come alive". By applying compliance controls built into processes, compliance gaps can be identified and detected at an early stage and it allows for regular (re)assessment and further development of the organisational, technical, data security and trust framework of compliance.

Achieving, maintaining and "monitoring" ethical operation is a costly, time-consuming and energy-intensive task. The management must find a balance between following the rules, maximising profit, managing risk and efficient use of time. There are "as many compliance solutions as there are organisations", i.e. the specific industry, typical processes, risks, organisational structure, etc. are pillars on which to build a compliance structure commensurate with the risks involved. A compliance culture does not bring immediate benefits in the short term, however establishing a resilient organisation provides a competitive advantage and good reputation.

5. Whistleblowing, ISO standards and compliance

Whistleblowing Directive and its transposition into Hungarian law

The EU Directive 2019/1937[34] (whistleblowing directive) provides protection for whistleblowers who report breaches of consumer protection rules, privacy and personal data protection rules, product safety rules or anti-corruption rules, among others. The scope of the Directive includes:

- all legal entities operating in the public sector (although Member States may exempt municipalities with fewer than 10,000 inhabitants or municipal entities with fewer than 50 workers),
- private sector business organisations (employers) with 50 or more employees; or

[33] Tone at the top: senior management sets the guiding values and ethical rules for the organisation.

[34] DIRECTIVE (EU) 2019/1937 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2019 on the protection of persons who report infringements of EU law https://eur-lex.europa.eu/legal-content/HU/TXT/PDF/?uri=CELEX:32019L1937, retrieved on 27.04.2023.

- employers who, irrespective of the number of employees, carry out activities that are subject to specific sectoral regulation (e.g. financial services, prevention of money laundering and terrorist financing, transport safety, environmental protection).

The deadline for Member States to transpose was 17 December 2021 for legal entities with 250 or more employees and is 17 December 2023 for private sector entities with 50 or more but no more than 249 employees.

Under the Directive, companies are generally obliged to set up a notification system and protect whistleblowers, i.e.

- designing, building and operating secure reporting channels;
- acknowledgement of receipt of the report;
- contacting the person who made the report;
- action to investigate the complaint impartially and remedy the breach;
- providing feedback on the handling of the report and the reasons for it within a specified timeframe;
- ensuring confidentiality and protection of personal data;
- recording and documenting reports.

The Directive will be transposed into Hungarian law. According to the Hungarian draft law on rules on complaints, whistleblowing and reporting abuse[35] , employers will be obliged to set up an whistleblowing system if they employ at least 50 people as well as certain other employers listed in the draft law, such as those registered in Hungary and carrying out offshore oil and gas activities outside the EU as licensees or operators. It is important to underline that companies employing at least 50 but less than 250 persons may jointly set up an internal whistleblowing system, and the rules will only apply to them from 17 December 2023. The draft law also provides for the internal whistleblowing system to be established in state and local government bodies, however this goes beyond the scope of this paper.

Under the draft law, the subject of a report is information on an unlawful or suspected unlawful act or omission or other abuse in the internal whistleblowing system [§ 20 (1)]. The following persons may submit a report in the internal whistleblowing system
a) employed by the employer,
(b) an employed person whose employment relationship with the employer has been terminated, and
(c) a person who wishes to establish an employment relationship with an employer and for whom the procedure for the establishment of such a relationship has been initiated.
The following persons may submit a report in the internal whistleblowing system

a) a self-employed person, a sole proprietor, if it has a contractual relationship with the employer,
b) a person with an ownership interest in the employer and a member of the employer's administrative, management or supervisory body, including a non-executive member,
c) a contractor, subcontractor or person under the supervision and control of a supplier who has started the procedure for establishing a contractual relationship with the employer, or who is or has been in a contractual relationship with the employer,
d) trainees and volunteers working for the employer,
e) a person who wishes to establish a legal or contractual relationship with the employer within the meaning of (a), (b) or (d) and for whom the procedure for the establishment of such a legal or contractual relationship has been initiated, and
f) a person whose legal relationship or contractual relationship with the employer under (a), (b) or (d) has ceased [§ 20 (2)].

[35]Draft act on rules on complaints, whistleblowing and reporting abuse, https://www.parlament.hu/irom42/03089/03089.pdf, downloaded 20.04.2023.

As a general rule, the draft law makes the investigation of an anonymous report a matter of discretion [§ 22 (6)]. Time limit for examination: within the shortest possible period, but not more than 30 days from the date of receipt of the report, or up to 3 months in the case of an extension [§ 22 (2)-(3)]. Interaction with the whistleblower is defined by the draft Act as the contact keeping between the operator of the internal whistleblowing system and the whistleblower, who may invite the whistleblower to supplement or clarify the report, to clarify the facts and to provide additional information [Section 22 (5)]. The whistleblower must be informed in writing of the outcome of the investigation. The law also provides for the possibility not to investigate the report [Article 22 (6)]. The draft law lays down specific rules for the processing of personal data contained in the report. The draft law also regulates the protection of the whistleblower against retaliation and the immunity from liability of the whistleblower in relation to the information reported, but does not set out the conditions for reporting.

Businesses are therefore obliged to set up a whistleblower system to comply with the law. Achieving whistleblower confidence is essential for these systems to becoming operational, which requires protecting the data of whistleblowers, ensuring the anonymity of the whistleblower and protecting the whistleblower from adverse consequences.

The ISO 37001 standard[36] focuses on anti-corruption and provides practical guidance on how to comply with the requirements of the Directive. It lays down uniform principles for meeting legal, regulatory and market anticorruption requirements. An internal audit must be carried out regularly, based on a detailed audit programme, in order to provide the organisation with information on whether its operations comply with the its own rules and the requirements of the ISO standard. It can be applied to any company, public or private, depending on its size, structure and complexity. The standard is intended to address corruption in the private, public or not-for-profit sector, to prevent corruption (e.g. active bribery, acceptance of bribes) or direct and indirect corruption in relation to the organisation, its employees, business partners.

The application of the Hungarian draft law on complaints and whistleblowing rules can be supported by the ISO 37002 Standard on whistleblowing management systems[37]. The standard provides guidance to companies on how to operate whistleblowing systems that provide a protected and confidential environment for whistleblowers and build trust between the company and its stakeholders. The standard is intended to provide guidance for the establishment of a whistleblowing management system, providing a methodology for implementing, operating, evaluating, maintaining and improving the system. Its guiding principles are trust, impartiality and protection. The objective of the system is to identify and report suspected cases of fraud, conducting investigations, evaluating the results, and implementing effective management tools and closing cases. A key factor for the effective functioning of the whistleblowing system is to gain the trust of the whistleblower, and therefore it is necessary to consciously build trust.

The ISO 37301[38] certification standard is based on generally recognised, tried best practices that can form the basis for a well-functioning compliance system. It is applicable to all types of companies, regardless of their sector, size, structure and complexity. Its main principles are corporate governance, independence, provision of resources, direct reporting to senior management, proportionality and transparency. According to the standard, compliance equals meeting compliance obligations. This

[36] ISO 37001:2016 Anti-bribery management systems - Requirements with guidance for use: https://www.iso.org/obp/ui/#iso:std:iso:37001:ed-1:v1:en, , downloaded 15.04.2023.
[37] ISO 37002:2021 Whistleblowing management systems - Guidelines: https://www.iso.org/obp/ui/#iso:std:iso:37002:ed-1:v1:en , downloaded 15.04.2023.
[38] ISO 37301:2021 Compliance management systems - Requirements with guidance for use https://www.iso.org/obp/ui/#iso:std:iso:37301:ed-1:v1:en , downloaded 27.04.2023.

means both the expectations that an organisation is obliged to meet (compliance requirement) and those that the organisation voluntarily undertakes to meet (compliance commitment). The standard covers the full compliance spectrum, with its necessary elements:

- the commitment of senior management
- independent compliance function (compliance officer)
- assessment of compliance risks
- regular assessment and weighting of risks
- taking the appropriate countermeasures
- continuous monitoring
- continuous improvement of the compliance environment
- whistleblowing.

The standard specifies the planned, scheduled audits to be carried out on the basis of a detailed audit plan. However, the standard does not specify the exact purpose of the audit procedures. The independence of internal auditors must be ensured and the standard allows for third party (external) audits to be carried out.

The following organisational governance steps are recommended based on the standards:

- Review of the operating model based on the strategy, processes, tasks, controls in the light of risks, i.e. applying a continuous plan - do - check - act logic.
- Establishment and operation of a complex monitoring system.
- Develop internal rules: codes of conduct (ethics), procedures and data protection.
- Introduction of new ICT solutions such as automated business processes, digital risk assessment, testing procedures.
- Providing training to staff members, acknowledging talents to promote proactivity.
- Appropriate levels of authoritsation and decision-making powers need to be defined.
- Ensuring a permanent supportive presence.
- Building a network of helpers: compliance ambassadors, professional communities.
- Use of ad hoc and systematic tests.
- Identify and present best practices to the organisation.

6. Compliance-sensitive sectors

Compliance in the financial and capital markets sector

The financial sector is a high-risk sector, the operation of which is governed by a number of sectoral laws, international standards, professional guidelines and recommendations. The need for compliance is strong in this sector. In addition to anti-money laundering, combating terrorist financing, anti-corruption, ethical issues, conflict of interest regulation, market manipulation investigations, investor and consumer protection are important compliance areas. Typical tasks addressed in this sector:

- combating money laundering and terrorist financing;
- anti-corruption;
- managing conflicts of interest;
- the separation of financial and investment servic activities;
- respecting the restrictions on the flow of information;
- preventing market manipulation (insider trading, exchange rate manipulation);
- preventing external and internal fraud;
- confidentiality and data protection (commercial, banking, securities and insurance confidentiality, protection of personal data),
- the financial organisation, group members and employees' own-account transactions;
- ensuring fair treatment of customers, including complaint handling;
- maintaining good reputation and goodwill.

Recommendation 12/2022 (VIII.11.) of the National Bank of Hungary on the establishment and operation of internal lines of defence and on the management and control functions of financial institutions was a significant progress, which sets out obligations for financial institutions in five areas. From 1 January 2023, it is mandatory to establish a fraud prevention and management culture and internal audit trail, and to review the risk management and compliance function procedures and related policies, taking into account conflicts of interest regarding close relatives. From 1 January 2014, the designation of a governing body/senior management member responsible for compliance with the requirements related to the prevention of money laundering and terrorist financing[39] is mandatory.

Compliance in the pharmaceutical industry
In the health care sector, the focus is on protecting patients, and clear and unambiguous information is essential, particularly in view of the information and knowledge gaps that patients have. An important principle is to respect doctors' therapeutic freedom, to avoid undue influence, to ensure that the promotion of medicines complies with the law and to ensure fair market conduct. It is a highly regulated industry, with a high level of regulatory oversight and significant industry self-regulation. Sector-specific compliance risks may include legal transparency in interactions with healthcare professionals, communication, information and advertising about medicines, and generally, health data impose great risks in this sector.

Compliance in the telecommunication sector
The focus of compliance is on anti-corruption, ethical issues, and internal communication. Typically, integrated management system is applied instead of sectoral compliance standards. Compliance tends is not to be an independent organisational unit, it usually functions in conjunction with other areas (e.g. legal, risk management).
The use of compliance is also gaining importance in the public sector, however this goes beyond the scope of this paper.

Based on the above, it can be stated that without a compliance function within the organisation, business success cannot be achieved in the long term, and its role is becoming increasingly important in almost all sectors. The development of a compliance culture and the application of a risk management system can represent additional operational support tools that can significant contribute to the development and maintenance of a resilient operation.

7. Summary
In this paper, I summarised the concept of compliance and outlined its place in the risk-based protection system. I have discussed the compliance practice based on the main challenges and benefits. I analysed the relationship between whistleblowing, ISO standards and compliance, with a special emphasis on the Whistleblowing Directive and its transposition into the Hungarian legislation. I also suggested organisational governance steps along these standards. I described some compliance sensitive sectors, including the financial and capital market sector, the pharmaceutical industry and telecommunications. Long-term corporate and organisational success and compliance-based operations are closely connected. Legislation, professional, quality standards, ethical rules can all contribute to compliance not only in principle but also in practice. In the 21st century, flexibility and adaptability play a central role. The development of a compliance culture is of strategic importance and is intertwined with risk management and effective organisational governance, which can lead to the practical application of compliance as a value.

[39] Recommendation No. 12/2022 (VIII.11.) of the Hungarian National Bank on the establishment and operation of internal lines of defence, the management and control functions of financial institutions, https://www.mnb.hu/letoltes/12-2022-belso-vedelmi-vonalak-ajanlas.pdf , downloaded on 25.04.2023.

Literature

5. Dr. István AMBRUS, Dr. Kitti MEZEI, Dr. Erzsébet MOLNÁR: Magyarázat a compliance jogszabályairól I., Általános és büntetőjogi compliance (Explanation of compliance legislation I., General and criminal compliance), page 22
6. Mónika BALOGH: A munkaügyi compliance audit (A labour compliance audit), Wolters Kluwer, Budapest, 2015, page 15
7. BOCK, Dennis: Strafrechtliche Aspekte der Compliance-Diskussion - § 130 OWiG als zentrale Norm der Criminal Compliance, ZIS 2009/2 (Criminal Law Aspects of the Compliance Discussion - § 130 OWiG as a Central Norm of Criminal Compliance, ZIS 2009/2,) page 293.
8. Gösswein, Georg: Mediation als Weg aus dem Compiance-Dilemma, Die Mediation 2017/2, page. 122-127
9. Judit JACSÓ: A pénzmosás compliance a hazai és európai dimenzióban a társadalmi innováció tükrében (Money laundering compliance in the domestic and European dimension in the light of social innovation). Miskolc Law Review, 2019/2/1, No. 397. page 397
10. KOCZISZKY G., & KARDKOVÁCS K. (2020). A compliance szerepe a közösségi értékek és érdekek védelmében (The role of compliance in protecting community values and interests.) Akadémiai Kiadó
11. Compliance Working Group of the Hungarian Banking Association: best practice in the operation of the compliance function (Best Practice Code), Budapest, 2017, https://www.bankszovetseg.hu/Content/alapdokumentumok/6_melleklet_Compliance_Best_Practice_Kodex_HUN.pdf , accessed 29.04.2023.
12. Recommendation No. 12/2022 (VIII.11.) of the Magyar Nemzeti Bank on the establishment and operation of internal lines of defence, and on the management and control functions of financial institutions, https://www.mnb.hu/letoltes/12-2022-belso-vedelmi-vonalak-ajanlas.pdf , downloaded on 25.04.2023.
13. ROTSCH, Thomas: 4th Compliance, in: Achenbach, Hans/Ransiek, Andreas: Handbuch Wirtschaftsstrafrecht, 3rd edition, C.F. Müller, Heidelberg, 2012, p. 47
14. The Institute of Internal Auditors: The IIA's three lines model, An update of the Three Lines of Defense, https://www.theiia.org/globalassets/site/about-us/advocacy/three-lines-model-updated.pdf, retrieved 25/04/2023.
15. Act XCV of 2005 on Medicinal Products for Human Use and other Acts Regulating the Pharmaceutical Market, https://net.jogtar.hu/jogszabaly?docid=a0500095.tv , downloaded 20.04.2023.
16. 2006 XCVIII Act on the General Rules for the Safe and Economical Supply of Medicines and Medical Devices and the Distribution of Medicines
17. https://net.jogtar.hu/jogszabaly?docid=a0600098.tv
18. Act CCXXXVII of 2013 on Credit Institutions and Financial Undertakings, https://net.jogtar.hu/jogszabaly?docid=a1300237.tv , downloaded 20.04.2023.
19. Act XVI of 2014 on Collective Investment Schemes and their Managers and on the Amendment of Certain Financial Acts, https://net.jogtar.hu/jogszabaly?docid=a1400016.tv , downloaded 20.04.2023.
20. Act LIII of 2017 on the Prevention of Money Laundering and Terrorist Financing, https://net.jogtar.hu/jogszabaly?docid=a1700053.tv , downloaded 20.04.2023.
21. Association of Certified Fraud Examiners: Occupational Fraud 2022: A Report to the Nations, https://acfepublic.s3.us-west-2.amazonaws.com/2022+Report+to+the+Nations.pdf , downloaded 28.04.2023.
22. DIRECTIVE (EU) 2019/1937 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2019 on the protection of persons who report infringements of EU

law https://eur-lex.europa.eu/legal-content/HU/TXT/PDF/?uri=CELEX:32019L1937 , accessed 27.04.2023.
23. Bill on complaints, whistleblowing and rules on reporting abuse, https://www.parlament.hu/irom42/03089/03089.pdf , downloaded 20.04.2023.
24. ISO 37001:2016 Anti-bribery management systems - Requirements with guidance for use: https://www.iso.org/obp/ui/#iso:std:iso:37001:ed-1:v1:en, , downloaded 15.04.2023.
25. ISO 37002:2021 Whistleblowing management systems - Guidelines: https://www.iso.org/obp/ui/#iso:std:iso:37002:ed-1:v1:en , downloaded 15.04.2023.
26. ISO 37301:2021 Compliance management systems - Requirements with guidance for use https://www.iso.org/obp/ui/#iso:std:iso:37301:ed-1:v1:en , downloaded 27.04.2023.

ÁGNES CSISZÁRIK-KOCSIR: EXPLORING USER SATISFACTION IN ARCHITECTURAL MEGAPROJECTS OF GLOBAL SIGNIFICANCE

Abstract: Measuring project success is a complex and still a topic of interest and debate. Projects are considered successful when they achieve their objectives and are delivered on time and within budget. But project success is a much more complex and complex concept. There are many factors that can make a project a success or a failure. End-users play a very important role in this process, especially for projects that directly or indirectly serve social objectives at local or international level. The satisfaction of the end users, i.e. the clients, is also a key issue to be addressed because the perception, profitability and prosperity of the results that the project has produced depend on the clients. Many well-intentioned and well-designed projects have failed because of inadequate results. This is particularly important for projects that are of international importance or interest. The present study aims to present a user-level assessment of two projects in Dubai, United Arab Emirates, that are of global interest. Due to the international nature of the two projects, the study is based on the opinions of Hungarian potential users. The projects are part of the PMI 2021 shortlist. The study will focus on the construction of the Dubai Expo building and the Museum of the Future, based on the opinions of users. The results are intended to provide a good basis for future projects of similar grandeur, highlighting the success factors and factors to be taken into account from the users' perspective.

Keywords: megaproject, user, project success, customer satisfaction

1. Literature review

The scope of a project summarises the processes and factors that need to be in place to make your project successful. Project success can be clearly defined in terms of the satisfaction of the end users, the stakeholders. Scope is the set of products and services that the project is intended to produce, i.e. the project itself is intended to achieve them. Scope is an important element of projects, the defining element of the iron triangle (project triangle), alongside time and cost. It is the achievement of scope that measures customer satisfaction and the level of project success. There are two aspects of scope definition (PMI, 2017):

- project scope - which is nothing other than the process of producing the deliverable, product or service, and the
- product scope - all important characteristics that define the product or service itself.

In the future, as the environment and circumstances change, customers will consider successful projects those that meet their needs, rather than those that meet the predefined specifications. Needs may change over the life of a project, so it is important to monitor customer needs continuously (Neal, 1995). Incomplete definition of project scope occurs when the needs of one or more stakeholders are not included or are given less weight than justified (Sharma - Lutcham, 2006). Failure to clarify stakeholder expectations in a timely manner, ignoring risks, again increases the risk of project failure (Atkinson et.al, 2006).

Project success is interpreted as a measure of the project. Project success is complex and complex, and it is not possible to provide a clear definition of a value that, if met, a project can be considered successful. Customer and stakeholder satisfaction is very important and can only be achieved through accurate and continuously monitored scope definition. The interpretation of project success is clearly subjective. As long as one stakeholder considers a project to be successful because it meets his

expectations, the other feels that it is nowhere near it. This is why several researchers, including co-authors Shenhar (2001), have attempted to define project success:

- meeting time, budget, and other requirements,
- impact on the client,
- impact on the implementing organisation, and
- impact on the future.

Before the turn of the millennium, the measurement of project success focused mainly on the triangular dimensions of the project. Cost containment, timeframes, quality and scope of the project were important, but little emphasis was placed on the functioning of the end result. However, due to economic and market changes, the focus has increasingly shifted towards customer satisfaction (Jugdev & Muller, 2005). Further interpretations of project success have also required consideration of the needs of different stakeholders, which has made the definition of project success increasingly heterogeneous (Stuckenbruck 1986). Here it is important to mention the users, owners, managers, project team, as well as the indirect and direct stakeholders who are affected by the success or failure of the project (Baccarini, 1999). Project success can vary depending on individual and business needs, which points beyond the classical project triangle factors. The success of a project designed to generate business and profit generally depends on how the project outcomes contribute to the achievement of business objectives, including financial benefits, market share and the long-term development of the organisation (Silva et al. 2015). The degree of cooperation between project participants during project implementation and how well the expectations of participants and stakeholders were met are also important in determining the success of a project. Project management, i.e. how project managers and project team members manage the project, the problems and risks that arise, and how effectively they are able to communicate with project participants and stakeholders, also plays an important role in the above. There are interpretations that divide project success into two, micro and macro levels (Lim & Mohammed, 1999), but it can also be interpreted in other dimensions such as project management, product or even market success (Al-Temeemy et al, 2011).

The management and control of projects and the planning and management of future projects are based on project success (Chovichien & Nguyen, 2013). Therefore, it is very important to keep project success in mind and evaluate it continuously, which will bring organizational and individual benefits both in the present and in the future (Pinto & Slevin, 1998). It should be noted, however, that project success is a rather subjective and highly complex concept (Parfitt & Sanvido, 1993), which makes it even more difficult to grasp and interpret in the case of construction projects (Chan & Chan, 2001).

If we want to examine and analyse the sustainability of projects, it is important to note that many studies on the subject do not clearly define its content. Sustainability has been used in previous literature to refer to the transmission of results over time through projects (Scheirer, 2005). This interpretation includes timeliness, material sustainability and even environmental sustainability. Undoubtedly, sustainability also includes an innovation dimension, with the introduction of the concept of sustainable innovation. Today, the environmental interpretation of sustainability is the one that has become the most familiar. It is also increasingly being incorporated by project managers into the definition of the scope of projects, making it an important element in increasing stakeholder satisfaction.

From a user perspective, project success is defined as how the project outcomes meet user needs and expectations (Salminen, 2005). From a user perspective, the success of construction projects can be defined primarily in terms of the construction objectives and the client's needs, where the usability of the project outcomes is always an important aspect. Construction projects are mostly long-term investments, which is why it is important to match them with the needs of the end users in several aspects.

A successful construction project should generally meet the following criteria (Baker et al. 2008; Freeman & Beale, 1992):

1. Deadlines: a construction project must meet deadlines in order to complete the project in the shortest possible time. If the project is completed within the deadline, users can use the building or infrastructure sooner, and if there is a time lag, it can cause financial and other damage to both parties (client and contractor).
2. Costs: the construction project must comply with budgetary constraints, while respecting the principle of cost-effectiveness, without compromising the quality and functionality of the building or infrastructure.
3. Quality: the project must comply with quality standards and specifications.
4. usability: the building or infrastructure must meet the needs, expectations and comfort of its users.
5. Safety: the building or infrastructure must be safe for users, adhering to all safety rules and guidelines for usability.
6. Sustainability: The building or infrastructure shall be sustainable and take into account environmental factors, in particular energy saving and environmentally friendly materials and operation.

2. Material and method

The megaprojects presented in this study are included in the top 50 project list published by the Project Management Institute (PMI) (PMI, 2021). Two construction projects are presented in this study, each of which is based in Dubai. The evaluation of the Dubai Expo and the Museum of the Future was carried out from the perspective of ordinary people, i.e. there was no prerequisite for inclusion in the sample, neither education nor previous project management knowledge, so the questionnaire used as a basis for the evaluation could be filled in by anyone. Respondents were asked to rate the selected projects according to some factors of project scope. In interpreting the scope of a project, the following were considered, among other things, the novelty, usefulness, interest, sustainability, feasibility and uniqueness of the project. Respondents rated the above factors on a scale of 1 to 4, with 1 being very weak and 4 being very strong. There were 172 evaluable responses to the questions. 39.5% of the respondents in the sample had a tertiary education, while 60.5% had a secondary education. 12.2% of the respondents are Generation Y, 23.3% are Generation X and 64.5% are Generation Z. The survey was conducted in April and May 2022.

3. Results

3.1 Evaluation of the Dubai Expo project

The pandemic has significantly altered the construction schedule of the Dubai Expo, postponing the original schedule, but has not been able to stop the Dubai Expo 2020 project. Leaders of the $8.2 billion mega-project have regrouped and pushed the global attraction back a year to open in October 2021 and run until March 2022. Organizers expected the event to attract 25 million visitors to the region, boosting Dubai's economy by $33 billion and creating some 300,000 jobs. The World Expo, which takes place every five years, will see hundreds of countries showcase the latest in architecture and technology in impressive pavilions. The project's success is due to the fact that the term 'vast' seems an understatement when describing the project site, which is best illustrated by the 4.4 square kilometres (1.7 square miles) of land - roughly the size of 600 football pitches - in the emirate's suburbs. The project includes dedicated public transport lines and motorway exits, an exhibition centre capable of accommodating 20 000 participants at a time and more than 200 pavilions.

First, I wanted to gauge how respondents rated the project overall. A high proportion of survey respondents rated it as medium (36%), with only 9% rating it as excellent. The proportions shown in

the graph below indicate that the project, despite its grandiose nature, did not receive unanimous support from the sample of respondents, a fact that is somewhat at odds with the objectives set out above.

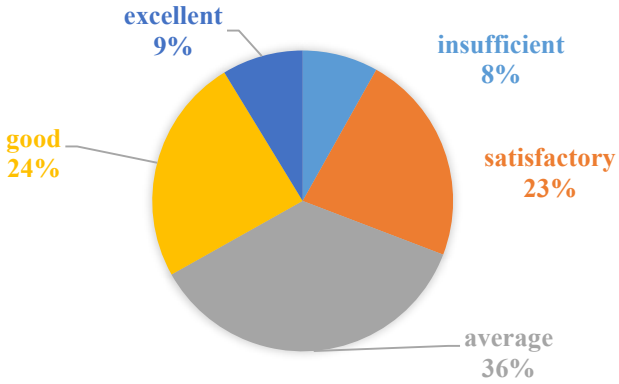


Figure 1. Overall assessment of the Dubai Expo project
Source: own research, 2022, N = 172

When looking at the average rating for each of the characteristics of project scope, the respondents' rating of the profit orientation of the project is the highest. This is followed by very high ratings for interest, feasibility and novelty. These four characteristics were all rated with an average value of three integers above the mean. It was clear to the respondents that the project is huge and unique, and that there is a clear profit motive behind it. Starting from the bottom of the list, the lowest average scores were given to the cost-effectiveness, environmental friendliness, sustainability and utility of the project. This low ranking of environmental awareness is interesting because the project was built with a strong emphasis on the environment, environmental awareness and sustainability by both the designers and the contractors, and the project as a whole is intended to promote these characteristics.

Table 1. Average rating and variance of the scope elements of the Dubai Expo project

	Mean	Std. dev.
Novelty	3,006	0,927
usefulness	2,494	0,908
interesting	3,192	0,874
future focus	2,983	0,888
sustainability	2,349	0,784
relevance	2,547	0,840
feasibility	3,140	0,744
usability	2,616	0,804
public interest	2,814	0,879
profit orientation	3,419	0,809
uniqueness, uniqueness	2,988	0,930
cost-effectiveness	2,081	0,976
environmental awareness	2,116	0,837

Source: own research, 2022, N = 172

I was also curious to see how much the average rating of the project influenced the rating of each characteristic. To do this, I carried out an analysis of variance. The results of the analysis of variance show that in only one case, profit orientation, is there no significant relationship between the average

project rating and the value of this characteristic of project scope. Thus, it can be said that the overall assessment of the respondents has a significant influence on the perception of each characteristic. Therefore, it is particularly important that a project is perceived by end-users as a whole, as only then will they understand and accept its details, and like the project as a whole.

Table 2. Correlation of Dubai Expo project scope elements with average project perception

		Sum of Squares	df	Mean Square	F	Sig.
Novelty	Between groups	26,211	4	6,553	9,060	*0,000*
	Within groups	120,783	167	0,723		
	Total	146,994	171			
usefulness	Between groups	68,591	4	17,148	39,552	*0,000*
	Within groups	72,403	167	0,434		
	Total	140,994	171			
interesting	Between groups	23,913	4	5,978	9,352	*0,000*
	Within groups	106,755	167	0,639		
	Total	130,669	171			
future focus	Between groups	32,089	4	8,022	13,025	*0,000*
	Within groups	102,858	167	0,616		
	Total	134,948	171			
sustainability	Between groups	29,037	4	7,259	15,945	*0,000*
	Within groups	76,032	167	0,455		
	Total	105,070	171			
relevance	Between groups	24,739	4	6,185	10,771	*0,000*
	Within groups	95,889	167	0,574		
	Total	120,628	171			
feasibility	Between groups	14,657	4	3,664	7,649	*0,000*
	Within groups	79,994	167	0,479		
	Total	94,651	171			
usability	Between groups	18,408	4	4,602	8,330	*0,000*
	Within groups	92,266	167	0,552		
	Total	110,674	171			
public interest	Between groups	26,018	4	6,505	10,245	*0,000*
	Within groups	106,028	167	0,635		
	Total	132,047	171			
profit orientation	Between groups	0,734	4	0,184	0,276	0,893
	Within groups	111,126	167	0,665		
	Total	111,860	171			
uniqueness, uniqueness	Between groups	20,178	4	5,044	6,592	*0,000*
	Within groups	127,799	167	0,765		
	Total	147,977	171			
cost-effectiveness	Between groups	22,545	4	5,636	6,708	*0,000*
	Within groups	140,315	167	0,840		
	Total	162,860	171			
environmental awareness	Between groups	28,008	4	7,002	12,757	*0,000*
	Within groups	91,666	167	0,549		
	Total	119,674	171			

Source: own research, One-Way ANOVA, 2022, N = 172

3.2 Average evaluation of the Museum of the Future project

Looking at Dubai's newest extreme building, it appears to have been dropped from space and is floating gently alongside the busy Sheikh Zayed Road, but in reality the building is firmly grounded - structurally and strategically. The AED 500 million project, supported by the Dubai Future Foundation, aims to provide a community venue for exhibitions, immersive theatre productions and themed exhibitions. Its mission is to expose the most pressing threats of our time, while highlighting possible solutions. Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the United Arab Emirates and Ruler of Dubai, has inscribed the 78-metre-high structure with his thoughts on the future. The unusual shape of the building is meant to symbolise understanding of humanity, with a void in the middle to represent the unknown.
Here too, I wanted to know first of all how the respondents rated the project overall. It can be said that a similar proportion of respondents considered the project to be appropriate as the one presented above. More than a third of respondents rated the project as medium, slightly more rated it as good (32%), but there was a fairly high proportion of respondents who rated the project as unsatisfactory (8%), which is in line with the similar rating for Expo.

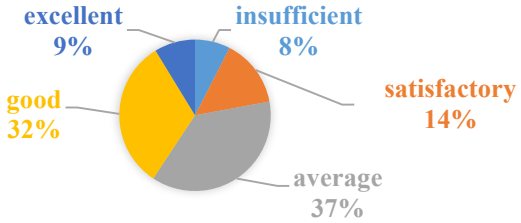


Figure 2. Overall evaluation of the Museum of the Future project
Source: own research, 2022, N = 172

I then asked how respondents perceive and evaluate each element of the scope. At the top of the list in terms of average value is the interest of the project. This is followed by its uniqueness with a relatively similar average value, then by novelty, future focus and profit orientation. Each of these factors has an average value above three integers. Respondents consider the project to be the least cost-effective, the least useful and the least environmentally conscious, even though the main message of the project would be to draw attention to the most pressing and urgent problems facing humanity, with a focus on the problem of environmental degradation and the importance of environmental protection.

Table 3. Average rating and scatter of the scope elements of the Museum of the Future project

	Mean	Std. dev.
novelty	3,407	0,786
usefulness	2,419	0,794
interesting	3,483	0,753
future focus	3,302	0,846
sustainability	2,669	0,879
relevance	2,494	0,834
feasibility	2,965	0,657
usability	2,744	0,833
public interest	2,762	0,842
profit orientation	3,110	0,976
uniqueness, uniqueness	3,436	0,719
cost-effectiveness	2,047	0,966
environmental awareness	2,419	0,973

Source: own research, 2022, N = 172

I was also curious to know how the overall evaluation of the Museum of the Future project influences the perception of the project. To measure the relationship, I again conducted an analysis of variance using ANOVA. Again, in this case, the average evaluation was associated with almost all of the factors based on the significance values. In the present case, it is also observed that the average evaluation of the project has an effect on almost all the project scope elements, with one exception, which is none other than novelty. The present project also supports the above findings, which were seen in the project evaluation of Expo. It is very important to win over end-users at first sight in order to make the project success meaningful from the user side.

Table 4. Correlation of the scope elements of the Museum of the Future project with the average perception of the project

		Sum of Squares	df	Mean Square	F	Sig.
Novelty	Between groups	3,704	4	0,926	1,519	0,199
	Within groups	101,807	167	0,610		
	Total	105,512	171			
usefulness	Between groups	50,225	4	12,556	36,382	*0,000*
	Within groups	57,636	167	0,345		
	Total	107,860	171			
interesting	Between groups	13,509	4	3,377	6,760	*0,000*
	Within groups	83,438	167	0,500		
	Total	96,948	171			
future focus	Between groups	38,576	4	9,644	19,241	*0,000*
	Within groups	83,703	167	0,501		
	Total	122,279	171			
sustainability	Between groups	35,300	4	8,825	15,223	*0,000*
	Within groups	96,810	167	0,580		
	Total	132,110	171			
relevance	Between groups	19,786	4	4,947	8,327	*0,000*
	Within groups	99,208	167	0,594		
	Total	118,994	171			
feasibility	Between groups	5,559	4	1,390	3,401	*0,011*
	Within groups	68,232	167	0,409		
	Total	73,791	171			
usability	Between groups	37,514	4	9,378	19,281	*0,000*
	Within groups	81,230	167	0,486		
	Total	118,744	171			
public interest	Between groups	23,107	4	5,777	9,832	*0,000*
	Within groups	98,120	167	0,588		
	Total	121,227	171			
profit orientation	Between groups	15,634	4	3,908	4,432	*0,002*
	Within groups	147,268	167	0,882		
	Total	162,901	171			
uniqueness, uniqueness	Between groups	17,452	4	4,363	10,285	*0,000*
	Within groups	70,845	167	0,424		
	Total	88,297	171			
cost-effectiveness	Between groups	34,279	4	8,570	11,417	*0,000*
	Within groups	125,349	167	0,751		
	Total	159,628	171			

environmental awareness	Between groups	39,768	4	9,942	13,599	*0,000*
	Within groups	122,092	167	0,731		
	Total	161,860	171			

Source: own research, One-Way ANOVA, 2022, N = 172

4. Conclusions

The success of a project can be interpreted along many dimensions and has many aspects. A project cannot be considered a success just because it has fulfilled all the elements of the project triangle, i.e. it has produced the desired output on time and within budget. How this is perceived and interpreted by the users is also very important, as they will be the ones for whom the project was created. The two megaprojects examined in this study focus specifically on attracting users. It is the users, i.e. visitors, who will be the ones who will use the projects, guaranteeing their return on investment by generating revenue through their visits. If the project does not appeal to end users, they will not visit it, thus causing a loss of revenue for the project. Therefore, it is very important to take into account user needs and expectations when designing any project, in order to make it interesting. This should be made clear at the project design stage. The conclusions that can be drawn from the study clearly call for design and thinking with the users' heads. It is not enough to have a spectacular and grandiose design that is a dream, it must reach the users' threshold of inspiration by making it worth our while. The success of 21st century projects must therefore not only be measured along the classic dimensions, but it is also very important to take into account the views of stakeholders and users in order to ensure the success and long-term sustainability of projects.

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References

Al-Tmeemy, S.M.H.M., Abdul-Rahman, H., Harun, Z., 2011. Future criteria for success of building projects in Malaysia. International Journal of Project Management 29(3), pp. 337-348

Atkinson, R., Crawford, L., Ward, S. 2006. Fundamental uncertainties in projects and the scope of project management. International Journal of Project Management, 24(8), pp. 687-698.

Baccarini, D., 1999. The logical framework method for defining project success. Project Management Journal 30, pp. 25-32.

Baker, B.N., Murphy, D.C. and Fisher, D. (2008) "Factors affecting project success" Project Management Handbook, 2nd ED, pp.902-919.

Chan, A.P., Chan, A.P. (2001), "Key performance indicators for measuring construction success", Benchmarking: An International Journal, Vol. 11, No. 2, pp. 203-221

Chovichien, V., Nguyen, T.A. (2013), "List of indicators and criteria for evaluating construction project success and their weight assignment", 4th International Conference on Engineering Project and Production.

Freeman, M., Beale, P. (1992), "Measuring project success", Project Management Institute.
Jugdev, K., Muller, R., 2005. A retrospective look at our evolving understanding of project success. Project Management Journal, 36, 19-31.

Lim, C.S., Mohamed, M.Z., 1999. Criteria of project success: an exploratory reexamination. International Journal of Project Management, 17, pp. 243-248.

Parfitt, M. K., Sanvido, V. E. (1993), "Checklist of critical success factors for building projects", Journal of Management in Engineering, Vol. 9, No. 3, pp. 243-249.

Pinto, J.K., Slevin, D.P. (1988), "Project success: definitions and measurement techniques", Project Management Institute.

Project Management Institute 2017. Project Management Body of Knowledge, 6th edition, Pennsylvania, USA

Sharma, A., Lutchman, C. 2006. Scope Definition for Expanding Operating Projects. AACE International Transactions.

Shenhar, A., Dvir, D., Levy, O., Maltz, A.C. 2001. Project success: a multidimensional strategic concept. Long Range Plan. 34 (6), pp. 699–725.

Silva Susil, G.A.K., Warnakulasooriya, B.N.F. and Arachchige, B.J. (2015), "Critical Success Factors for Construction Projects: A Literature Review" In 12th International Conference on Business Management (ICBM).

Stuckenbruck, L.C., 1986. Who determines project success? PMI Annual Seminar and Symposium, Montreal, pp. 85-93.

GERGELY ORSOLYA, KÁDÁR BEÁTA:
WHAT DOESN'T KILL YOU, MAKES YOU STRONGER?
THE SITUATION OF FEMALE ENTREPRENEURS AFTER A LONG CRISIS PERIOD FROM ROMANIA ACCORDING TO A DESK RESEARCH AND EXPERT INTERVIEWS

Abstract

Entrepreneurs, in particular female entrepreneurs have to face nowadays in the European and indeed global labour markets how to survive crises and adjust their businesses to become more resilient, remain competitive and sustainable in a time of crises. The circumstances caused by Covid-19 also bring forth the need for women entrepreneurs to be flexible, resilient, improve digital skills, and effectively apply crisis management strategies.

We propose to present the primary results of a national desk research regarding the situation of female entrepreneur in the first month of 2023 and a qualitative research conducted amoung experts regarding female entrepreneurs from Romania. The aim of the research conducted as part of a 3 year long Erasmus+ project launched at the end of 2022, is to increase the understanding of the impact of the last 3 years and to explore the situation of women entrepreneurs and assess their needs. More specifically the expert interviews will gather information how experts see the situation of female entrepreneurs from Romania, on the challenges, difficulties they've faced in times of crisis, as well as on their strategies to mitigate or overcome those challenges, reorient and adapt their business.

Key words: female entrepreneurs, COVID-19, impact of crisis, economical crisis

1. Introduction

Among the most significant social changes worldwide can be enrolled the fact that during the last half century the gender roles have been going through a transformation process (Bokányi & Bauer, 2019). As a part of this process, an increasing number of women entered the entrepreneurial sector, by starting their own businesses (Castrillon, 2019; Geambaşu, 2019a; Gergely, 2019a; Bokányi, 2019). This personal and professional decision is not rarely motivated by the desire for financial independence (Gergely – Zerkula, 2021). There are female entrepreneurs, who want to work part-time because they opt for a better work-life balance, or because they do not want or able to return to a full-time 8 hours less flexibel work programme. Entrepreneurship is considered a career path for women because it offers equal social and economic opportunities (Szekeres, 2014; Gódány, 2018; Gergely, 2020).

In the last decades gender differences regarding to employment, wages, and education have decreased significantly, however the female population is still in a different situation in the labour market than men, and women are over-represented in those occupational sectors, where the wages are much lower (Gergely – Zerkula 2021). They work as employees rather than being self-employed, and they are underrepresented among entrepreneurs and in leadership positions (Bokányi & Bauer, 2019), but the entrepreneurial carrier promises them a wider opportunity for self-fulfilment (Gódány, 2018, Gergely 2019). However, during the last twenty years, the gender gap has been slowly closing over the past two decades (Gergely 2020). But the pandemic has had a impacts in all the business sectors. But these – mainly negative – impacts have disproportionately affected female entrepreneurs.

2. Female entrepreneurs in time of crisis

Since the female entrepreneurs can be more vulnerable in economical and social way as well (Lomazzi 2020), the COVID-19 pandemic had a disproportionately large negative impact on this particular entrepreneurail strata. According to a cross national study conducted in summer 2020 (Koltai et al. 2020), 62% of female entrepreneurs from Europe experienced a major decrease in income (62%), half of them experienced declining in market demand as well (52%) (Koltai et al. 2020). Only one fouth of women entrepreneurs could introduce new products (23%), and 14% had increase in online sales (Koltai et al. 2020). According to some studies, the most successfull women

entrepreneurs – under the influence of neoliberal principles – tend to invest time and energy in the business, and sacrifice the family (De Simone – Priola 2021), otherwise they cannot overcome the gender barriers (Adamson – Kelan 2019). But since the pandemic crisis increased the workload for women (Del Boca et al 2020, Geambașu et al. 2020, Koltai et al. 2020), women, mainly those who raise small children did not have much choice: they had to invest time and energy in the family. And this means that they could give less time, energy and dedication to their firms: those who had small childre, could work much less during the pandemic period (Koltai et al. 2020). The success of the strategy which could be use during this period lays on the success of balancing family–work conflict, as a main part of the entrepreneurial success (De Simone et al. 2021)

3. Resilience throw cross national research project

Entrepreneurs, among them the women entrepreneurs, have not got the chance to recove from the economic shock caused by the pandemic period, yet they already had to face an energy crisis followed by an economic crisis. Our Erasmus plus RE-FEM project[40] has multiple objectives. On one hand to focus on the impact caused by the COVID-19 by describing the strategies used by female entrepreneurs to cope with the Covid and post-Covid era, but on the other hand it focuses on all types of crises the female entrepreneurs need to cope with nowadays, because it is becoming more and more apparent that we live in a crisis society (Bruyninckx, 2021).

The main objective of the RE-FEM project is to decrease the gender gap in entrepreneurship. In order achieve this, we want to explore the challenges women entrepreneurs (WEs) face in a post-Covid era and their needs for having resilient businesses, nevertheless to improve female entrepreneurs' competencies to maintain resilient enterprises with a special focus on those being in vulnerable situations. Throught this project we would like to gain a deeper understanding of the challenges female entrepreneurs had or still have to face during the various waves of the COVID-19 pandemic, focusing on specific aspects of the situation of women with fewer opportunities/in disadvantaged regions. This project will help to assess the digital readiness, resilience, crisis management and coping strategies of women entrepreneurs in times of crisis. The project will also contribute in gathering the needs of women entrepreneurs for competence development with a focus on digital tools and skills, adaptability and crisis management. Nevertheless, thanks to this project, there will be developed capacities of adult education in the field of women entrepreneurship, and to improve access to specific knowledge related to entrepreneurship throughout Europe via online educational platform and international networking opportunities. Last, but not least the research and the empirical data based educational material will build a strong cooperation, synthesising relevant knowledge and experience, and providing recommendations for policy and practice that stimulates women entrepreneurship development.

4. Methodology and data collection

The first ten months of the 3 year-long Erasmus plus project is a cross national research based on mixed methods. The research applied a mix of methods to collect data and information regarding the impact of Covid-19 and energy crisis on women entrepreneurs' business situation, future perspectives and needs for support. We conducted 5 in-depth semi-structured interviews with experts in female

[40] RE-FEM - Upskilling pathways for **RE**siliency in the post-Covid era for **FEM**ale Entrepreneurs, Erasmus+ KA220 ADU. Leading partner: HÉTFA Research Institute (H). Partnership: Andalucía Emprende Fundación Pública Andaluza (AEFPA) – Spain, Sapientia Hungarian University of Transylvania – Romania, Regional Agency for Entrepreneurship and Innovations - Varna (RAPIV) – Bulgaria, Mihajlo Pupin Institute – Serbia, Slovak Business Agency – Slovakia, Brand-Sofi – Finland, SEED Foundation – Hungary.

entrepreneurship during March – April 2023. In this paper we present data from only one country from seven and only based on expert interviews. Through these expert interviews we will provide an understanding of the situation of women entrepreneurs and challenges they face due to the crises (Covid-19 pandemic, energy crisis) in the Romanian situation and we will identify the needs of women entrepreneurs, especially those with fewer opportunities, for coping with crisis situation(s), and identify the needs of educators/trainers/mentors for supporting women entrepreneurs.
Who was considered an expert? As in the case of most qualitative studies, the recruitment of expert interviewees is suggested to be based on the so-called *convenience sampling technique*. In the case of this research, the diversity of experts' sample is suggested to be ensured through their recruitment from the following stakeholders:
Table 1.: Our sample

Stakeholder categories	No. of persons interviewed	Codes
Female expert working in NGOs supporting female entrepreneurs and providing access to external actors (such as funding institutions, governments)	2	E1, E2 & E3
Researchers/university teachers (sociologist and economist) whose expertise are linked to subjects related to entrepreneurship, and in particular women entrepreneurship.	2	E4 and E5
Business angels, business coaches providing counselling, mentoring, education for female entrepreneurs	1	E2
Representative of local government who is responsible for setting up the legal framework within which economic and social actors operate, and whose expertise is relevant for examining female entrepreneurs' situations and opportunities for coping with crisis situations.	1	E1
In total	5	

Sourse: own editing

5. Results

In this chapter we will present the responses gathered from our experts regarding to the following main topics:

- How did Covid-19 and the energy crisis affect women entrepreneurs?
- What kind of support have women entrepreneurs received for coping with the impact of Covid-19 and the energy crisis? On a local/national/international level?
- What are the needs of women entrepreneurs for successfully maintaining their businesses during a crisis?
- Who are the main players and who should be the main players for supporting women entrepreneurs for overcoming the difficulties caused by the 2 crises?
- What are the strategies women entrepreneurs apply for overcoming the difficulties caused by the 2 crises?
- What are the desirable directions in which female entrepreneurship should evolve?
- What needs to be developed (field, policy, policy instruments, strategy, education, etc.) to better support women entrepreneurs and create equal opportunities?

5.1 *"Even before the Covid life was hard. Not it is even harder"* (E5)

According to the experts, the Covid-19 crisis had a negative impact of the majority of the entrepreneurs from Romania, mainly in the rural Romania. Anyhow all of them agreed, that the micro and small businesses where infected the most, since they were smaller and without a safety net, with no reserves, no escape route, no alternative income or capital acquisition strategy.
"The covid period rammed mainly the craft entrepreneurs, who were unable to participate in fairs I think half of the craftsmen have disappeared in the last 2 years. Now there is a big reorganization

here. There will also be a good return for those who remain, they will be very, very good, but a lot of people have been dropped out" (E2)
Regarding the energy crisis the experts think that this period stopped and even reversed the situation of female entrepreneurs. And what had developed positively over the past half a or one decade now has stopped or started to regress. Even before Covid-19 and the energy crisis, female entrepreneurs had very under-planned their entrepreneurial activities, made developement on a much smaller scale, and set smaller goals. Now it this has now become even more accentuated, in fact, many women are barely keeping up, so there are implementing no developments or major plans. And most of those who can do it, wait on this saving flame.
"Previous research results have shown that regional and rural female entrepreneurs cherish plans are similar to male entrepreneurs, only they develop to a much smaller extent, more slowly, and allow themselves to develop only in baby steps. Small investments, small steps, small improvements. These small steps have now become microscopic due to the energy crisis, and in general because they have all been trying to pull themselves together for three years." (E5)

5.2 *"Not a real support"* (E2)

The experts mentioned a few types of statal support, what there could recall from this period, which were primarily intended to support SMEs during the COVID-19 period. Nevertheless, they refer to these with a bit of deception, and not considering them as a real support.

"(...) Because what can I say about subsidies that someone receives with great difficulty, through a bureaucratic, cumbersome application process, and then this small amount of money had to be repaid after a few months? I can't say that it was normal, real, actually helpful state support" (E2)

We can point out that these were not subsidies that corresponded to needs coming from below, not necessarily responding to individual needs, but small amount of money that could be tendered for by many. These small subsidies were perhaps enough to sustain the company for 2-3 months, but not in the long term.

"However, this would not necessarily have been necessary, but the type of support that would help female entrepreneurs to replan their entrepreneurial activity. For example, how can I digitize my activity? My firm's communication platforms? How to invent a new product that is necessary even in time of crisis? How can I reach my local market offline? And online? Or how to get out of non-local market" (E4)

5.3 ***"Networking, networking and networking"*** (E3)

What are the needs of women entrepreneurs for successfully maintaining their businesses during a crisis?
Experts believe that it basically female entrepreneurs are open and eager to learn, and they are open to take part in several types of training, which them consider there are essential. Basically, in the field of digital skills, or knowledge of pricing, management, tendering. But their financial situation does not allowed to take part, to pay for such trainings. The experts consider that becoming an active member of networks, finding partnerships specific projects with other entrepreneurs in a similar situation for, looking for mentoring programs are also specific needs that can be identified in case of female entrepreneurs. So it would help them a lot if very high quality training were available to many of the female entrepreneurs. If they could apply – in financial way as well – for networking events in more cases. If, in several cases, they could meet women in a similar situation, exchange ideas, and learn from each other's successes, at a minimal cost.
"these women are often very insecure. it would be very important to strengthen their knowledge, this can be done at the cost of training. if they trust themselves, they will come up with good survival strategies. but for that they need to be strengthened, they need training. Good trainings. Very good trainings. And community building." (E4)

5.4 *"The state should be an important actor. But not the only one"* (E2)

The experts believe that yes, the state is a very important actor, its role is unavoidable. It is necessary to have legal frameworks, state subsidies and discounts to support SMEs. However, it is very important that there are civil initiatives, but also initiatives from the business sector. On a more local level, as they can better focus on local needs. And proactivity on the part of the female entrepreneurial community is very important. So that real demands are received, and then there are small and large communities that react to them.

"We have to break with the old school believe, that someone will help us. We must learn not to expect something from others. Let me take the first step! What I want? How I want? I should find a partner, partner. We cannot expect that someone will always figure out our needs. They won't. (E3)

5.5 *"What we whitened so far has now turned gray again"* (E2)

Experts see several strategies.

- operating the business on a budget, with minimal financial outlay. (for example, cancelling the office lease and working from home office)
- closing their businesses, temporarily or permanently (mainly the craft businesses)
- looking for an opportunity to return to employee status, and from their salary to maintain the entrepreneurial activity as well, even if just unofficially
- learning, developing, looking for new markets, networking, finding a mentor - this is typical for a thin layer according to the experts

"(...) One of my regrets is that in recent years quite a few of us invested a lot of time and energy in trying to whitewash businesses. To show, to make people believe that it is possible to do business in Romania in a fair and correct way, even as a woman. (...) And the worst thing is that thanks to this period, many people returned to the gray or black zone. Because taxes. Because the wages. Because the expenses. And what we whitened so far has now turned grey again" (E2)

5.6 "Awareness, professionalization, community building" (E3)

The expert opinions agree that professional communities and networks are very important, they should be strengthened, and if they become stronger, their members will also become stronger.

"I have noticed in the last 5 years that the female entrepreneurial community is much more active, a lot of things are happening that show direction on a professional, economic, but also human level. In this regard, I believe that this is the right direction, this is the useful direction. Dealing with one's own individual situation, reflecting, thus finding the goal of development" (E4).

Not all experts believe that only women's communities must be built, but integration into communities and development together with them is inevitable. At the same time, digitization, the development of personal digital competences, but also the development of the demanding online image of businesses must be a fundamental goal. Participating in professional events and monitoring market needs should be very important goals for female entrepreneurs.

"I also saw it in the mentor action or the Transylvanian Hungarian Entrepreneur School. Women are hungry to learn. And this is very important. have to learn. Constantly. Those who will learn will improve. Those who don't will have nowhere to draw new strength from." (E2)

5.7 *"Now there is a reorganization. Everyone who finds herself again, has a future"* (E3)

According to the experts, there would be a great need for a normal tax reorganization, which could help for real the SMEs. In the same time real tax benefits and subsidies for female entrepreneurs raising young children. And there would be a great need for social collective support, with which half of the work of women would be turned over to the community. Supporting institutions, supporting communities.

"When you have to decide whether to feed your business or your family, I think everyone will only decide one way. But this decision should not arise." (E2)

As a result of the expert interviews, it was revealed that there were several negative effects of the last three years, but perhaps the most serious five. First of all handicraft products, which are the products of a significant group of female entrepreneurs, were classified as luxury products due to the crisis period of the last three years over, and the demand for them is getting smaller and smaller, so many craft businesses have ceased to exist, will cease to exist. for female entrepreneurs in rural Romania, pricing, so that their products are priced appropriately for their services, has been problematic until now. Secondly, in this crisis period, this has become even more problematic. It is difficult for them to set prices in order to keep their customers, but also to be able to operate profitably. Furthermore, the changes affecting the Romanian tax system have and will have a very negative effect on SMEs from the beginning of 2024, this scares a lot of women away from the business. This is not a Covid-caused crisis, but likely related to the energy crisis, because the whole country is experiencing the crisis, and the redesign of the tax system is no accident. Nevertheless in recent years, a significant community-building activity has begun in the field of female entrepreneurs, women apply for more training, participate in many places, and really want to learn. This period is an obstacle to this fortunate process: when survival is at stake, there is no money or very little amount of money for self-improvement. According to experts, this is a very big disadvantage because it stops or significantly slows down a positive process. And last, but not least at all, the experts perceive a negative process at the economic corruption level. In Romania there is have been a long process the process of whiten economy from black and gray to white. But this period has also reversed this, and the previously white is starting to turn gray again. Perhaps this is one of the biggest dangers that experts see.

6. Conclusions

It is not a novelty, that the majority of the female lead businesses declined during or after the pandemic (Koltai et al. 2020). And as in other European countries, female entrepreneurs from Romania reported problems and difficulties not only on financial level, but they were struggeling as individuals, as mothers, as women during and after the pandemic period (Koltai et al. 2020, Del Boca et al. 2020, Gergely-Zerkula 2021). Many of the female entrepreneurs thought even in 2021 that getting their business back ont he track will be a long process (Gergely-Zerkula 2021). According to our qualitative data, we can articulate that this long process has not ended, yet.

What doesn't kill you makes you stronger? It's a pretty old school statement, and perhaps it is a cliché, too. Nevertheless, based on the expert interviews, we can say that this can be true for the Romanian female entrepreneurs: those who will be able to operate their businesses successfully after the Covid and post-covid period, will definitely continue their entrepreneurial activities strengthened, armed with better competences, will make entrepreneurial decisions as a better strategists.

The circumstances, social and economic context caused by Covid-19 and the post-covid period bring forth the need for female entrepreneurs to be more flexible, more resilient, and in the same time to improve their skills, their digital skills, their management skills, their vision about being an entrepreneur, being a female entrepreneur. Furthermore, this period highlighted to need to be ready to find and apply crisis management strategies effectively. Based on these expert interviews, developing tailored activities which are focusing on very innovative and very-very practical solutions for supporting the upskilling and resiliency of women entrepreneurs are essential.

7. Bibliography

1. ADAMSON Maria, and KELAN Elisabeth K. (2019). Female heroes: celebrity executives as postfeminist role models. *Br. J. Manage*. 30, 981–996.
2. BALAN Aliona – GAMUREAC Mihaela (2019). Rolul femeilor în afaceri. Chişinău: Simpozionului Ştiinţific Internaţional al Tinerilor Cercetători. https://ibn.idsi.md/sites/default/files/imag_file/32-33_8.pdf

3. BRUYNINCKX Hans (2021) Living in a state of multiple crises: health, nature, climate, economy, or simply systemic unsustainability? European Environment Agency. https://www.eea.europa.eu/articles/living-in-a-state-of
4. CASTRILLON Caroline (2019). Why More Women Are Turning To Entrepreneurship. https://www.forbes.com/sites/carolinecastrillon/2019/02/04/why-more-women-are-turning-to-entrepreneurship/?sh=c488620542a7
5. DE SIMONE Silvia – PILERI Jessica – RAPP-RICCIARDI Max – BARBIERI Barbara (2021) Gender and Entrepreneurship in Pandemic Time: What Demands and What Resources? An Exploratory Study. Frontiers in Psychology. https://www.frontiersin.org/articles/10.3389/fpsyg.2021.668875/full
6. DE SIMONE Silcia– PRIOLA Vicenza (2021). "Who's that Girl?" The entrepreneur as a 'super(wo)man'. Canadian Journal of Administrative Sciences.
7. DEL BOCA Daniela – OGGERO Noemi – PROFETA Paola – ROSSI Mariacristina (2020). Women's and men's work, housework and childcare, before and during COVID-19. Rev. Econ. Household 18, 1001–1017.
8. DERDERIAN Marie-France (2020). What Is the Impact of COVID-19 on Entrepreneurship? https://www.hospitalitynet.org/opinion/4098262.html
9. GEAMBAȘU Réka (2019). A két világ legjava? Vállalkozói stratégiák erdélyi kisgyermekes nők körében. Korunk, 6-16.
10. GEAMBAȘU Réka – GERGELY Orsolya – NAGY Beáta – SOMOGYI Nikolett (2020) Qualitative Research on Hungarian Mothers' Social Situation and Mental Health During the Time of the COVID-19 Pandemic. Corvinus Journal of Sociology and Social Policy 151-155.
11. GEAMBAȘU Réka (2019). Women Entrepreneurs in Europe. Challanges, Strategies and Policies. https://ifempower.eu/wp-content/uploads/2019/12/ifempower_intellectual-output_1_FINAL_EN.pdf
12. GEAMBAȘU Réka – GERGELY Orsolya (2019). A székelyföldi vállalkozónők gazdasági és társadalmi szerepei. Székelyudvarhely: Udvarhelyszéki Kis- és Középvállalkozások Szövetsége .
13. GERGELY Orsolya – ZERKULA Andrea (2021) "Either We Start from Scratch, or We Close It". The Effects of the COVID-19 Pandemic on Female Entrepreneurs in Transylvania, Romania. AUS Social Analysis (11) 60-78.
14. GERGELY Orsolya (2020) The Entrepreneurial Gender Gap in. Rozália Klára BAKÓ - Gizella HORVÁTH (eds.) Mind the Gap. Partium Press Debrecen University Press. 103-121.
15. GERGELY Orsolya (2013). Female entrepreneurs in Szeklerland, Romania. GÉNEROS. Multidiscilpinary Journal of Gender Studies, 58-80.
16. GÓDÁNY Zsuzsa (2018). Női vállalkozók-Kutatási területek. Elméleti áttekintés. Vezetéstudomány - Budapest Management Review, 49 (4). pp. 58-67.
17. KOLTAI Luca – GEAMBAȘU Réka – BAKACSI-SAFFER Zsuzsanna – BARNA-PETRÓCZI Andrea – ZSÁR Virág (2020). COVID-19 and Female Entrepreneurs Throughout Europe. Budapest: Hetfa Research Institute Ltd.
18. LOMAZZI Vera (2020) The COVID-19 Crisis and Gender Inequality: New and Old Challenges for Europe https://blog.gesis.org/the-covid-19-crisis-and-gender-inequality-new-and-old-challenges-for-europe/
19. SAVA Justina Alexandra (2020): Impact of COVID-19 on business activities in Romania 2020. Statista, November 2020 (https://www.statista.com/statistics/1114494/romania-covid-19-impact-on-business-activities/)
20. SZEKERES Valéria (2014). Női vállalkozók a XXI. században . Budapest: Óbudai Egyetem, Keleti Károly Gazdasági Kar. http://kgk.uni-obuda.hu/sites/default/files/06_SzekeresValeria.pdf
21. TELEKI Wendy (2020). Towards a gender-smart response in the COVID-19 (coronavirus) crisis. Washington: we-fi.org. https://we-fi.org/towards-a-gender-smart-response-in-the-covid-19-coronavirus-crisis/

22. Magyar Exportfejlesztési Ügynökség (2020). Hírösszefoglaló: A koronavírus gazdasági és kereskedelmi hatásai. Budapest: zmkik.hu
23. Mentális egészségmegőrzés a COVID-19 koronavírus járvány időszakában. (2020). Budapest: Állatorvostudományi Egyetem. https://univet.hu/wp-content/uploads/2020/03/Covid-19-info-HUN.pdf
24. Women Entrepreneurs Struggling & Innovating in the Face of COVID-19. Cherie Blair Foundation For Women (2020). London. https://cherieblairfoundation.org/app/uploads/2020/05/impact-of-covid19-on-women-entrepreneurs-in-low-and-middle-income-countries-report-1.pdf
25. România în pandemia. Comportament financiar. Achiziții și economii. (2020) ires.ro. https://ires.ro/articol/388/romania-in-pandemie-partea-a-iii-a-
26. A koronavírus-járvány gazdasági következményei: a vállalkozások többsége még idén javulást vár. (2020) Budapest: Századvég Gazdaságkutató Zrt. https://szazadveg.hu/hu/kutatasok/a-gazdasagkutato-kutatasai/elorejelzesek- kozlemenyek/a-koronavirus-jarvany-gazdasagi-kovetkezmenyei-a-vallalkozasok- tobbsege-meg-iden-javulast-var
27. COVID-19 - Romanian Economic Impact Monitor. (2020) Universitatea Babeș-Bolyai|Facultatea de Științe Economice și Gestiunea Afacerilor https://econ.ubbcluj.ro/coronavirus/?fbclid=IwAR0CGVifEYH-inXiZPR75ZHifLWJOIuE1ZQV5TcOLF5Dw8VwxAC1PivF9Ww
28. The Impact of COVID-19 on Women Entrepreneurs. (2020). Women Entrepreneurship Knowledge Hub (2020). Canada. https://www.georgiancollege.ca/wp-content/uploads/The-Impact-of-COVID-19-on- Women-Entrepreneurs.pdf

BARBARA VARGA PAULIKNÉ, PÉTER TAKÁCS, MAGDOLNA LÁCZAY: COMMUNITY OF PRACTICE AS THE APPEARANCE OF COMPETITION IN HUNGARY

Abstract

The general practitioner service is an organizational form of care in which the general practitioner fulfills the role of maintainer, owner and manager. The general practitioner with a practice undertakes the obligations listed above in the task performance contract previously concluded with the municipality, and currently with the General Directorate of the National Hospital. In Hungarian primary health care, this operation resulted in a specific business form. Later, as a new phenomenon in the communities of practice formed by the cooperation of practitioners, competition and cooperation prevail at the same time, thereby creating a cooperative structure in which family physicians can strive to maximize the efficiency of their own activities. In our opinion, the advantages of cooperative operation can only be demonstrated by responses to professional challenges that renew the strategic and operational structure of the practices themselves. The aim of our study is to get to know the opinions of those involved. This was formulated on the basis of responses received from about 250 general practitioners to an online questionnaire survey.

Keywords: healthcare, community of practice, cooperation, competition, management

The historical background of the Hungarian healthcare system

Among the extraordinary changes and crises of the 20th century, the explosion in health care worldwide is significant. On the one hand, this resulted in significant differences in the healing results and the technologies required for medical activity, as well as in the way of financing, which appeared in almost every country with a multitude of problems waiting to be solved. Healthcare systems have been constantly forced to undergo reforms and transformations, but despite all common phenomena, there are differences in the healthcare system reforms of individual countries. The healthcare industry itself has become extremely diversified. In the present study, we approach the most direct provision of healthcare itself, the doctor-patient relationship. Even today, medicine can be interpreted as a two-pole relationship between the patient and the doctor based on trust, even if it sometimes involves medical teams. The other aspect resulted from the socialization of healing, which took place in Europe in the 19th century. This led from the development of insurance systems based on solidarity, through different systems of insurance methods, to centrally organized state health systems, and today not only medicine, but also prevention has joined this scope of tasks. The construction of healthcare systems developed primarily in publicly funded care and became a public health task primarily expected of the state. According to György Kosztolányi, the moral emphases between the two responsibilities, i.e. individual and community medicine, have already diverged, and increasing tension has become general, which manifests itself in many areas. While healthcare has become a multi-stakeholder sector, its demand for resources and the number of people and patients to be cared for have also increased due to the population explosion and the aging characteristic of some societies. In addition, they must provide preventive public health screenings, epidemic management tasks, etc., which require different organizational and operational forms. On the other hand, the staff of medicine is limited, and the specialization of medical specialties has also become characteristic, while the activities of treating doctors have been supplemented by the cooperation of paramedical specialists.

In order to coordinate the operation of the multisectoral health care that was created in this way, a concept based on an all-societal compromise and prioritizing professional criteria became necessary, which emerged as a global challenge from the second half of the 20th century. In Hungary, all this

was made difficult by the social, political and economic changes, which were accompanied by the intertwining of the social and health systems.
After the Second World War, the constitution of the World Health Organization (WHO) adopted in 1946 tried to formulate guidelines that could help the functioning of the two areas of health care, a compromise between the healing work under medical oath, which has been known for centuries, and the various state health services. For example, that the healthcare service be based on an insurance system operating on the principle of mandatory solidarity, or that the system of services and the fate of public funds be transparent. Insurance systems have developed based on the historical traditions of individual countries. Depending on state participation, four major systems emerged, the Bismarck, Szemaskó, Beveridge and Mixed models, none of which could harmonize social responsibility and the human right to health. "Two ideas were conceived at this time, which are still relevant today, solidarity and public service. ... However, the problem is much more complex than this and requires the exploration of deeper connections. In order to renew the healthcare sector, of course, in addition to financing, the transformation of its structural and operational system is just as necessary, current and urgently important as increasing the prestige and motivation of professionals." (LÁCZAY, 2021) Examining these aspects, we can show that the current problems of the Hungarian health administration can be traced back to at least three generations earlier, that is, to the end of the Second World War.

Healthcare systems and reforms in Hungary

In the first period of health insurance, even in Hungary at the end of the 19th century, according to the Bismarck model, members paid contributions in proportion to their income, which entitled them to free medical care, free medicine and medical aids, and a certain period of sick pay (PAULIKNÉ VARGA, 2020), but the range of insured persons remained quite narrow. After the Second World War, the Soviet-style Szemaskó model was introduced, which resulted in the state practically making health care free for everyone.
Hungary signed the WHO constitution, and even the 1948 XII. incorporated into the Hungarian legal system by law, but the operation was burdened with serious anomalies. One of these was not only a Hungarian phenomenon, but at the same time Hungary was forced to make particularly large sacrifices by the war. The human victims of the war were not only those who died on the fronts, perished in concentration camps, various prisoner-of-war camps and prisons, but also the survivors who waited for years for the burden of their illness, orphanhood, abandonment, the cure of their illnesses, and the financial part of starting over in their daily lives to be at least partly assumed across from their own country. Added to this, after the entry of the Soviet army, they were right to think that this care was a state task. After 1948, the socialist takeover started with the most popular promise of the Soviet healthcare system, free patient care for everyone. In socialism, it also logically followed from the obligation of general employment that everyone financed their health care and pension contributions, from which the state organizes their care, but this is only a theoretical explanation, the practice was much more contradictory. The people of the time did not come across these concepts, they identified the caring state with the stage leading to the welfare state. Today we know that the difference came from the system itself. However, when hundreds of thousands of people became unemployed after 1989 as a result of the rapid privatization following the change of political regime - according to some statistics, one and a half million between 1989 and 1996, and employment dropped to 40% (SZALAI, 2007) - they also expected help from the state. Due to the lack of this, there was a systemic turn to the health sector (food allowance, disability pension, etc.).
Back in the years of the regime change, János Kornai (1998), the internationally recognized economist, pointed out that complex changes are needed in the operation of the healthcare sector, in which two basic principles must prevail: the sovereignty of the individual and the solidarity of society. While the first refers to the right and duty to make one's own decisions, the second refers to the social duty to support those in need. He summarized his recommendations in nine points, which were later incorporated into the European Union's 2012 document examining the typology of healthcare

systems. Questions were expected to clarify whether the value of health (market) is that the answer is that the value of life is not comparable. What should be the standard of access to health care? What are the basic needs that everyone has the right to according to the principle of solidarity? However, even today, many ethical and economic questions remain open.
Despite all this, there was hope that the healthcare sector in our country could be modernized and a new model introduced. In 1988, the General Directorate of National Social Insurance was separated from the budget and placed in an independent institutional structure. As a result, they hoped that the country would return to the Bismarck insurance system, which had been modernized in the meantime. In 1993, this Directorate General was split into two, the National Pension Insurance Directorate General and the National Health Insurance Fund.
The modernization of health care has also started. The transformation of primary care was set as a goal already in the 1980s. From 1992, patients had the opportunity to freely choose their doctor, and when the family doctor contracted with the local government for local care and with the health insurance company for financing. This essentially meant the functional privatization of primary care. Within a short period of time, it became clear that the doctors who became entrepreneurs showed spectacular results and an increase in the standard of living through more cost-effective management. This also increased the prestige of the general practitioner career. (RURIK, 2018) Today, general practitioner practices have experienced many changes, which are detailed below, but we still consider the concept that it is appropriate to start the complex reform of the healthcare sector from here to be relevant today. First, however, it is worth examining the issue from an economic point of view.

A new phenomenon in the multi-actor health systems

Healthcare workers and researchers agree that healthcare is a multisectoral system with many factors and actors. Healthcare cannot exist without a strategic concept based on social responsibility that assumes interactivity. These challenges are already drawn attention to in the UN's Sustainable Development Goals, which is of particular importance and imposes a heavy responsibility on all decision-makers who manage policy, who distribute resources and research funds, care and research in all fields of medicine, education politicians, to ethicists formulating moral aspects. (KOSZTOLÁNYI, 2019). However, emerging network systems are necessarily looking for the most suitable operating options themselves, and they try to adopt good examples.
The practices and communities of practice operating in primary care can also be understood as a network, and starting from this, they can even use a spontaneously organized advocacy tactic adopted from economic life. While competition and cooperation were not mixed in the classical economy, by the turn of the millennium strategic networks had emerged that had similar interests. They supported each other in these similar interests but not in other areas. An example can be a product or group of products, in the production, sale and use of which, in some cases, even competitors are involved, but they unite in fighting for a law, which is defined as coopetition. The phenomenon itself is also known in other fields (e.g. game theory), but the power of cooperative competition can really be enforced more effectively by larger networks (HÁMORI, 2013). At the same time, cooperation (cooperation) also follows from cooperative competition, since the multi-actor network, who are also interested in the continuation as common users, are also dependent on each other later on. This phenomenon (competitive behavior) can be observed in different formations, which increases innovation, efficiency and the protection of the stakeholders. Our question is whether the actors of Hungarian primary care can develop points of common interest in which they are able to act together and thus be initiators in a reform process initiated by them.
However, the situation of primary care and the definition of its scope of activities has changed a lot in recent decades, and it has been affected by all the problems that generally call for the reform of the modern healthcare service as a whole, and in particular has become the terrain of delayed or distorted transformation attempts in Hungary. At this level, doctors had to experience the fundamental dilemma of whether, after the system change, the care is a citizen's right, or whether the financing is based on insurance, and if so, whether the care will be differentiated, or what it will cover and what it will be.

is solidarity enough? The details of this dilemma were shown in the study volume of Éva Orosz (2018), which traces the concepts that tried to solve the modernization of the Hungarian healthcare sector from the 1980s to the turn of the millennium. The WHO's Ljubljana Charter (I. 1.) published in 1996 bypassed this issue and laid down the general and common principles, which "are based on the basic principle that health care should first and foremost lead to a better quality of life and better health of the population lead" (OROSZ, 2018). The discussions of the countries of Western Europe and the world were characterized by a multi-pronged approach to achieving the goal, and it turned out that the healthcare sector is facing global problems due to the significant transformation of macro factors. Among the changes at the macro level, it is customary to mention, in addition to economic and social changes, the outstanding development of health technology and at the same time its increase in price, or the different health policies of social security systems and states, the extent of basic values and solidarity. A point of contention is that "Government should only provide essential services, such as treating serious illnesses, and encourage people to take care of themselves in other cases" (European Commission, 1998). With the extremes of opinion, no decision could be reached, and this fundamentally complicated the issue of the compatibility of the foundations of the medical profession and market conditions.

The Hungarian healthcare sector was not spared the debate either, but many other problems had to be dealt with as well. First of all, dealing with the economic downturn after the regime change and the treatment of the large number of unemployed, as well as the deteriorating health conditions and the unfavorable health status of the population, would have required quick and reassuring answers. Before the regime change, health care was interpreted as a state task (SZALAI, 1986) At the time of the regime change, there was no pre-developed health policy concept, only the hope that it would become more modern and better. On the other hand, there were three problems that needed to be tackled immediately. The functionality of the new system had to be maintained, so that in the meantime it was necessary to get rid of the state socialist health care system, the Szemaskó model and the inherited health problems. For this, a democratic healthcare structure and a new system of operation should be developed, which can not only create a new, consensual cooperation with the much wider market participants of the healthcare industry, but is also suitable for maintaining the rules of healing based on traditional, ethical and professional values. It was a legacy of the socialist era that the exclusion of competition and distribution based on physical quantities had to be implemented as the main pillars of the implementation of healthcare in state-owned and financed healthcare institutions. The medical service was removed from the direct influence of the supply and demand conditions of the market. Thus, the free and universal healthcare system was realized. The actual operation was based on a pyramid-like planning-distribution order, which was based on the territorial-regional principle. Health care organizations and institutions also operated on the territorial principle, which meant that they were aimed at providing health care for the residents of a specific area (CSEMNICZKI, 2000)). However, this organizational and territorial system could not be changed immediately. At the level of primary care, only minor changes were made within this framework, which, however, started a spontaneous development. At the request of the Scientific Association of Hungarian General Practitioners, the general medical examination was introduced in 1974. For general practitioners, obtaining the specialist exam was determined by Decree 6/1993 NM. All this happened after 6/1992. (III. 31.) NM decree effectively privatized general practitioners and pediatricians, and introduced the general practitioner system (RURIK, 2018). This was accompanied by the possibility of freely choosing a doctor, and in the case of general practitioners, the quota system, while in the case of hospitals and clinics, performance-based financing. This did not end the concepts of reforms that began in the 1970s and later, but rather shifted to the issues of centralization and decentralization. In some professional issues, there was a consensus that, despite the continuation of the debate, it is necessary for primary care to be given more independence, and even for the turn of the millennium, it is even being formulated that the unreasonably high hospital and specialist care burdens could be reduced by other forms of care, for example involving family doctors. This is relevant to this day, should be sorted out and would be desirable. The basis of a two-decade debate is that patients receive care at a level appropriate to their condition, and this could be redirected from

active hospital care to primary care and outpatient care, if the conditions for this can be created. On the other hand, in the same period, funding is more focused on inpatient care and even strengthens the professional management role of hospitals to this day.
On the other hand, the indicators of healthcare expenditures turned out very unfavorably at the turn of the millennium. Despite the fact that the GDP achieved a 20% increase in ten years, the public healthcare expenditures decreased in real and nominal terms, the final consumption ratio of households gradually increased, thus the gap between GDP and healthcare expenditures became more open. All of these urged the state to introduce a more effective regulatory system.
In addition to all this, positive things also happened during this period. Examining the period between 1990 and 1998, the resources and capacity data available for the health sector, measured in natural units of measure, increased both in absolute value and in relation to needs in this decade. The number of registered doctors increased by 20%, the number of general practitioners and pediatricians by 11%, the number of working doctors per 10,000 inhabitants by 13%, and the number of nurses by 9%. The turnover of specialized outpatient care has been increasing year by year. Although the number of doctors working in inpatient care decreased by 7.3%, the number of hospital beds decreased by 20%, the number of nursing staff increased by 2.6%, and the number of patients increased by 12%. During the eight years, the number of doctors and nurses per 100 beds increased significantly, and the average nursing time spent in the hospital decreased by 16%. In the period between 1994-97, parallel to the reduction in the number of hospital beds, the number of machines and instruments in hospitals expanded significantly (MIHÁLYI, 2000). Although by now these data are already trending in a negative direction, behind the results it was assumed that the modernization of the basic service had already started earlier, in the 1980s, and then after the change of regime, the laws that made it possible at this level appeared one after the other the reform at that time. At the same time, the real earnings of healthcare workers have been continuously decreasing since the 1980s, and the relative position of the workers has continuously deteriorated compared to other sectors. Legal medical earnings and the wages of nurses were and remain extremely low compared to international data (MIHÁLYI, 2000).
It is true that almost a quarter (23.6%) of working doctors were left out of these statistics, since before the turn of the millennium, like private practices, 80% of general practitioners and 70-75% of dentists worked as contractors, so their earnings it was no longer detectable in the official wage statistics (GYENES, 1998).
Based on the 1998 data of the OECD, our country was in 4th place in terms of the number of doctors, while in terms of the number of specialists, it was in first place in an international comparison. Despite the legally low salary, there were still many doctors and a low proportion of nurses, nurses and operating room assistants with basic education.
However, for the successful implementation of the Health Act, a plan based on consensus and assuming a health strategy would have been necessary. However, this was not born, but at the turn of the millennium, the government had to present some kind of reform that would be effective and reach many people. The previous concepts were started by other governments, so instead of making a public commitment, they achieved - practically without a significant increase in resources - by introducing practice law, so that positive information about health care spread.

From the general practitioner district to the community of practice

The 1992 NM decree made it possible for family physicians to carry out their assumed territorial care duties in primary care in different legal positions, so they had an employment relationship with the municipality or their institutions, they could sign a contract with the municipality, or they could undertake the care of their district in the form of a health enterprise or as a private doctor. The decree also extended to those who did not treat on a territorial basis, but for example as a company doctor, as well as to nurses, midwives and other paramedical workers participating in family medicine care.
It can be said that the frameworks for independent, responsible work were already ready, and the Health Act specified the independent medical activity as mentioned above, and applied the territorial care obligation to general practitioners and pediatricians as well as dental general practice districts.

So the question is, what was new in the 2000 II. the institution of practice law on independent medical activity in the law, and what made this the basis of another reform process?
According to § 1 of the law, the right to practice is a right included in the license granted by the health state administrative body to the physician providing independent medical activity, on the basis of which independent medical activity can be performed in a specified area with a territorial provision obligation. But what was really new was that, according to § 2: "practical law is a property-related right that can be alienated and continued if the conditions defined by law exist. A practice license is a right included in the license granted by the health administrative body to the doctor to provide independent medical activity, on the basis of which independent medical activity can be carried out in a specified area with a territorial provision obligation. The right to alienate the practice right also belongs to the owner of the practice right" - followed by a detailed description of how to operate and live with the right.
In this way, the privatization was considered complete, and this increased the hope of the continuation of the reform, even when the family doctors could actually take on the costs of the operation and related development constraints.
In this period, the survey prepared by TÁRKI (1996-1997) was already known, which examined the preparation of the primary care reform based on a representative questionnaire survey. This shows that the majority of family doctors - especially in rural areas - already performed their duties as healers and other service and official duties in their area in business. However, the transition still had events that created a competitive situation. Due to the possibility of freely choosing a doctor and the introduction of the quota system in financing, a kind of supply market has developed. It is true that in the rural districts, where there were practically no competitors, this was not critical, but in the urban districts the migration of patients showed differences. At the same time, for the patients, the possibility of choice resulted in a kind of satisfaction and adherence to the doctor. However, family medicine practices were not able to develop sufficiently and uniformly in terms of equipment, even though it already represented a competitive advantage in acquiring patients and providing the most comprehensive service possible. As a result of these and similar facts, the competition contributed to the improvement of patient care, the cooperation and efficiency of the practice workers.
In the meantime, there were serious discussions in professional circles about the need to reduce centralization in the activities of hospitals, a "flatter" healthcare structure would be more efficient (BARÁTH, 2008) and with serious analyzes doctors and economic experts tried to prove the urgency of reforms necessary for the sake of quality care (DÓZSA, 2011). Many professors warned the political management of the biggest danger, the disconnection of Hungarian health care.
Our admission to the European Union encouraged the current government to accept international conventions and, if necessary, undertake to catch up. From these years, it is worth highlighting that while the reform attempts were mainly focused on inpatient care, changes also took place in general practitioner districts. Spontaneously, but the individual practices were forced to cooperate in some matters. Such were the substitutions and the operation of the on-call system. They agreed on this with the municipalities and each other. The situation was different with the introduction of the mandatory quality management system. The need for this was already published in the 1997 CLIV. § 121 of the Act, but it took years until, with the processing of international experience, the Hungarian healthcare industry went from the application of ISO quality assurance to the introduction of MEES, i.e. Hungarian Healthcare Standards 2.0, which was developed specifically for primary care. This amendment to the law entered into force after June 28, 2012. In most cases, the family doctors fulfilled the obligation associated with the beneficial but burdensome administration by jointly employing a specialist, which strengthened their cooperation in addition to the competition.
It was significant to realize that less attention is paid to primary care than necessary. According to a 2005 study: "It is a senseless waste if we do not add licenses to existing skills (today there is an example that the same doctor as a general practitioner cannot prescribe the same medicine for his patient that he can prescribe in the same specialist practice as a substitute doctor). At the same time, it is obvious that the additional work of the family physician performing the specialist task should receive additional funding" (SOLYMOSI, 2005).

The recognition was not new, since Gyula Kincses had already developed a discussion paper in 1996 for the modernization of the model of primary care introduced in 1992, which he continues to recommend to be implemented in the following decades under the name of group practices. The point is that in this model, by making better use of the competencies of general practitioners, the primary care providers can perform the tasks related to specialist care, which do not require too many resources, with sufficient competence.)
This concept is still among the basic tenets of the reform concept of the Hungarian Medical Chamber. On the other hand, comprehensive modernization of the healthcare sector has not occurred in recent years either, but it is a fact that the government was looking for the possibility of cooperation between practices. The CXXIII of 2015 Act demanded a comprehensive settlement, but as we have seen, this did not happen. Nevertheless, the 2015 law already contains the possibilities of connecting to international trends, which could even be suitable for modernization. Such is the section on the community of practice explained in § 2 of the law.
a) community of practice: a form of operation established to perform the tasks of family doctors, family pediatricians, primary care dentists, and nurse practitioners;
b) group practice: a form of cooperation in the framework of which, in addition to the primary care tasks of a family doctor and a family pediatrician, certain services within the scope of outpatient specialist care can also be provided, as defined by law."
There is no doubt that these two legal forms could have helped the local professional community, even if it could have meant improving the cooperation between basic and specialist care, but this did not happen, but created an opportunity for the creation of private practices and mini-clinics, i.e. public financing and for the separation of private care. There was an attempt to develop primary care and public health with the financing of the EFOP-1.8.2-17 grant, the overall goal of which was to assess the health status of the population and increase their health awareness. The communities of practice created at that time could not be considered functional in the long term, mainly due to the limited funding, but they were excellent for creating a new work culture, which could have been modified by the needs expressed in practice.
This dichotomy has now resulted in even more variations, in contrast to group practice, the various forms of community of practice are either less established, or try to adopt the principle of group practices in a different way.
However, the debates point out that the need to modernize primary care is still relevant today. The basic purpose of the government decree is to describe possible forms of cooperation in primary care, the framework and administrative tasks of which are defined in such a way that they affect the exercise of practice law in different ways. One of the strongest differences came from the following. From the beginning of 2022, the agreed cooperation also generated financial returns. Those who chose the strictest form of community of practice received the entire benefit, those who chose the looser form of community of practice received 80% of the wage increase. Those who did not enter into any form of cooperation received a 30% increase. With this regulation, they tried to encourage joining the community of practice, which tried to make the choice easier with materials, but the decision threatened the right to dispose of an independent practice right at least as much.
The basic purpose of the government decree is to describe possible forms of cooperation in primary care, the framework and administrative tasks of which are defined in such a way that they affect the exercise of practice law in different ways. One of the strongest differences came from the following. In the case of the joint community of practice, the cooperating general practitioner, pediatric and dental practices actually operate a single healthcare provider, in close economic and professional cooperation between them.
- The next possibility was offered by the integrated community of practice, in which "family physicians with practice rights or health care providers operating family medicine services - while maintaining their independence - created a jointly founded health care provider for the coordinated provision of their primary care tasks" . Here, it may be an important aspect that the family doctors concerned undertake the cooperation while preserving their independence.

- The third form of operation was offered by the community of practice consortium in which the close professional and economic cooperation remains, but to coordinate this and provide representation, a consortium leader must be chosen by the family physicians concerned.
The fulfillment of the numerous operational conditions all apply to primary care, including cooperation with prevention, other professional administration and other professional organizations. It can be read in a single subsection that "the community of practice service provider established in accordance with this decree is entitled to perform, without a referral, the activities that require a specialist medical qualification for the patients of the community of practice for which it has an operating license." However, they do not provide here on how to obtain this. The General Directorate of the National Hospital, on the other hand, registered the communities of practice under a different name: designated as loose collegial and close communities of practice and registered the consortium leaders separately. The results cannot be measured yet, but we can already estimate the opinion of family doctors from our survey.
Instead of arguments, let the facts follow: all the problems of today's Hungarian health care appear in the practice of general practitioners:
- They experience on a daily basis the problems of operation and financing, the necessity of technological development, the difficulties of establishing telemedicine and the necessary collaborations, the threat of the constantly changing legal environment and the need to adapt, and last but not least, the extent of the direct doctor-patient relationship, the quality of life improvement, a series of moral and obligatory activities serving social inequalities.
- The majority of general practitioners would be suitable to choose a private practice, but they perceive that people who are in a cumulatively disadvantaged situation or are vulnerable for other reasons would remain unserved if publicly funded healthcare became unavailable to them.
- The pandemic confirmed the position of the WHO and the European Union, according to which the basic obligation of the member states according to human rights is to guarantee the financing of solidarity. It turned out that epidemics know no borders, and defense against them can only be collective. Therefore, the state must take part in the creation of the health infrastructure, the development of the appropriate insurance system and financing, the regulation of the relationship between the health industry and care, etc.
In our research, among other things, in connection with all of these, we looked for the answer to how general practitioners think about the functionality and development possibilities of practices and communities of practice.

Material and methods

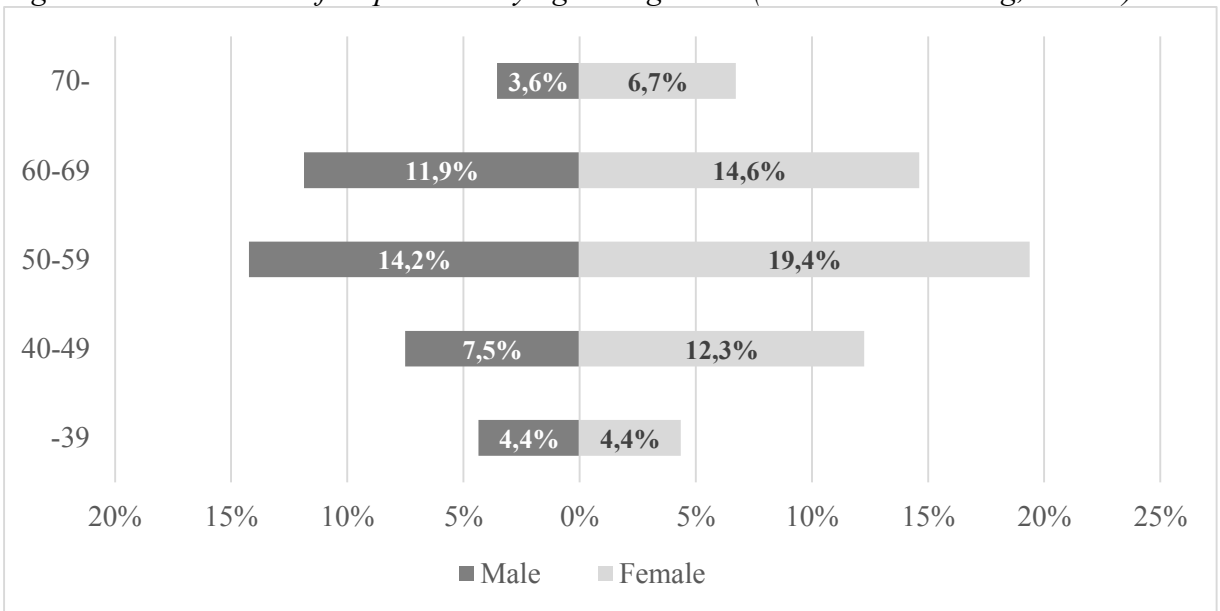
In the course of the research, a cross-sectional study was carried out in connection with the career path of general practitioners between March and December 2022, using a self-completed questionnaire among general practitioners practicing in Hungary. Community of practice leaders and members, as well as general practitioners who did not accept community of practice membership, participated in the research. The online questionnaire was sent to the respondents using several methods. Contact was made with the collegiate professional leaders of national and county general practitioners and general paediatrics. We used a direct inquiry to the e-mail address issued by the heads of public health departments of the National Center for Public Health in the counties of Szabolcs-Szatmár-Bereg, Hajdú-Bihar and Borsod-Abaúj-Zemplén counties, and both types of data requests were also made at the congress of the National Association of Family Physician Researchers. Our study cannot be considered nationally representative regarding the organizational satisfaction and motivation of general practitioners, as there are counties from which no responses were received. A total of 253 general practitioners filled out the questionnaire (N=253), which number still qualifies the results obtained from the answers according to the measurement criteria as authoritative.
The first module of the questionnaire contains socio-demographic questions, the second module deals with the work, business form, and specialist qualifications of family physicians. The next module asked about the possibilities of the reform affecting family medicine services and the respondents'

attitudes, opinions and ideas about the reform. Here, there was an opportunity to specify the relationship to the community of practice, to formulate an opinion regarding the composition of the current community of practice and the formation of group practice. The fourth module focuses on the current problems of primary health care. Here, there was an opportunity to express satisfaction with working conditions and problems related to the operation of the general practitioner service. In the fifth module, we formulated workload issues during the pandemic (order time, use of telemedicine). In the sixth module, the goal was to learn about organizational and professional commitment, while in the last module, job satisfaction and professional motivation were the goals.
The questionnaire was processed using the Excel program, and the statistical analysis of the data was done using the SPSS statistical program. We analyzed the results using descriptive statistical methods, cross-tabulation, chi-square test, Fisher's exact test, and the Monte-Carlo method. The confidence interval (CI) was set at 95%. Respondents could consider identification with the statements in the questions. They were able to mark their degree of agreement on a Likert scale from 1 to 5, where 1 is completely disagree and 5 is full agreement.

Results and Discussion

Of the 253 respondents, 3 did not provide their year of birth, so we could not take the data of the 3 people into account when applying the descriptive and advanced statistical methods in the case of age group studies.
Figure 1 shows the distribution of respondents by age and gender. Korfa shows that 8.8% of all respondents are under 40, while 36.8% are over 60. Based on our preliminary expectations based on the research topic, the 40-59 age group, which is considered to be the most active and motivated, appears in the sample with 53.4%.
Based on the type of district, 59% of the respondents work as family physicians in adult districts, while 18% work in children's districts. 23% of general practitioners represent mixed districts that accept patients who sign up regardless of age. The distribution of respondents according to district type shows the dominance of districts formed as the traditional form of operation of general practitioners. Based on the distribution by age and type of district, 69.7% of adult GP services are provided by family doctors under the age of 60, 51.1% of mixed districts and 45.6% of children's districts are provided by GPs over 60 years of age.

Figure 1. Distribution of respondents by age and gender. (source: own editing, N=250)



Similar to the previous question, we were able to evaluate 250 answers based on the business form chosen during the performance of the tasks of the family doctor service.

Business form of GP service	Frequency	Percent
Freelance activity in health care	1	0,4
Individual healthcare entrepreneurs	54	21,3
Member of partnership	157	62,1
Civil servant legal relationship	3	1,2
Health service legal relationship	4	1,6
Public service legal relationship/government service legal relationship	13	5,1
Member of a private company	16	6,3

Table 2. Distribution of respondents according to business form. (source: own editing, N=250).

As members of a partnership, 62.1% of the respondents, 21.3% as individual healthcare entrepreneurs, and 6.3% as members of an individual company perform their family physician duties. In addition to the small percentage of the other answers, it should be mentioned that 5.1% of the respondents work in a public service legal relationship/government service legal relationship. Only 1.2% perform their duties in the civil servant legal relationship typical before the system change (Table 1). Family doctors under the age of 60 typically work as members of a partnership, while family doctors over the age of 70 work as individual health entrepreneurs.

Among the respondents, 244 answered the question whether they had previously joined a community of practice within the framework of a tender. Before 2022, 61.3% of the respondents did not join a community of practice within the framework of any tender. 15.8% of them joined a community of practice within the framework of the EFOP-1.8.0-VEKOP-17 program, 10.3% of them participated in the Three Generations of Health Program I, while 9.1% of them participated in the Three Generations of Health Program II.

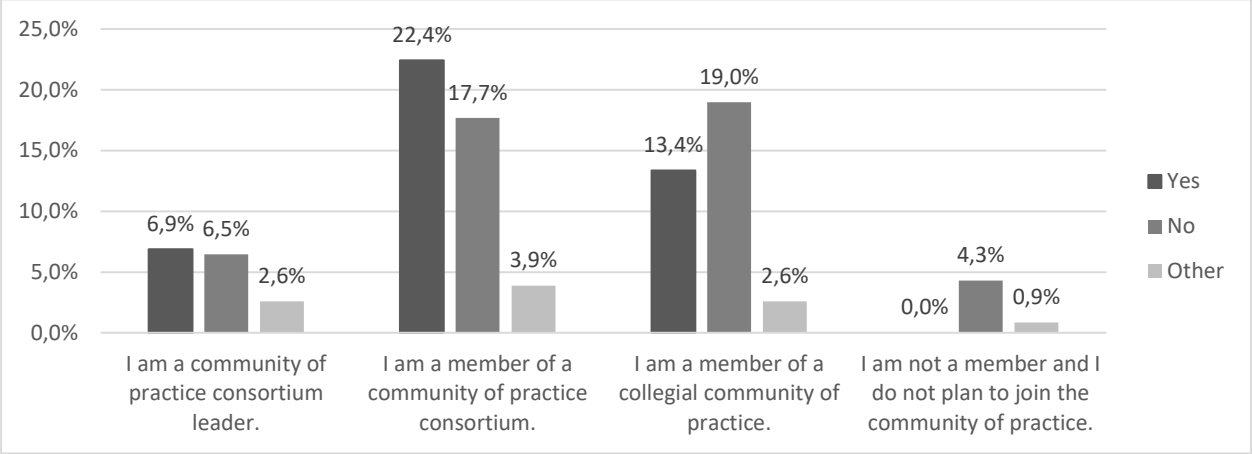
We wanted to show the situation based on the age group of the respondents and their relationship to the community of practice in Table 2, from which, unfortunately, we omitted 3.2% of the respondents due to incomplete answers. A significant part of the 247 respondents, 57.5%, joined a tight community of practice consortium as a leader or member, and 33.5% joined a loose collegial community of practice. 3.6% of the 6.1% GPs who did not join the community of practice are over 50 years old.

	Age group					
Relationship to community of practice	**-39**	**40-49**	**51-59**	**60-69**	**70-**	**Total**
I am a community of practice consortium leader.	0,8%	5,3%	5,3%	4,5%	0,0%	15,9%
I am a member of a community of practice consortium.	2,4%	7,8%	15,9%	12,2%	3,3%	41,6%
I am a member of an integrated community of practice.	0,4%	0,8%	0,8%	0,4%	0,0%	2,4%
I am a member of a joint practice community.	0,0%	0,0%	0,0%	0,0%	0,4%	0,4%
I am a member of a collegial community of practice.	2,4%	4,9%	11,0%	9,8%	5,3%	33,5%
I have worked in a community of practice before, but I am not currently a member.	0,4%	0,0%	0,0%	0,0%	0,4%	0,8%
I am not a member of a community of practice, but I am planning to join.	0,0%	0,4%	0,0%	0,0%	0,0%	0,4%
I am not a member and I do not plan to join the community of practice.	0,4%	1,2%	1,6%	0,4%	1,2%	4,9%
Total	6,9%	20,4%	34,7%	27,3%	10,6%	100,0%

Table 3. Distribution of the respondents' age group and relationship to the community of practice (source: own editing)

We formulated a multiple-choice question regarding what motivated the respondent to join the community of practice. 30% of the respondents indicated professional development, 35.2% belonging to the community, 47.4% for the benefit of the patients and 82.2% for financial interest.
Figure 2 shows the relationship between the current relationship with the community of practice and the effectiveness of the community of practice form. Overall, 41.5% of the 244 main respondents considered the operation of the current community of practice to be effective. On the basis of belonging to a community of practice, it cannot be clearly stated even for community of practice consortium leaders that they consider this form of operation to be effective. Non-joiners do not consider the community of practice to be effective. Based on the data, perhaps the members of the close community of practice consortium expressed the most optimistic view on this issue.

Figure 2. Do you consider the current form of the community of practice to be effective? (source: own editing, N=244)



It has been proven that a close correlation can be shown between the form of operation chosen by family doctors and the family doctor's age (X2 (df=24,N=245)=46.749, p=0.004), since family doctors see him as a member of an individual business or a member of a partnership this activity (Table 3).

			Korcsoport - numeric					
			-39	40-49	50-59	60-69	70-	Total
KSH 1021 - forma	Freelance activity in health care	Count	0	1	0	0	0	1
		% within Korcsoport - numeric	0,0%	2,0%	0,0%	0,0%	0,0%	0,4%
	Individual healthcare entrepreneurs	Count	2	7	15	16	13	53
		% within Korcsoport - numeric	11,8%	14,0%	17,6%	23,9%	**50,0%**	21,6%
	Member of partnership	Count	9	32	57	46	12	156
		% within Korcsoport - numeric	**52,9%**	**64,0%**	**67,1%**	**68,7%**	46,2%	63,7%
	Civil servant legal relationship	Count	0	2	1	0	0	3
		% within Korcsoport - numeric	0,0%	4,0%	1,2%	0,0%	0,0%	1,2%
	Health service legal relationship	Count	2	1	0	0	0	3
		% within Korcsoport - numeric	11,8%	2,0%	0,0%	0,0%	0,0%	1,2%
	Public service legal relationship/government service legal relationship	Count	2	4	5	2	0	13
		% within Korcsoport - numeric	11,8%	8,0%	5,9%	3,0%	0,0%	5,3%
	Member of a private company	Count	2	3	7	3	1	16
		% within Korcsoport - numeric	11,8%	6,0%	8,2%	4,5%	3,8%	6,5%
Total		Count	17	50	85	67	26	245

Table 4. Relationship of respondents by age and type of business (source: own editing, N=245)

A correlation between the type of district and the age group can be demonstrated. (X2 (df=8, N=247)=20.348, p=0.009). In the case of adult and mixed districts, family doctors aged 50-59, while in the case of children's districts family doctors aged 60-69 perform the tasks (Table 4).

			Age group - numeric					
			-39	40-49	50-59	60-69	70-	Total
istrict type	Adult district	Count	14	35	52	36	8	145
		% within District type	9,7%	24,1%	**35,9%**	24,8%	5,5%	100,0%
	Children district	Count	3	6	13	18	5	45
		% within District type	6,7%	13,3%	28,9%	**40,0%**	11,1%	100,0%
	Mixed district	Count	2	9	20	13	13	57
		% within District type	3,5%	15,8%	**35,1%**	22,8%	22,8%	100,0%
otal		Count	19	50	85	67	26	247
		% within District type	7,7%	20,2%	34,4%	27,1%	10,5%	100,0%

Table 5. Relationship of respondents by age and district type (source: own editing, N=247)

We were also unable to show a correlation between the relationship to the community of practice and the age group, as well as the relationship to the community of practice and the district types.
It has been proven that a close correlation can be shown between the form of operation chosen by family doctors and the family doctor's age (X2 (df=24,N=245)=46.749, p=0.004), since family doctors see him as a member of an individual business or a member of a partnership this activity (Table 3).
There is also no significant correlation between the leader/member classification undertaken in the community of practice and the age group, as well as the leader/non-leader classification undertaken in the community of practice and the type of district.
There is no detectable correlation between the current relationship to the community of practice and previous participation in the community of practice, as well as between the leadership/non-leadership role assumed in the community of practice and participation in the previous community of practice.
38.3% of the respondents had previously joined a community of practice in some form. We wanted to prove whether belonging/non-belonging to a community of practice established before 2021 has any connection between the motivational factors of the intention to join the community of practice. We found that neither professional development, nor belonging to the community, nor the patient's interest, nor even financial benefits showed any correlation with the accomplice.
In the case of the new form of community of practice, on the other hand, financial interest already showed a significant relationship (X2 (df=1,N=230)=6.206, p=0.013) between joining and joining for financial interest.
One of the main questions of the research was adapted to the assumption that the preparedness of family doctors would enable an expandable service structure, which would allow certain outpatient care to be taken over in addition to primary care. As a result, the professional activities of the communities of practice working in the districts would be expanded and could become group practice. In the process, by increasing the number and training of paramedical specialists working alongside them, a more complex healthcare service would be created, while the recognition and professional prestige of district doctors and the care of their patients would improve Even in this crisis period, the professional preparation of the respondents provides an opportunity for a more serious structural and operational reform.

Discussion

The participation of the 40-59-year-old age group in the sample suggests that the respondents positively experienced our interest in the research question and felt motivated to make the study successful. It was found that in the mixed and children's districts, nearly half of the respondents are over sixty years old, but in the adult districts, family physicians typically under this age predominate. The distribution of the respondents by district type shows the dominance of districts formed as the traditional form of operation of general practitioners, which is also the reason that there are few or no pediatric or dental practices in smaller settlements.
Nearly ninety percent of the respondents perform their duties as family doctors in the form of individual or joint ventures. This corresponds to the typical process after the regime change, in which, as a result of privatization, a significant number of general practitioners switched from the form of

civil servants to free, self-regulated entrepreneurial life. The research proved that the form of operation chosen to perform the task is independent of the respondent's age.
Based on the forms of community of practice already described and the related legal and financing conditions, the stakeholders chose the most suitable form according to their interests, the introduction of which was not yet linked to the concrete strategic concepts of improving the operating conditions. It is no wonder that the responses do not demonstrate the widespread acceptance of these forms.
The results of the research could also be evaluated based on aspects such as the fact that there may be tensions, grievances, and even contradictions between primary care workers, in fact they are the ones who may be able to cooperate against a system that does not value them enough, which may become similar to the effects of the strongest strikes or crises. , on the other hand, their cooperation with each other can create such a strong alliance of interests, which can be a strong basis for asserting interests and can lead to the renewal of the sector as a whole. The millennial oath of the medical profession has made such strong extremes unimaginable until now, and perhaps it will not be the doctors, but those who miss them, the patients, who will reach them in order to appreciate health as one of the main values of life.

Literature

BALOG, Z., 2016. *Beszámoló az egészségügyi ágazati humánerőforrás 2015. évi helyzetéről,* Budapest: Állami Egészségügyi Ellátó Központ.
BARÁTH, L., 2008. Az egészségügy és a kórház, mint szervezet kihívásai a XXI. században. *Egészségügyi Gazdasági Szemle,* pp. 10-12.
CSEMNICZKI, K., 2000. Nyugdíjrendszerünk 1929-től 1997-ig. *kÖZGAZDASÁGI SZEMLE.*
DÓZSA, C., 2011. *A kórházak stratégiai válaszai a változó környezetre - Magyarországon a 2000-es években, Ph.D. értekezés.* hely nélk.:ismeretlen szerző
GYENES, M., 1998. A kiegészítő egészségpénztárak jelenleghi helyzete és lehetséges szerepe a jövő egészségügyében. *Egészségügyi Gazdasági Szemle,* pp. 465-477.
HÁMORI, B., 2013. Új szereplők és magatartásformák az átalakuló tranzakciós térben. In: Budapest: ismeretlen szerző, pp. 235-238.
KäSLER, M., 2019. *Beszámoló az egészségügyi ágazati humánerőforrás 2018. évi helyzetéről,* Budapest: Állami Egészségügyi Ellátó Központ.
KINCSES, G., 1996. *Javaslat az ellátórendszer szervezeti továbbfejlesztésére és Mi is az a csoportpraxis?*. [Online]
Available at: https://www.kincsesgyula.hu/dokumentumok/csoportpraxis.pdf
KINCSES, G., 2019. A köz- és a magánszféra szerepe az egészségügyben. *Magyar Tudomány,* pp. 1510-1522.
KOSZTOLÁNYI, G., 2019. Feszültségek és kompromisszumkényszer a 21. századi egészségögyben. *Magyar tudomány,* pp. 1486-1495.
LÁCZAY, M., 2021. A COVID hatás okozta társadalmi változások becslése / Bódi Ferenc gondolatainak továbbfűzése. *ACTA MEDICINAE ET SOCIOLOGICA,* 12:33. kötet, pp. 27-46.
MIHÁLYI, P., 2000. *Magyar egészségügy: diagnózis és terápia.* Budapest: Springer Orvosi Kiadó Kft..
OROSZ, É., 2018. *Félúton vagy tévúton? / Egészségügyünk félmúltja és az egészségpolitika alternatívái, Egészséges Magyarországért Egyesület.* hely nélk.:ismeretlen szerző
PAULIKNÉ V., B., 2020. Néhány szempont a magyar egészségügyi ágazat problématérképének összeállításához. *Acta Medicinae et Sociologica,* pp. 23-31.
RURIK, I., 2018. Alapellátás, alapellátók Magyarországon. *Orvosi Hetilap,* 160: 24. kötet, pp. 926-935.
SOLYMOSI, T., 2005. Mai magyar egészségügy/helyzetelemzés és kibontakozás. In: hely nélk.:Védegylet.
SZALAI, J., 1986. *Az egészségügy betegségei.* Budapest: Közgazdasági és Jogi Kiadó.
SZALAI, J., 2007. Nincs két ország.... In: hely nélk.:Osiris Kiadó, pp. 105-145.

JÁNOS VARGA, ÁGNES CSISZÁRIK-KOCSIR, MÓNIKA GARAI-FODOR, BÍBORKA ESZTER BÍRÓ, BORÓKA JÚLIA BÍRÓ, KINGA KATALIN SZÉKELY:

THE PANDEMIC'S PRESSURE TO CHANGE THE LIVES OF HUNGARIAN AND ROMANIAN BUSINESSES[41]

Abstract: The escalation of the coronavirus epidemic in 2020 has brought many changes to the lives of ordinary people, and the micro, small and medium-sized enterprise sector is no exception. Overnight closures and unprecedented new challenges have prompted changes to stay alive. Work had to be reorganised and new foundations had to be laid. There were unprecedented challenges in digital transformation, marketing, procurement and even finance. These changes and transformations have affected different categories of businesses differently, and the impact has varied significantly from one country to another. The aim of this study is to assess the changes and shifts in the lives of Hungarian and Polish enterprises caused by the pandemic, shedding light on the differences and similarities and the strength of the effects, based on the results of a questionnaire survey covering both countries.

Keywords: change, change management, SME sector, primary research, Hungary, Romania

1. Introduction

The COVID-19 pandemic has caused significant disruption, including to business operations worldwide (Sooreea & Sooreea, 2021), forcing many companies to switch to home office or teleworking, adapting to changing customer needs and new regulations and security protocols (Ling et al, 2021). These changes have highlighted the importance of organisational change as a response to a crisis situation (Freeman et al, 2021). Organisational change is the process of transforming an organisation in response to new circumstances, such as a crisis or market changes (Phillips & Klein, 2023). This process may involve reorganising the organisation, changing business processes or introducing new technologies or business models. The pandemic has highlighted the need for companies to be flexible and adaptable to changing circumstances (Belitski et al, 2022). However, this should not be used as a buzzword or cliché.

2. Literature review

2.1. The age of great crises

The events of recent years (COVID-19 pandemic, inflationary pressures, energy crisis, Russian-Ukrainian conflict, food crisis) have all highlighted that resilience, variability or innovativeness can be understood as important organisational attributes or capabilities (Kaftandzieva & Nakov, 2021). The term resilience as a resilience has emerged and become common. Those who previously did not understand why effective change management can be important in the life of an enterprise or business organization now understand the importance of change (or change) (Kotter, 2012). Organizational change refers to any intentional or unintentional change in an organization's structure, processes, systems, culture, or strategy. Change, in turn, implies conscious intervention in a process (this is

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41

essentially what change means). This is done with the aim of changing the behaviour of the organisation in order to achieve a desired goal or objective (Kotter, 2008). This goal may be to achieve a better outcome, but it may also be to ensure survival or survival. However, change may also require the introduction of new ideas, good practices or new technology, since the primary objective of a change is also to enhance competitiveness, improve productivity or efficiency. Change may also be necessary if the firm finds itself in a less favourable situation than it was in at a previous time (Errida & Lofti, 2021; Sartori et al, 2021). Ultimately, a crisis is a state in which the vision and mission of the organisation is compromised. It can also be a sudden and unexpected event that can threaten the survival or reputation of an organisation. Crisis is fundamentally characterised by uncertainty, complexity and the importance of emergency interventions, but not all crises are unexpected. There are also crises that unfold slowly as a result of protracted processes. In fact, crises are slower-moving and have a more gradual development, whereas a crisis is more of a rapid, unexpected event. However, whatever crisis situation we focus on, crisis management should be important not only before the crisis unfolds, but also during it. Crisis management should not only be done when the crisis has already emerged and is raging in the organisation, but certainly well before it occurs, it is possible to prepare the organisation for emerging situations and to strengthen the resilience of the organisation against such processes and events (Simola et al, 2005). Economic organisations and businesses should never forget the fact that there is no such thing as steady growth. In economic life, it is a natural state of affairs that growth and decline alternate, so that it is almost a matter of course that a prolonged growth path is followed by a slowdown or decline (Davidsson, 2002). This is how the world economy, the national economy, works, but it is also how business organisations work. Crises and downturns are a legitimate, and in many cases a regular, state of affairs that cannot always be avoided, but there is one thing we can do: prepare for and respond to them. Preparation is, among other things, a general ability that can also be called resilience or crisis resilience (Koronis & Ponis, 2018). Resilience can be strengthened by taking into account and mapping what we can expect, what our weaknesses and areas for improvement are, where the market or a competitor might catch us, what could happen if we miscalculate, etc. Building resilience and effective crisis management is best done when everything is going well in your business, as you have time to do planning or analysis. If the crisis is already raging, there is often no time to do this and you need to intervene quickly, put out fires or take immediate action. In recent years, the COVID-19 pandemic has been the most prominent example of the importance of crisis management and the need to build resilience (Eckey & Memmel, 2022).

2.2. The importance of responding to a pandemic

The pandemic has highlighted the importance of organisational change at several key points. Firstly, it highlighted the need for businesses to be flexible and adaptable (Vargo & Seville, 2011; Donthu & Gustafsson, 2020). For example, organisations that were able to quickly switch to teleworking were better able to continue operations during lockdowns and stand-offs. The pandemic highlighted the importance of resilience in the face of uncertainty. Businesses that were able to weather the storm of the pandemic had strong contingency plans and were able to change their business strategy (business model) quickly to adapt to changing circumstances. These companies were also able to build resilience by fostering a culture of innovation and experimentation. For the latter reason, the SME sector is seen as a much better crisis manager, because these firms are typically smaller and therefore more flexible, with less tied structures, and therefore able to implement changes, including to their business model, more quickly (Varga, 2021). The pandemic has also highlighted the importance of organisational change in building a more sustainable future (Aukena et al, 2021). Many companies have recognised the need to prioritise sustainability and corporate social responsibility (CSR) in their business operations (Peus et al, 2019). By adopting new technologies and business models that prioritise sustainability, companies can not only reduce their environmental impact, but also achieve long-term success in a changing world. After the COVID-19 pandemic, traditional theses on competitiveness and management have been reaffirmed (Gosztonyi, 2022). Innovation remains an

important crisis management tool, proving to be a key factor for recovery (Sung & Kim, 2021). And sustainability and digitalisation are seen as elements that can be important not only for present competitiveness but also for future competitiveness. Resilient and sustainable businesses are better positioned to meet future challenges and succeed in a rapidly changing business environment (Hastings & Schwarz, 2022). The pandemic situation has also opened up new industries and sectors, forcing many businesses to change their profile. COVID-19 highlighted the importance of digital transformation and e-commerce. E-commerce has seen a significant surge in demand and businesses that had already established an online presence were able to adapt more quickly to changing consumer behaviour and needs. Digitalisation has been one of the defining trends of our time. The pandemic period has brought the use of digital solutions even more to the fore, not only for business operations but also for management (Hossain et al, 2021). When we think of the pandemic (COVID-19), we often think of the negative consequences. However, this event not only had crisis consequences, but in some cases also opened the way to new opportunities. Innovation has become even more valued, as has the importance of sustainability and digital transformation. The latter will continue to be important factors for competitiveness and competitiveness also means being able to maintain, even in a period of crisis, the core capabilities that can give a business a real advantage in meeting consumer needs at a higher level. It is therefore important to look at the way in which economic organisations and enterprises try to respond to environmental changes or crises and how successful they can be considered to be from an economic or management point of view.

3. Material and Method

The results presented in this study are partial results of a quantitative survey of domestic and Romanian enterprises. The same questionnaire was used for the Hungarian and Romanian samples, the data were collected through a pre-tested standardised online survey, in both cases using an arbitrary sampling technique. The Hungarian sample was resampled in 2022 and 2023 using the same questionnaire and the same sampling technique to ensure comparability of the data over time. The questionnaire contained only closed questions, bivariate, multivariate and scaled (Likert and semantic differential) questions were used in the research instrument. In the case of the Hungarian sample, 161 evaluable questionnaires were developed in 2022, 72 in 2023 and 65 in 2023 for the Romanian sample, in both cases the population was considered to be the registered enterprises in the respective country. The evaluation of the primary results was carried out using descriptive statistical tests and the One-Way ANOVA technique for comparing metric and non-metric scales. Limitations of the study include the locality of the results due to arbitrary sampling. In the continuation of this research, we will seek to use quota sampling to compensate for this limitation and we also plan to implement a post-qualitative survey in the form of expert interviews to provide a more sophisticated analysis of the results.

4. Results

For the first time in the Hungarian sample, we compared the responses in 2022 and 2023 in terms of the perception of the areas affected by the pandemic. In 2022, the most affected areas in 2022 were work organisation, finance and procurement. One year later, finance was still affected, but work organisation was even more affected by the pandemic according to the respondents. Purchasing, rather than procurement, was in the spotlight, according to domestic businesses.

First, we examined in which areas and to what extent the pandemic has led to changes according to the Hungarian and Romanian respondents. Hungarian businesses identified work organisation, finance and customer relations as the areas most affected by the pandemic in 2023. According to the Romanian sample, work organisation was the area most affected by the pandemic, with the greatest need for change. This was followed by finance, according to the Romanian sample. It is interesting to note the emphasis on human capital related elements in the Romanian sample, which shows that

human capital is one of the most important pillars for enterprises operating in the country, which was strongly influenced by the pandemic and required Romanian enterprises to make a number of changes.

Table 1: Areas affected by the pandemic based on responses from Hungarian and Romanian businesses

Areas	average (1 = not at all affected, 4 = fully affected), ***Hungarian*** sample 2023.	average (1 = not at all affected, 4 = fully affected), ***Romanian*** sample 2023.
Finance	2,30	**2,62**
Organisational development	1,92	**2,68**
Communication	2,05	2,51
Work organisation	2,55	**2,80**
Digital switchover	2,08	2,51
Marketing	1,97	2,35
Customer relations	2,29	2,52
Procurement	2,16	2,29
Logistics	2,00	2,45
Strategic planning	2,18	2,32
Project Management	2,03	2,08
Green transition	1,41	1,74

Source: own research, 2023 N=72 Hungarian, 2023. N=65 Romanian

We could not find any statistically verifiable correlation between the areas affected by pandemics and the size of enterprises in Romanian sample (sig >=0.05), as we can see below.

Table 2: Correlation between the areas concerned and company characteristics in the Romanian sample

	Opearting time		**Size**	
	F	**Sig.**	**F**	**Sig.**
Finance	2,082	0,133	1,741	0,184
Organisational development	0,325	0,724	1,671	0,196
Communication	1,460	0,240	0,255	0,776
Work organisation	0,199	0,820	1,194	0,310
Digital switchover	1,626	0,205	1,712	0,189
Marketing	0,180	0,835	0,331	0,719
Customer relations	0,328	0,721	0,650	0,526
Procurement	2,043	0,138	0,530	0,591
Logistics	0,663	0,519	1,461	0,240
Strategic planning	2,401	0,099	0,475	0,624
Project Management	0,111	0,896	0,229	0,796
Green transition	0,432	0,651	0,088	0,916

Source: own research, 2023. N=65 Romanian

In the sample due to the Hungarian 2023 data collection, we found correlations in the sample with the operating time, as illustrated in the table below and the analysis that follows.

Table 3: Correlation between the areas concerned and company characteristics in the Hungarian sample

	Opearting time		**Size**	
	F	**Sig.**	**F**	**Sig.**
Finance	0,702	0,499	1,274	0,286
Organisational development	1,531	0,223	0,334	0,717
Communication	4,806	**0,011**	1,153	0,322
Work organisation	6,107	**0,004**	1,389	0,256
Digital switchover	2,580	0,083	0,944	0,394
Marketing	0,992	0,376	0,071	0,931
Customer relations	1,011	0,369	0,797	0,455
Procurement	0,993	0,376	0,026	0,974
Logistics	0,468	0,628	0,878	0,420
Strategic planning	5,114	**0,008**	1,311	0,276
Project Management	6,495	**0,003**	1,044	0,357
Green transition	3,066	0,053	0,664	0,518

Source: own research, 2023 N=72 Hungarian sample

The duration of enterprise operation also showed no significant relationship with the areas affected by pandemics in the Romanian sample. In the Hungarian sample, a significant relationship was found between the duration of the enterprise's operation and some of the affected areas (sig <=0.05).

Table 4: Correlation between areas affected by the pandemic and the length of time a business has been in operation in the Hungarian sample in 2023.

Areas affected by pandemic		**N**	**Mean**	**Std. Deviation**	**sig**
Communication	Less than 5 years	22	1,50	0,91	
	Between 5-15 years	28	2,07	1,15	
	More than 15 years	23	2,57	1,34	
	Total	73	2,05	1,21	0,011
Work organisation	Less than 5 years	22	1,91	1,27	
	Between 5-15 years	28	2,61	1,13	
	More than 15 years	23	3,09	1,00	
	Total	73	2,55	1,21	0,004
Strategic planning	Less than 5 years	22	1,86	1,17	
	Between 5-15 years	28	1,89	1,13	
	More than 15 years	23	2,83	1,23	
	Total	73	2,18	1,24	0,008
Project management	Less than 5 years	22	1,50	1,19	
	Between 5-15 years	28	1,89	1,10	
	15 évnél több	23	2,70	1,15	
	Total	73	2,03	1,22	0,003

Source: own research 2023 Hungarian sample N=72; One Way Anova

The results show that the areas that needed the most change in response to the pandemic were communication and work organisation in older businesses (more than 15 years). Also in the areas of strategy making and project management, Hungarian businesses that have been operating for a longer period of time said that these areas were the most affected by the pandemic. It seems that the long-term impact of the pandemic is more dominant for enterprises with a longer history, which can probably be explained by the fact that for these enterprises the above-mentioned areas may have been well-established systems before the pandemic, so that the changes in these areas are not ad hoc and short-term, but require significant and complex changes.

5. Conclusions

The pandemic has affected all organisations and economic entities. The changes have drawn attention to problem areas that had previously been hidden from the life of businesses, or simply not given the attention they deserved. The changes and challenges brought about by the pandemic did not affect the SME sector equally, either within or outside the country. The aim of this study was to examine the impact of the pandemic through the example of Hungarian and Romanian enterprises, based on the results of a questionnaire survey on the size and operational experience of the enterprise. The data show that business size did not significantly influence the areas affected by the pandemic in the case of businesses, but that in some cases the operating time showed a correlation in the Hungarian sample. This suggests that experience and past practice influenced the impact in some cases. The results show that both Hungarian and Romanian enterprises need to make substantial changes in the affected areas, which in many cases would require external assistance. The challenge for the future is to prepare the SME layer for similar events in order to minimise the effects.

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References

[1] Aukena, H.E, Ardakanib, M.F, Carraherc, S. & Avorganid, R.K. 2021. Innovation among entrepreneurial SMEs during the COVID-19 crisis in Iran. Small Business International Review SECTION: Research Articles 5(2) DOI: https://doi.org/10.26784/sbir.v5i2.395

[2] Belitski, M., Guenther, C., Kritikos, A.S. (2022). Economic effects of the COVID-19 pandemic on entrepreneurship and small businesses. Small Business Economics 58., pp. 593-609 https://doi.org/10.1007/s11187-021-00544-y

[3] Davidson, P. 2002. Restating the Purpose of the JPKE after 25 Years Journal of Post Keynesian Economics 25(1), Taylor & Francis, Ltd., pp. 3-7. https://www.jstor.org/stable/4538808

[4] Donthu, N., & Gustafsson, A. 2020. Effects of COVID-19 on business and research. Journal of Business Research, 117, pp. 284–289. https://doi.org/10.1016/j.jbusres.2020.06.008

[5] Eckey, M. & Memmel, S. 2022. Impact of COVID-19 on family business performance: evidence from listed companies in Germany, Journal of Family Business Management, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/JFBM-11-2021-0143

[6] Errida A. & Lotfi B. 2021. The determinants of organizational change management success: Literature review and case study. International Journal of Engineering Business Management;13. https://doi.org/10.1177/18479790211016273

[7] Freeman, H., Barnes, L., & Long, W. 2021. Leading change without formal authority: The ICC model for the 21st century. Advances in Social Sciences Research Journal, 8(11), pp. 335–351. https://doi.org/10.14738/assrj.811.11269
[8] Gosztonyi, M. 2022. COVID-19 positivism: Has COVID-19 changed Hungarian entrepreneurs' perception of business opportunities?, Prosperitas, 9(4), 1. Budapest Business School. https://doi.org/10.31570/prosp_2021_0006
[9] Hastings, B. J., & Schwarz, G. M. 2022. Leading Change Processes for Success: A Dynamic Application of Diagnostic and Dialogic Organization Development. The Journal of Applied Behavioral Science, 58(1), pp. 120–148. https://doi.org/10.1177/00218863211019561
[10] Hossain, R.M., Akhter, F. & Sultana, M.M. 2021. SMEs in Covid-19 crisis and combating strategies: A systematic literature review (SLR) and a case from emerging economy. Operations research perspectives. 9, https://doi.org/10.1016/j.orp.2022.100222
[11] Kaftandzieva, T., & Nakov, L. 2021. Sustainable leadership of change for effective organizational change management. Knowledge - International Journal, 45(1), pp. 61–67. Retrieved from https://ikm.mk/ojs/index.php/kij/article/view/4993
[12] Koronis, E. & Ponis, S. 2018. A Strategic Approach to Crisis Management and Organizational Resilience. Journal of Business Strategy. 39 (1), pp. 32-42. https://doi.org/10.1108/JBS-10-2016-0124
[13] Kotter, JP. 2008. A Sense of Urgency. Harvard Business Press
[14] Kotter, JP. 2012. Leading Change. Boston, Harvard Business Review Press
[15] Ling, H.W.H., Shum, M. & Kwan, C.K. 2021. Social workers' adaptation in times of pandemic crisis: A Hong Kong case, International Social Work, Research article https://doi.org/10.1177/00208728211064581
[16] Peus, C., Frey, D., Gerkhardt, M., Fischer, P., & Traut-Mattausch, E. 2009. Leading and Managing Organizational Change Initiatives. Management Revue, 20(2), pp. 158–175. http://www.jstor.org/stable/41783612
[17] Phillips, J. & Klein, J.D. 2023. Change Management: From Theory to Practice. TechTrends 67, pp. 189–197 https://doi.org/10.1007/s11528-022-00775-0
[18] Sartori R, Costantini A, Ceschi A. & Tommasi F. 2021. How Do You Manage Change in Organizations? Training, Development, Innovation, and Their Relationships. Front Psychol. 2018 Mar 15; 9:313. https://doi.org/10.3389/fpsyg.2018.00313.
[19] Simola, S. K. 2005. Organizational crisis management: Overview and opportunities. Consulting Psychology Journal: Practice and Research, 57(3), pp. 180–192. https://doi.org/10.1037/1065-9293.57.3.180
[20] Sooreea, R., & Sooreea, B. 2021. The Impacts of COVID-19 on Business Practice: Some Key Insights. Advances in Social Sciences Research Journal, 8(12). pp. 366-376.
[21] Sung W, Kim C. 2021. A Study on the Effect of Change Management on Organizational Innovation: Focusing on the Mediating Effect of Members' Innovative Behavior. Sustainability; 13(4):2079. https://doi.org/10.3390/su13042079
[22] Vargo, J., & Seville, E. 2011. Crisis strategic planning for SMEs: Finding the silver lining. International Journal of Production Research, 49(18), pp. 5619–5635.
[23] Varga, J. 2021. Defining the Economic Role and Benefits of Micro, Small and Medium-sized Enterprises in the 21st Century with a Systematic Review of the Literature. Acta Polytechnica Hungarica. 18(11)

ÁGNES CSISZÁRIK-KOCSIR, JÁNOS VARGA, MÓNIKA GARAI-FODOR, KATARZYNA SZYMCZYK:

THE IMPACT OF THE PANDEMIC ON POLISH AND HUNGARIAN BUSINESSES[42]

Abstract: The pandemic has brought many changes to our daily lives, affecting all sectors of the economy. The pandemic, and the dramatic changes that followed, have created new challenges for businesses, requiring new operational foundations and frameworks. However, the economic downturn following the pandemic and the new operational arrangements did not affect businesses of different size categories or areas within an organisation in the same way. The effects are even more pronounced when looking at it country by country. The aim of this paper is to present the impact of the pandemic and its aftermath on the lives of Hungarian and Polish enterprises, highlighting the segments and areas that deserve particular attention in terms of changes and impacts, based on the results of a questionnaire survey conducted in Hungary and Poland.

Keywords: pandemic, change, SME sector, Hungary, Poland,

1. Literature review

The third industrial revolution and the changes it brought meant the introduction of automation in the daily lives of economic operators. In contrast, the Fourth Industrial Revolution has pushed the economy towards smart solutions and technologies (Loughlin, 2018). These changes have created a powerful challenge for micro, small and medium-sized enterprises to compete in a world that has moved strongly online. This is due to the scarcity of resources, knowledge and financing gaps, which create additional difficulties for the SME sector (Masood & Sonntag, 2020; Rajnai et al, 2017). The changes that have taken place, brought about by the fourth industrial revolution, are increasingly pushing the economy towards a fifth major industrial revolution (Xu et al, 2021), in which artificial intelligence will play a role. The pandemic has given a new impetus to these processes. However, the path is not straightforward, as there are many obstacles to overcome, such as lack of motivation, resources, knowledge, innovation and agility, which hinder the full scale-up of these processes (Cortino et al, 2020; Kumar et al, 2020).

The pandemic and the changes that followed have affected all actors in the economy, and the business sector has not been left untouched (König & Winkler, 2021). The situation has forced many businesses to rethink their operations, rethinking the implementation of new technologies in order to survive (Dwiwedi et al, 2020; Caroll & Conboy, 2020). The virus has not only affected the way we work, but has also changed our human and social habits and relationships, changing the way businesses and supply chains operate. In some ways, the impact on society can be seen as even more serious than the economic problems. Inward-looking has become a general phenomenon. Depression and alienation began to dominate more and more people (Long et al, 2021). The mental and psychological health of individuals was significantly damaged. At the same time, consumer habits and ways of working have changed. Online living, online education and the home office have become more prevalent. Online commerce has increased and for many people the intimate family home has been transformed into a place of work. It is almost impossible to list all the changes that have resulted

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42

from the COVID-19 pandemic. There is hardly a person or organisation in the world today that has not directly or indirectly encountered the challenges and problems caused by the COVID-19 pandemic. These effects have had a direct impact on the way businesses operate. However, these impacts varied significantly from country to country and region to region, with different impacts on those affected.

The COVID-19 pandemic opened a new chapter in human history. The viral situation has forced us to learn to work together again, it has reshaped educational methods (e-learning and hybrid education), it has promoted the use of digital tools in everyday life and we have realised that the use of online technologies can indeed make our lives easier. In addition to its many negative effects, the virus has also brought new insights for humanity. Ling et al (2021) called the situation caused by the epidemic the "New Normal". They point out that the effects of the virus are still ongoing and in this situation people, including businesses, have had to adapt significantly to new patterns of work and life (Ling et al, 2021). The viral situation has really shown how well we can manage change and adapt and resilience, or the development of resilience, has become fashionable. The latter has become a new buzzword for modern management and leadership theories, but can also be understood as a concept of increasing strategic importance in national economic policies. The aim is to emerge from crisis and to build a capacity to be more resilient and stable in future crises. The analysis of the impact of the coronavirus should be broken down into distinct phases:
1. the pre-viral stage,
2. the process of the crisis caused by the virus,
3. the period following the crisis.

This will help to better model and express when and by which factor each economic actor was more directly affected, and thus to better understand the patterns of behaviour observed in each phase (Rattanaprichavej, 2021). It is not only from this perspective that the effects of the virus need to be separated. The amplification of the virus in several waves did not always generate the same numerical effects.
Although there is much talk about mitigating the economic impact of the coronavirus crisis, less is said about how the negative and bad beliefs, fear and anxiety that have developed in members of society will be addressed (Kalat & Shiota, 2007). Fear becomes anxiety when attempts to cope with the threat fail and the fear persists. In the aftermath of the COVID-19 pandemic, many people felt a real threat of losing their jobs, businesses or their inability to survive. Many people were desperate to find a new job, and it was very difficult to find a new job because of the extreme difficulties in certain sectors (e.g. tourism, catering). Two studies should be highlighted in particular with regard to the impact of COVID-19 on society. In both cases, they concluded that fear of the coronavirus is associated with higher levels of depression and general anxiety in adults (Ahorsu et al, 2020; Lee et al, 2020a; 2020b).
Moreover, the pandemic burst at a time when uncertainty among economic agents was significantly high (Song & Zhou, 2020). Fear of the virus strongly influenced consumption patterns (Mawani et al, 2021), so it was not only the restrictive measures taken that had an impact.

Along the lines described above, the pandemic has had a number of impacts on businesses and their operations in many parts of the world. The impacts were very diverse, ranging from economic shocks to digital and operational challenges. The most important impacts (Kraus et al, 2020; Papadopulos et al, 2020) are:

1. Economic impacts: such as loss of revenue, store closures, supply chain disruption, turnover loss, loss of suppliers and partners.
2. Labour shortages and labour surpluses: the pandemic has caused a large number of workers to be off work due to mass illnesses, but many businesses have been forced to lay off workers due to lost markets and reduced revenues.

3. Funding problems: banks and other financial institutions have tightened their credit standards, and many businesses have found it difficult to obtain additional, supplementary loans or other sources of finance to tide them over the difficult period.
4. Digitalisation challenges: online shopping, online education and online working have, however, created new opportunities for businesses. It is also important to mention the challenges, as not all economic entities were adequately prepared for the sudden and rapid transition.
5. Innovation pressures and opportunities: rapid change can only be responded to with new and innovative solutions. Agile and open businesses have focused on innovation, focusing on new responses to cope with a rapidly changing environment.
6. Shutdowns and closures: the epidemic situation has put many businesses (hotels, restaurants, shops, cinemas, entertainment and other service providers) in a particularly difficult situation. The loss of guests and visitors and the reduction in turnover to zero has resulted in a huge loss of revenue, pushing many organisations to the brink of bankruptcy.
7. Job losses: business closures and the economic slowdown have forced many businesses to lay off workers, resulting in job losses and unemployment.
8. Financial difficulties: due to the epidemic measures, businesses have suffered a loss of income while continuing to pay rent, employee wages and other costs. This led to financial difficulties and many businesses were forced to take out loans to sustain themselves.
9. Increase in online presence: however, the role and prevalence of online commerce and teleworking has soared, giving businesses the opportunity to shift to online sales and work from home, while cutting costs.

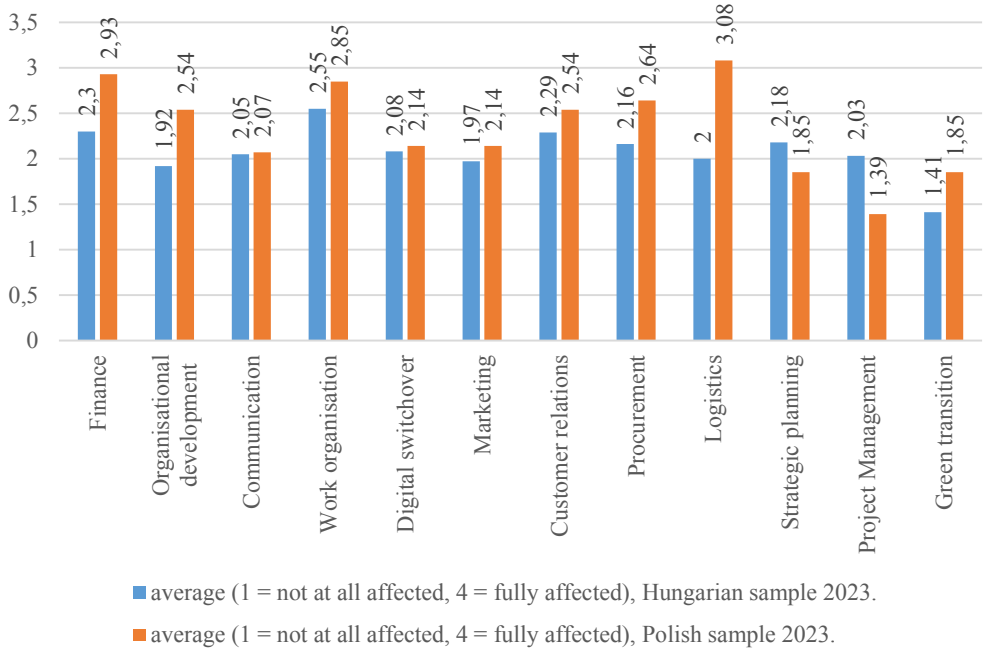
2. Materials and methods

The results presented in the paper are partial results of quantitative research among Hungarian and Polish enterprises. The same questionnaire was used for the Hungarian and Polish samples, and the data were collected through a pre-tested standardised online questionnaire survey, in both cases using an arbitrary sampling technique. The Hungarian sample was also resampled in 2022 and 223, using the same questionnaire and the same sampling technique to ensure comparability of the data over time. The questionnaire contained only closed questions, bivariate, multivariate and scaled (Likert and semantic differential) questions were used in the research instrument. In the case of the Hungarian sample, 161 evaluable questionnaires were developed in 2022, 72 in 2023 and 59 in 2023 for the Polish sample, in both cases the population was defined as registered enterprises in the respective country. The primary results were evaluated using descriptive statistical tests and the One-Way ANOVA analysis of variance technique to compare metric and non-metric scales.
Limitations of the study include the locality of the results due to arbitrary sampling. In the continuation of this research, we will seek to use quota sampling to compensate for this limitation and we also plan to implement a post-qualitative survey in the form of expert interviews to provide a more sophisticated analysis of the results.

3. Results

Firstly, we looked at the areas where respondents felt the pandemic had changed and the extent of the changes. Hungarian businesses identified work organisation, finance and customer relations as the areas most affected by the pandemic. In the Polish sample, logistics was the area most affected by the pandemic, which is not surprising given the country's location, logistics network and its dominant role in the European supply chain. Polish businesses perceived the pandemic to have had a much stronger impact on finance than Hungarian businesses perceived it to have had in 2023. The third most important aspect in the Polish sample was work organisation. Along with finance, this is the area that came out on top in both samples, demonstrating the impact of the pandemic on these areas regardless of regional aspects.

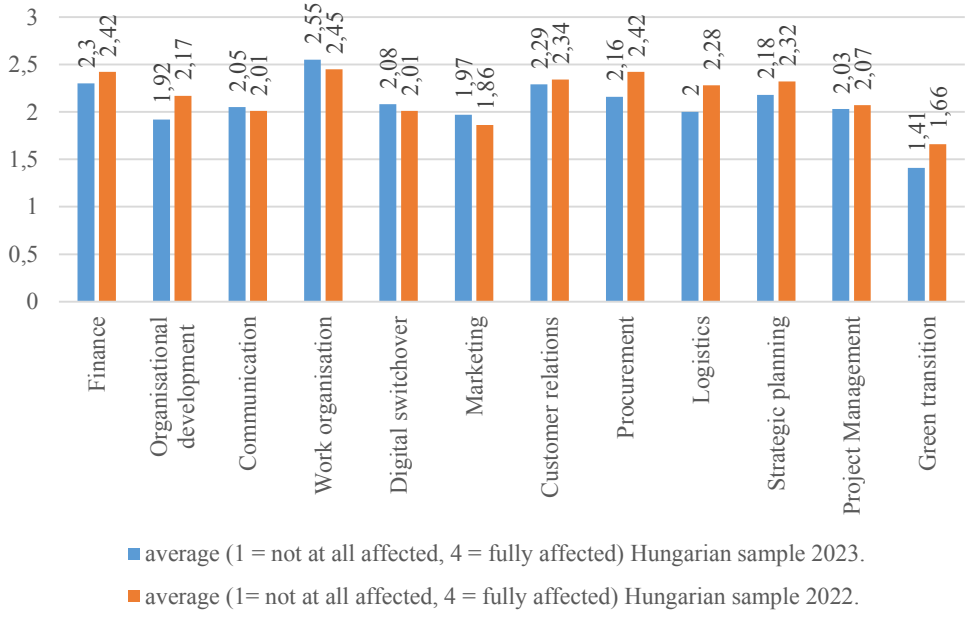
Figure 1. Hungarian and Polish sample of areas affected by the pandemic



Source: own research, 2023 N=72 Hungarian, 2022. N=59 Polish sample

In the Hungarian sample, we compared the responses in 2022 and 2023 in terms of the areas affected by the pandemic.In 2022, the most affected areas in 2022 were work organisation, finance and procurement. One year later, finance was still affected, but work organisation was even more affected by the pandemic according to the respondents. Purchasing, rather than procurement, was in the spotlight, according to domestic businesses.

Figure 2. Areas affected by the pandemic in the Hungarian sample in 2022 and 2023



Source: own research, 2023 N=72 Hungarian, 2022. N=161

A statistically significant correlation between pandamia affected areas and the size of enterprises was obtained for some areas in the Polish sample (sig <=0.05). In the Hungarian sample, no significant relationship between the size of the enterprise and the affected area was found.

Table 1. Correlation between areas affected by pandemic and size of business in the Hungarian and Polish sample

	Hungarian sample N = 72		**Polish sample N = 59**	
	F	**Sig.**	**F**	**Sig.**
Finance	1,274	0,286	10,511	**0,000**
Organisational development	0,334	0,717	3,813	**0,028**
Communication	1,153	0,322	0,175	0,840
Work organisation	1,389	0,256	4,568	**0,015**
Digital switchover	0,944	0,394	0,521	0,597
Marketing	0,071	0,931	0,289	0,750
Customer relations	0,797	0,455	3,597	**0,034**
Procurement	0,026	0,974	1,819	0,172
Logistics	0,878	0,420	0,256	0,775
Strategic planning	1,311	0,276	0,996	0,376
Project Management	1,044	0,357	2,203	0,120
Green transition	0,664	0,518	0,654	0,524

Source: own research, 2023 N=72 Hungarian, 2022. N=59 Polish sample

For micro enterprises, finance was the most exposed area. For organisational development, work organisation and customer relations, we also saw a greater impact for micro-enterprises. We believe that these are the areas that are most correlated with the size of the organisation, the smaller the business in many cases the greater the exposure, which the pandemic has amplified according to the results.

Table 2. Correlation between areas affected by pandemic and size of business in the Polish sample

Pandemic-affected areas in the Polish sample		**Mean**	**Std. Deviation**	**sig**
Finance	Micro-enterprise	3,58	0,607	
	Small enterprise	3,00	1,049	
	Medium enterprise	2,21	1,032	
	Total	2,93	1,065	0,000
Organisational development	Micro-enterprise	3,16	1,214	
	Small enterprise	2,24	1,221	
	Medium enterprise	2,26	1,098	
	Total	2,54	1,236	0,028
Work organisation	Micro-enterprise	3,37	0,955	
	Small enterprise	2,67	0,577	
	Medium enterprise	2,53	1,172	
	Total	2,85	0,979	0,15
Customer relations	Micro-enterprise	3,05	1,129	
	Small enterprise	2,38	0,973	
	Medium enterprise	2,21	0,976	
	Total	2,54	1,072	0,034

Source: own research, 2023. N=59 Polish sample

4. Conclusions

The study shows that the epidemic situation has challenged businesses in all regions of the world. Hungarian and Polish SMEs were no exception. However, the effects were very different, as our results showed. In many cases, Polish businesses felt the impact on the areas affected by the pandemic more strongly than Hungarian businesses. Finance, organisational development, communication, or even work organisation, digital switchover, alongside marketing and customer relations, and procurement were also much more strongly affected according to the Polish businesses' perceptions. It is also interesting to note that when we look at the opinions of Hungarian businesses, we find that over time they feel less affected in each area due to the pandemic, which is supported by our results. It is also found that a number of factors have been shown to be influenced by the size of the enterprise. It can be said that the impact was also confirmed by the research results in the case of Polish enterprises, where it emerged that it was the micro-enterprise segment that experienced the most negative effects of the crisis on all its days. Interestingly, in contrast, there was no such significant relationship in the Hungarian sample, so it can be said that Hungarian enterprises, regardless of their size, felt the pandemic situation was problematic. This suggests that the resilience of small and medium-sized enterprises and their ability to cope with change need to be strengthened in order to make them less vulnerable to similar shocks. A major task in the coming years will be to prepare the sector in this direction, where both knowledge and education have a very important role to play.

acknowledgement

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References

[1.] Ahorsu, D. K., Lin, C., Imani, V., Saffari, M., Griffiths, M.D., Pakpour, A.H. 2020. The fear of COVID-19 scale: Development and initial validation. International Journal of Mental Health and Addiction, 20(3), pp. 1537-1545.
[2.] Calia, R. C., Guerrini, F. M., & Moura, G. L. 2007. Innovation networks: From technological development to business model reconfiguration. Technovation, 27(8), 426–432. https://doi.org/10.1016/j.technovation.2006.08.003
[3.] Carroll, N., & Conboy, K. 2020. Normalising the "new normal":Changing tech-driven work practices under pandemic time pressure. International Journal of Information Management, 55(102), 186. https://doi.org/10.1016/j.ijinfomgt 2020.102186
[4.] Cotrino, A.; Sebastián, M.A.; González-Gaya, C. 2020. Industry 4.0 Roadmap: Implementation for Small and Medium-Sized Enterprises. Applied Sciences, 10(23), 8566.
[5.] Dwivedi, Y. K., Hughes, D. L., Coombs, C., Constantiou, I., Duan, Y., Edwards, J. S., Gupta, B., Lal, B., Misra, S., Prashant, P., Raman, R., Rana, N. P., Sharma, S. K., & Upadhyay, N. 2020. Impact of COVID-19 pandemic on information management research and practice: Transforming education, work and life. International Journal of Information Management, 102211 https://doi.org/10.1016/j.ijinfomgt.2020.102211
[6.] Kalat, J.W. & Shiota, M.N. 2007. Emotion. Thompson Wadsworth
[7.] König, M. & Winkler, A. 2021. COVID-19: Lockdowns, Fatality Rates and GDP Growth. Review of European Economic Policy. 56(1), pp. 32-39.
[8.] Kraus, S., Clauss, T., Breier, M., Gast, J., Zardini, A., & Tiberius, V. 2020. The economics of COVID-19: Initial empirical evidence on how family firms in five European countries cope with the corona crisis. International Journal of Entrepreneurial Behavior & Research, 26(5), pp.1067–1092. https:// doi. org/ 10. 1108/IJEBR-04-2020-0214

[9.] Kumar, R.; Singh, R.K.; Dwivedi, Y.K. 2020. Application of Industry 4.0 Technologies in SMEs for Ethical and Sustainable Operations: Analysis of Challenges. Journal of Cleaner Production, 275, 124063.
[10.] Lee, S. A. - Jobe, M.C. - Mathis, A.A. 2020. Mental health characteristics associated with dysfunctional coronavirus anxiety. Psychological Medicine. https://doi.org/10.1017/S003329172000121X
[11.] Lee, S.A. & Crunk, E.A 2020. Fear and psychopathology during the COVID-19 crisis: neuroticism, hypochondriasis, reassurance-seeking, and coronaphobia as fear factors, SAGE Journals, August 6, https://doi.org/10.1177/0030222820949350
[12.] Ling, H.W.H. - Shum, M. - Kwan, C.K. 2021. Social workers' adaptation in times of pandemic crisis: A Hong Kong case, International Social Work, Research article https://doi.org/10.1177/00208728211064581
[13.] Long, E. - Patterson, S. - Maxwell, K. - Blake, C. - Perez, R.B. - Lewis, R. - McCann, M. - Riddell, J. - Skivington, K. - Lowe, R.W. - Mitchell, K.R. 2021. COVID-19 pandemic and its impact on social relationships and health, Social and Public Health Sciences Unit, University of Glasgow
[14.] Loughlin, S. 2018. Industry 3.0 to Industry 4.0: Exploring the Transition; IntechOpen: Houston, TX, USA
[15.] Masood, T.; Sonntag, P. 2020. Industry 4.0: Adoption Challenges and Benefits for SMEs. Computers in Industry 121, 103261.
[16.] Mawani, F. - Gunn, V. - O'Campo, P. 2021. COVID-19 economic response and recovery: a rapid scoping review, International Journal of Health Services. March 18, 2021. https://doi.org/10.1177/00207314211002785
[17.] Papadopoulos, T., Baltas, K. N., & Balta, M. E. 2020. The use of digital technologies by small and medium enterprises during COVID-19: Implications for theory and practice. International Journal of Information Management, 55(4) https://doi.org/10.1016/j.ijinfomgt.2020.102192
[18.] Rajnai, Z.; Kocsis, I. 2017. Labor Market Risks of Industry 4.0, Digitization, Robots and AI. In Proceedings of the 2017 IEEE 15th International Symposium on Intelligent Systems and Informatics (SISY) (eds: Szakál, A.), Subotica, Serbia, 14–16 September; pp. 343–346
[19.] Rattanaprichavej, N. 2021. Impact of COVID-19 pandemic and crisis management strategies on real estate agencies. Contemporary Management Research, 17(4), pp. 303-332. https://doi.org/10.7903/cmr.21349
[20.] Song, L. & Zhiu, Y. 2020. COVID-19 pandemic and its impact on the global economy: what does it take to turn crisis into opportunity? China & World Economy, July 28(4) https://doi.org/10.1111/cwe.12349
[21.] Xu, X.; Lu, Y.; Vogel-Heuser, B.; Wang, L.2021. Industry 4.0 and Industry 5.0—Inception, Conception and Perception. Journal of Manufacturing Systems, 61, pp. 530–535.

PANKOTAY FRUZSINA MAGDA, KOLOSZÁR LÁSZLÓ: SUSTAINABLE HOTEL PROCESSES: OPTIMISATION OPPORTUNITIES TO AVOID WASTES THROUGH A LEAN APPROACH

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KOLOSZÁR habil. László PhD, associate professor, University of Sopron

Today's accommodation providers are faced with continuous challenges. They have not yet forgotten the effects of the COVID-19 pandemic and are already caught up in a crisis of soaring energy costs and inflation. At the same time, the negative impact of the climate crisis can also be felt intensively on a daily basis. In a constantly accelerating and resources wasting world, one of the keys of survival may be to optimise internal processes and move towards becoming a sustainable accommodation provider. The present research conducted a survey by assessing job-related situations focusing on the wastes of the lean approach among 206 employees of accommodation providers in Hungary. The waste categories in the survey were analysed using statistical methods to draw conclusions about the presence of lean waste categories. We sought to answer the question whether the usage of lean could be a potential answer for a sustainable optimisation of internal processes and how much improvement potential can be achieved by eliminating lean wastes.

Keywords: sustainability, optimisation, accommodation, hospitality industry

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1. INTRODUCTION

Companies have now become more sensitive to social, environmental and economic issues and global problems. The sustainableand socially conscious development that also takes into account environmental aspects is increasingly an actuality, issue and task for individuals, organizations and companies. Based on the experts' definitions, sustainability means that the company must satisfy the needs of all its internal and external stakeholders in the present in such a way that it does not jeopardize the satisfaction of similar needs of future stakeholders (Szóka, 2022). The definition of sustainability used today means a complex framework for companies, the purpose of which is to meet economic, environmental awareness and social justice goals simultaneously. Since the goal of sustainability is to achieve excellent social, environmental and economic (financial) performance at the same time, evaluating and measuring this is not so easy. One of the main reasons for this is that financial goals are linked to measurable, short-term metrics, while sustainability measurements are uncertain and examine long-term data series. It is also a problem that we do not see the causal relationships of the individual aspects (both social, environmental, economic) in their full complexity (Gácsér, Szóka, 2021).

The national, international and global markets are in a cyclical and continuous evolution. The paradox of acting fast but thinking long term must be addressed, in the spirit of sustainability. Customers are more when buying products, so continuous innovation, flexibility in response to product demand, and a focus on speed of production all underpin this. In 1943, the Hungarian Tivadar Rajty, who preceded Einstein, put it this way: *'Nothing is eternal. Economic conditions are changing, technology is evolving, and what met our needs yesterday no longer meets them today.'* (Rajty, 1943) Walton, (2018) author of a Deloitte & Touche study, pointed out the growing vulnerability of companies to

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global competitiveness. Manufacturing companies must meet the key factors of production strategy, speed and flexibility. *'As the workforce becomes more mobile and living standards rise, EU integration will mean the erosion of Central Europe as a low-cost geography,'* Walton said.

Some domestic owned companies are currently compensating for skill shortages by lowering the cost of cheap labour. Accession to the European Union generally represents a significant risk for countries with low-cost production capacity. A number of government programmes have been launched to catalyse this process, but none have produced breakthrough results. According to Koloszár and Pankotay (2017), the management tools used in the Hungarian SME sector are narrowly tailored, which also affects the competitiveness of firms. Competitiveness is influenced by young people becoming entrepreneurs, the use of new methods (such as lean), but also by the effective use of intellectual capital (Pankotay, 2013; Pankotay, 2017). Szóka (2014) notes that process thinking, production cycles and production processes need to be simplified, standardised and shortened, and strategic orientation should not be ignored. Haskin (2010) takes a financial perspective. More and more companies are adopting the lean enterprise model or some variant of it. "The use of standard overhead reduction models in a lean environment does not accurately reflect the benefits of becoming a lean enterprise and may distort the impact of change" (Haskin, 2010)

The aim of the research is to draw attention to the fact that efficiency cannot only be increased by financial and marketing means, but also by paying great attention to the operational and work organisation background. In addition, this research does also not support unnecessary meetings and reports, but sees the potential for improvement in the operational level value chain. For all managers, the goal is to create value efficiently, i.e. to create as much value as possible using as few resources as possible. One way to do this is to reduce the rate of waste in the value creation process.
A further aim of our research is to identify the wastes in the value creation process in small and medium-sized hotels in the accommodation services sector. To identify them by location and job, based on the seven types of wastes identified by lean.

2. MATERIAL

There has been little comprehensive research among accommodation providers on 'waste' detection or cost-based efficiency measurement. In our review of the literature on this topic, we found that although the academic publications cover the same topic, their vocabulary is heterogeneous. While in the automotive and manufacturing industries the term lean - lean management is established in the international literature, this is not the case in the service industry. There is a growing tendency to use the term lean in the modern, globalised and rapidly changing service industries, although the systematic application of lean is also not widely established among Hungarian manufacturing SMEs (Koloszár 2018). This trend is not present in the hotel and catering sector, especially among the small and medium-sized enterprises surveyed.

In their synthesis, Pnevmatikoudi and Stavrinoudis (2016) have listed 119 KPIs used by the accommodation providers and the literature on them. The following are the three most popular KPIs that converge in the literature: Revenue Per Available Room, Occupancy Rate, Average Daily Rate. Generally speaking, they revolve around a single key performance indicator. These include the issue of locality, as well as, the marketing sales capability. These are factors that hide effective efficiency and do not provide information on the operational efficiency of accommodation providers. For the other indicators, it is confirmed that very different results were obtained from source to source, as different indicators were used. This was to be expected, as presumably different information is considered important by management. The reviewed literatures (Kala and Bagri 2014; Srivastava and Maitra 2016; Jugović et al., 2022) agreed that they examine numerical data that deal with profitability and utilisation. However, they do not focus on the potential for waste reduction.

The results of lean thinking in reverse are no different from the ones of the traditional approach. However, the primary objective is not to create profit, but rather to minimise wastes compatible with the long-term objective (market growth). From an economic point of view, therefore, if we reduce our wastes while generating ceteris paribus revenues, the gap opens wider and the realised profit will be higher. In other words, we have achieved the primary objective in the traditional sense by improving our internal processes. *'The biggest waste is unused talent and untried ideas.'* (Taiichi Ohno 2013)

Ohno (1988) categorised the tools for waste detection. Lean waste detection is not, but the philosophy is supported by benchmarking; idea management, job rotation, autonomous and diverse teams, knowledge management. Koloszár and Pankotay (2017) point out that the literature (Matt and Rauch, 2013; Belhadi, et al., 2016; 2017) suggests that lean tools for SMEs, although applicable for efficiency improvement, are subject to criticism because they are not, or not fully, lean tools. On the one hand, some tools are strongly interdependent, mutually consequential and mindset-generating, like VSM and visual management. On the other hand, A3 and Poka-yoke can be used independently. No consistent grouping of lean tools has been found in the literature, research experience or empirical exploration (Figure 1).

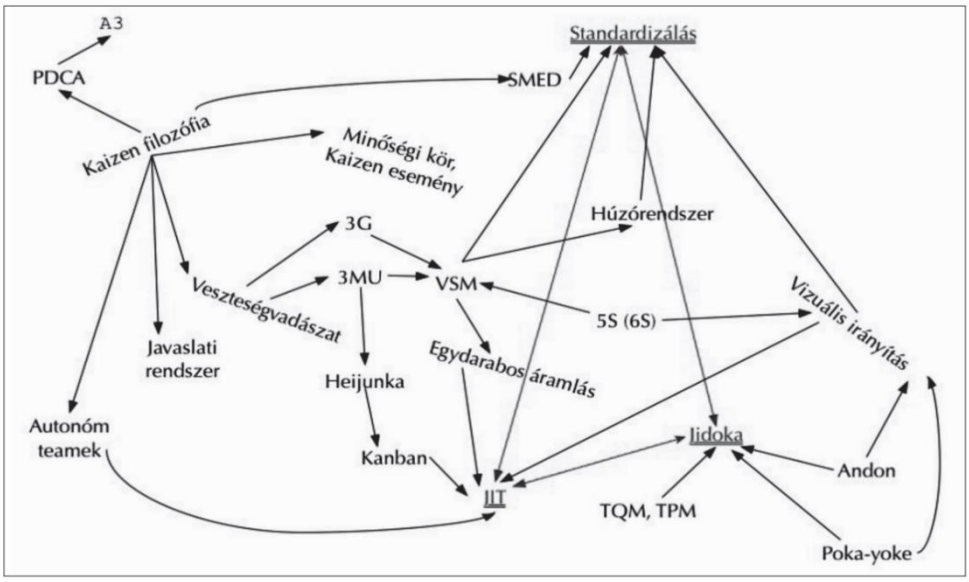

Figure 1: Context of the use of lean tools
Source: Koloszár és Pankotay, 2017 p.91

Service lean is a service-specific version of the methods used in production, which in some cases is radically different (Dévai et al., 2021). The effects of the global market are also present here. With market changes, the organisation and management of services has also changed. In addition to IT/IS applications, awareness of the environment and security has led to a review of existing operational systems. The tools previously focused on manufacturing companies are now being used more and more successfully by service sector companies as lean thinking and approach is gaining ground.

The service is not deliverable, not stockable, there is no overproduction (except perhaps the HR area), but lean is (can be) strongly present as a waste in the categories of waiting, moves, scrap. Innovation, and over-delivery are in the over-manufacturing category of a service. "An interesting phenomenon is the Kano model, whereby over time, extra excitement, excess satisfaction, is already widespread and becomes part of the base case" (Dévai et al., 2021)
The other two strands of 3 Mu, mura (imbalance) and muri (overload), are existing problems in services, from which many customer dissatisfaction and problems arise(s).

According to Rother, the popular methods used in process improvement have a flawed approach. "It's not a matter of finding many mistakes, but of finding the few that will produce results that will mitigate the others." (Rother & Shook, 2012) A service company excels when it is able to execute its business strategy more effectively than its competitors over the long term. Its operations cover processes, organisation and the activities of partners and customers. It is a long-term process with a multi-stage organisational development model (Dévai et al., 2020).

On this basis, we formulated the following hypothesis.
H: All seven types of wastes can be identified among accommodation providers in the studied area.

3. METHODS

'Raise a good problem,
ask a good question,
- is half the job.'
(Szent-Györgyi, 1972)

The majority of accommodation providers are small and medium-sized enterprises. Thus, we have made our findings with the limitations already known among SMEs in mind.
Prior to the present research, we conducted a micro study (Pankotay & Koloszár, 2019) with the secondary aim of exploring the investigability, potential and limitations of lean among accommodation providers. This was a control milestone of the research questionnaire. The interview confirmed that situational questioning is the most effective way to assess wastes. Then, for each of seven waste categories of lean, we formulated four-four situations that occur in everyday work that can track back to the presence of the waste we wanted to assess. The questionnaire was validated by an in-depth interview with employees of the accommodation service providers. Then, after incorporating the comments, the questionnaire was queried online and in paper form. Statistical analyses were then carried out.

The situations were statements that could occur on any working day of the respondent. Measured on a 5-point Likert scale, we know that the variable could take on a range of 1 (Never occurs) - 2 (Rarely occurs) - 3 (Occurs but not typical) - 4 (Occurs many times) -5 (Occurs every day). The data set was subjected to a one-sample median test. The procedure is based on the two-sample test known as the Wilcoxon procedure. In the two-sample test, the procedure tests for deviation from the control group. In the present study, the reference group was replaced by a reference value. In the one-sample test, an alternative to the two-sample test was used to determine the extent of significant deviation from a predefined median - the reference value. A significant deviation from the median - three - indicated that the variable was worth further investigation. In addition the direction of deviation determined whether it indicated the presence or absence of a result. However, the median test does not address cases in which a response option was an outlier. Therefore, a chi-square test was also used to examine how the responses received were distributed. The chi-square test allows for the analysis of reference distributions as well as uniform distributions. In the present study, we was looking for the answer to the question in which cases the responses are not uniformly distributed and what causes these non-uniformities. Interpretation of the results was used to decide whether there was an outlier frequency value that could be used to clearly identify which response category was dominant. If categories 4-5 are dominant, then the phenomenon is present in the sample under study, if categories 1-2-3, then it is not present or cannot be interpreted. In this case, we also examined the direction of the variables before the final classification as in the one-sample median test.

The analysis was conducted using SPSS v21 (Statistical Package for the Social Sciences), but the data were summarised in tabular form using Microsoft Excel.

Subsequently, a simulation interview was carried out, aiming to interview at least one hotel manager from each of the tourist resorts in the study area. We also expected the interviewees to have several years of professional experience in the accommodation services sector and to manage hotels of different profiles and sizes. The second leg of the expert interview was to contact and interview people with influence and insight into tourism in the region. The results of the statistical analysis carried out after the questionnaire surveys were validated in the interview.
The survey was carried out among accommodation providers in the Western Transdanubian region, in particular in the counties of Győr-Moson-Sopron and Vas. According to the 2019-2020 KSH statistics, there are 272 (2019), and 238 (2020) accommodation providers in the region. This means that 11.8% to 13.5% of the accommodation providers in the region were contacted. We based our research on the responses of a total of 206 respondents and 4 in-depth interviews.

4. RESULTS AND DISCUSSION

It was agreed by the interviewees that the size of the hotel had an impact on the wastes and the way they were handled, and that the Covid effect may have influenced the responses, as well. In tourism, flexibility and stable fundamentals go hand in hand. A1)[44] thought that *'overproduction is present'* of the seven main wastes and inventory depreciation was considered low, but the presence of the others was not excluded. *'I could consider overproduction (e.g. abundant breakfast) as a marketing cost, it's a matter of accounting space.'* Transport costs are not perceived as high, guest trips are well organised. *'Back roads are seen as redundant areas, not generating money, not a priority to operate. Office ergonomics is a new approach to hotel management. Room attendant route is more important issue from working time, JIT point of view. If I look at working time as a value, process organization in management is closer to engineering. It is also an innovative approach and even education (tourism) has not moved in this direction, although it has a raison d'être. There is a case for training hotel-specific operational managers and operations managers.'*

A2) do not feel that wastes are a feature of your hotel. Customer responses (satisfaction rating) are processed, attention is paid to their solutions. *'This is an important opinion.' 'No inventory wastes due to periodically planned equipment, at most conscious over-ordering for accounting, purchasing reasons.'* In terms of wastes, he mentions the redeployment of staff between Budapest, Balaton and hotels in the region. *'The draining effect of the Austrian border was not a problem during Covid, they were happy to work from home.' 'The waste of movement is not perceived as strong, but the responses show it. In fact, as a decision-maker, I have to wait, but I have my own priorities, I have a reaction time, I have to talk to the girls about that. Transportation waste happens, I agree with that, but I don't feel it is typical, it is more departmental. If it's a high number, I have to look into why, but there are hotel givens you have to live with.'* Room maids' laundry moving is supported by helpers in the hotel because of the infrastructure. *'In some cases we have done this as a team. I think it is important that a hotel is professionally planned.'* A3) is on similar opinion *'Hotels are not designed for daily practice. The 'front' is more important than the operational 'back'. In construction they save on this, so there is no warehouse, even though the extra cost of transport, if I look at the labour time alone, for it to offset the financial impact is just a question of time, I think.' 'These are basic structural and design problems, inherited situations. The operational side of the hotel is not designed.'* Hotel operations management as a way of identifying wastes is a new field, according to the interviewee.

A2) considers unnecessary work to be a waste for the hotel. The values of the questionnaire are over-represented according to them, the presence of waste is rather medium. A4) indicates bias in the results based on the size of the respondent's accommodation provider. *'Workflow processes may be elaborate in a hotel chain, but not necessarily good or adhered to. We work in enterprise system, it will filter out quite a few gaps on its own. Colleagues can define redundant work, they are aware of it.'*

[44] Interviewees are marked A1-A4.

A3) says *'the transport waste is not project planned.'* The hotel keeps its inventory at a minimum level, which it cannot change because of the background infrastructure, but JIT has not applied.
To summarize, before the statistical evaluation of the questionnaire, based on the interviews, overproduction is present, inventory waste is low due to adequate stocks; transportation waste is low, no movement, no moving waste. Overwork, overproduction is present but the question is overrepresented.

The questionnaire survey was closed with 204 fully completed responses, almost half of the 567 questionnaires that started the survey. (Table 1)

Table 1: Distribution of respondents to the questionnaire survey

Position	Number of respondents
Manager, owner	*31 pcs*
Other managerial employee	*25 pcs*
Non-managerial employee	*148 pcs*
Total sample	*204 pcs*

Source: own construction

A total of 123 variables were included in the study to examine waste and lean presence. It is generally accepted that the sample is not normally distributed. Since the sample is not normally distributed, we have no direct means of showing what the expected value of a given variable is. Using two indirect methods, the statistical methods presented, we aim to predict the expected value as accurately as possible.
We start by presenting the relevant analyses with non-managerial employees, then continue with managerial employees, and finally summarize the results supported by the analysis.

4.1 Non-managerial employees

In the table 2, we illustrate the detail of the results of the one-sample median test at $p>0.05$ for transportation waste.

Table 2: One-sample median test (non-managerial staff) for transport waste – fragment

Nr.[1]	**Observed[2]**	**N[3]**	**Z[4]**	**p**	**H[5]**	**Decision**
1	3	148	1.65	0.099	H0	-
2	3	148	2.339	0.019	H1	-
3	4	148	6.671	0.000	H1	Exist
4	2	132	-7.091	0.000	H1	Not exist

[1]*Question number in the data table;*
[2]*Observed value-observed median;*
[3]*N is the sample item number;*
[4] *Z is the standardised test statistic value;*
[5]*Which hypothesis is accepted.*
Source: own contruction

Table 3: Chi-square test (non-managerial staff) – fragment

Nr[1]	N[2]	Chi-square	p[3]	Decision	Waste category
1	148	20.784[a]	0.00	Exist	Transport
2	148	14.635[a]	0.01	Not exist	Transport
3	148	53.689[a]	0.00	Exist	Transport
4	132	71.561[b]	0.00	Not exist	Transport

[1]*Question number in the data table;*
[2]*N is the sample item number;*
[3]*Likelihood value.*
Source: own contruction

The chi-squared goodness-of-fit test compares the frequencies for the categories of variables with the reference frequency. In the present study (Table 3), the reference frequency assumes a uniform distribution, i.e., if N=148, there were 29.6 responses in each possible category.
For some indicators, not all questions were answered. In these cases, the expected number of items per category was mapped on the basis of the number of items.

Among non-managerial employees, we sought to find out the proportion of waste variables that were perceived, whether the responses received were evenly or unevenly distributed. In the case of acceptance of H0, the data were evenly distributed, and in the case of acceptance of H1, the data were not evenly distributed; in the latter case, we visualised the distribution diagram of the variable frequency and made a decision based on whether the unevenness was interpreted as an acceptance or rejection of representation.

The analyses confirmed the presence in two categories. The first one is transport waste. For the one-sample median test, the median of four for the third row number *Same trip, more than once*, is significantly different from the reference median of three (N=148, $p< 0.001$) The majority of respondents believe that this form of transport waste is present (med > 3) during an average (normal) working day. The chi-square test also confirmed its presence. An outlier was found in the category *'This phenomenon is commonplace on a normal working day'* (N= 148, $\chi2=53.689$) The question implied different meaning content for some respondents during the interviews, so no clear conclusion can be drawn based on this question alone. However, the chi-square analysis showed an outlier for one more indicator in the daily category. This is *'In the course of his/her work, he/she must ask for permission, for which he/she must contact his/her supervisor.'* (N= 148, $p<0.001$)

In the one-sample median test for inventory waste, there were two instances of presence, but one of these situations was a statement with content with opposite meaning. That is, presence, meant absence of waste. The indicator that proved the meaning was ultimately caused by the accumulation of stocks. This was confirmed for both the one-sample median test (N=148, $p<0.001$) and the chi-square test (N=148, $\chi2=56.662$).
The statistical tests and the interview results are presented in a common table.

4.2.Managerial employees

The median one-sample test for the 56 managerial employees included in the study conclided the following results. (Table 4 and 5)

Table 4: One-sample median test (managerial staff) transport waste – fragment

Nr.[1]	Observed value[2]	N[3]	Z[4]	p	Decision
1	2	56	-1.379	0.168	-
2	4	56	1.775	0.076	-
3	4	56	4.7	0	Exist
4	2	56	-1.741	0.082	-

[1]*Question number in the data table;*
[2]*Observed value-observed median;*
[3]*N is the sample item number;*
[4] *Z is the standardised test statistic value.*
Source: own contruction

56 respondents were interviewed among the managers. It was more typical for medians to give their responses in the categories of rarely or regularly occurring.
The chi-square test was more effective among managers than the one-sample median test. It gave significant results in half of the cases (14 variables).

Table 5: Chi-square test (managerial employees) transport waste – fragment

Nr[1]	N[2]	Chi-square	p[3]	Decision	Waste category
1	56	5.786[a]	0.216	-	Transport
2	56	15.607[a]	0.004	Exist	Transport
3	56	35.964[a]	0	Exist	Transport
4	56	14.536[a]	0.006	Not exist	Transport

[1]*Question number in the data table;*
[2]*N is the sample item number;*
[3]*Likelihood value.*

Source: own contruction

There were three categories of managers that showed presence.
Transport waste was the first such category. Similar to non-managerial employees, the same regular trip to work showed presence for the one-sample median test (N=56, $p<0.001$) and the chi-square test (N=56, $\chi2=35.964$). The chi-square test revealed the presence of one additional indicator. In the case where the manager's work is hampered by the issuance of authorizations or instructions, i.e., when his subordinates cannot work independently, either the manager or the subordinate has to seek the other party to issue the authorization or instruction. If the daily routine consists mostly of this workflow, it indicates a poor organisation of the workflow (N=56, $\chi2=15.607$).
In the case of inventory waste, the one-sample median and the chi-square test showed the same picture. Managers perceive that they have more than enough of all the materials, products, forms and tools needed to do their job (N=56, $p<0.001$) (N=56, $\chi2=26.857$).

Overtime waste is a category of waste not previously observed among non-managers. For managers, it captures instances when excessive control of subordinates becomes necessary or an excessive control protocol is built into the workflow. Presence was evident in two categories in both surveys. The *'need to check the work of subordinates several times during the working day, more regularly than necessary.'* (N=56, p=0.005) (N=56, $\chi 2$=16.25) and *'You also have to do work that is not your job'*. This phenomenon can be interpreted in several ways. Basically, it appears that you see the work of your peers and, being a team player, you help your peers, which is part of a process with a positive connotation. However, it increases opacity, and sometimes a non-dedicated task is not dedicated because it is not necessary to perform the task. In the other approach, a task that was not dedicated to the completer, who had to eventually complete it, because the person who was supposed to do it did not do so. In principle, it is plausible to say that if it is regular or commonplace in someone's nomal working day that they do not perform their own task, then someone is making a waste: either the colleague whose job is to be done or the one who is not properly assigned to the task (N=51 Z=3.258 p=0.001) (N=51 $\chi 2$=23.608).

5. CONCLUSION

At the outset of the research, we assumed that the most common types of wastes among accommodation providers would be movement, handling and inventory wastes, and that the occurrence of waste types in a category would be dominant based on the studies.
In summary, the results of the waste studies are presented in Table 6.

Table 6: Summary Waste presence table

	Non- managerial employees		**Managerial employees**		
Waste category	**One-sample median test**	**Chi-square test**	**One-sample median test**	**Chi-square test**	**Interview**
Transport	1	2	1	2	2
Inventory	1	1	1	1	-
Motion	-	-	-	-	-
Waiting	-	-	-	-	1
Over-processing	-	-	2	2	1
Overproduction	-	-	-	-	1
Defects	-	-	-	-	-
Concerned waste categories	2	2	3	3	4

The values are the number of confirmed presence from four-four daily routine situations formulated for each waste category.
Sourcew: Own construction

When comparing the categories of waste experienced by managers and non-managers, we see a nearly identical picture. The specificity of transport waste is that, although not interpreted in the literature in the service sector, it was perceived as present by both interview subjects and questionnaire respondents. It is commonplace for accommodation providers to have to move assets, materials and information. A common feature of this moving is that the moving itself is not value-creating. The

asset, material or information does not need to be moved in order to be used. The reason for the movement is that it is not available in the right - place, time, quality, quantity, etc.
As expected, stock-outs appeared in both groups, but the interviews did not confirm this. This is due to conceptual asymmetry. Inventory accumulation for the interviewees means something different from how it was defined at the start of the research. For the purposes of this study, unrealistic safety reserves are already considered as stock outs. This theoretical assumption has been rewritten by the supply chain problems of recent years (Covid, Suez, war in Ukraine...). However, we still consider it as a stockholding waste on a scientific basis, with the comment that it could become economically justified and a strategic advantage.
The other categories of waste have only been observed among senior managers. The presence of overwork waste was confirmed both by statistical analysis and interviews. Overtime is a waste category where a higher than necessary, more thorough and meticulous work is carried out. For example, a senior colleague is unable to delegate tasks and does not trust the quality of his subordinate's work. So although the task is done, the manager scrutinises it and spends more time than necessary checking it.
In one additional case, interviewees highlighted the waste of waiting time and unnecessary work. While the former is relatively easy to identify, the latter category includes, for example, the production of reports that are produced out of habit, are not used by anyone and do not add value. For some types of waste, there may be intentionality behind the occurrence. An example is the overwork waste in restaurant and room services, which may appear to the outside world to be unduly accumulated and wasteful, but the underlying source of management intent is strategic or marketing.
Based on the waste analysis, neither of the categories showed a dominant presence. However, the presence of three waste categories is clearly acceptable. These are transport, inventory, overwork waste, and the interviews indicated the presence of two categories, which were the waiting and wasted work categories.

In sum, the formulated hipothesis – We assume that all seven types of wastes can be identified among accommodation providers in the studied area – was rejected.

6. SUMMARY

The objectives of this research were motivated by the limited research on the subject. During the literature analysis and exploratory interviews, we also sought to answer the question of which method would provide an appropriate and reliable answer to this question. A full screening process, as used in similar research, was not possible, as we wanted to focus on more than one accommodation provider in the region.
We was unsuccessful in simultaneously identifying seven lean waste types among accommodation providers. Differences were found between the interviews conducted with managerial and non-managerial staff and with the owner-operator group. There were no waste categories that appeared simultaneously in all three study rounds. The research suggests that, with varying degrees of intensity, six of the seven waste categories can be identified in the study area. After the movement, it is repair waste that did not appear dominantly in any of the respondent rounds. We see the reason for this in the fact that the industry expects, or even requires, flexible peer-to-peer working, so that respondents do not perceive this waste category as blatant and dominant. If processes are running smoothly and there is minimal disruption, this category is less evident.

The thesis (T) of the research:
Lean waste categories can be identified among accommodation providers. The perception of the presence of lean waste categories and the extent of its presence is influenced by the status of the employee, such as owner, manager, employee.

7. REFERENCES

DÉVAI, Z., FÉSÜS, N., KISS, A., KOSZTOLÁNYI, J., KŐVÁRI, R., NIKA, T., és VINCZE, M. (2021). *Lean szolgáltatásfejlesztés 2*. [*Lean Service Development 2]* Kaizen Pro Oktatási és Tanácsadó Kft.

DÉVAI, Z., FÉSÜS, N., KOSZTOLÁNYI, J., KŐVÁRI, R., és NIKA, T. (2020). *Lean szolgáltatásfejlesztés 1 [Lean Service Development 1]* Kaizen Pro Oktatási és Tanácsadó Kft.

GÁCSÉR, N., SZÓKA. K (2022): Gondolatok fenntarthatósági számvitelről és társadalmi fenntarthatóságról. [] ECONOMICA (SZOLNOK) 13 : 1-2 pp. 28-33. , 6 p. (2022)

HASKIN, D. (2010). Special Decisions In A Lean Accounting Environment. *American Journal of Business Education (AJBE)*, *3*(6), Article 6. https://doi.org/10.19030/ajbe.v3i6.447

JUGOVIĆ, T., ŠTAVLJANIN, V., és KOSTIĆ STANKOVIĆ, M. (2022). Winter destinations hotels performance measurement practice—Evidence from CEE. *Economic Research-Ekonomska Istraživanja*, 1–15. https://doi.org/10.1080/1331677X.2022.2048195

KALA, D., és BAGRI, S. C. (2014). Key Performance Indicators for Hospitality Industry: A Study from the Tourist State of Uttarakhand, India. *Tourismos*, 187-206 Pages. https://doi.org/10.26215/TOURISMOS.V9I1.395

KOLOSZÁR, L., - PANKOTAY, F. M. (2017). Lean eszközök a KKV-k fejlesztésében. *[Lean tools for the development of SMEs] Gazdaság És Társadalom*, *9*(3–4), Article 3–4. https://doi.org/10.21637/GT.2017.3-4.05

KOLOSZÁR L. (2018). Opportunities of lean thinking in improving the competitiveness of the Hungarian SME sector. *Management and Production Engineering Review*, 9(2), 26–41.

OHNO, T. (2013). *Taiichi Ohno's workplace management: With new commentary from global quality visionaries* (Special 100th birthday edition). McGraw-Hill.

OHNO, T. (1988). *Toyota Production System: Veyond Large-Scale Production*. Taylor and Francis Group

PANKOTAY, F. M. (2013). A fiatalok vállalkozóvá válásának lehetőségei az osztrák-magyar-szlovák határtérségben. [Opportunities for young people to become entrepreneurs in the Austrian-Hungarian-Slovak border region.] In *XXXI. Országos Tudományos Diákköri Konferencia: Közgazdaságtudományi szekció előadáskivonatok* (pp. 363–363). Pannon Egyetem Gazdaságtudományi Kar. Veszprém

PANKOTAY, F. M. (2017). Vállalati hatékonyság mérés kritikája a közszférában. *[A critique of corporate efficiency measurement in the public sector]* In *Tavaszi Szél Konferencia: Konferencia kötet II.* (pp. 382–396). Doktoranduszok Országos Szövetsége.

PANKOTAY, F. M., és KOLOSZÁR, L. (2019). Lean Management in the Hotel Sector—Opportunities and Threats. In *Proceedings of the 9th Business and Management Conference* (pp. 49–61). International Institute for Social and Economics Sciences (IISES).

RAJTY, T. (1943). *A szervezés alapelvei és módszertana*. Minerva Nyomda.

ROTHER, M., és SHOOK, J. (2012). *Tanulj meg látni! [Learning to See]* LEI Magyarországi Egyesülete.

SRIVASTAVA, N., és MAITRA, R. (2016). Key Performance Indicators (KPI) in Hospitality Industry: An Emphasis on Accommodation Business of 5 Star Hotels of National Capital Region. *International Journal of Research in Tourism and Hospitality*, *2*(1), Article 1. https://doi.org/10.20431/2455-0043.0201004

SZÓKA, K. (2014). A controlling és az értékelemzés lehetséges kapcsolódási pontjai. *[Possible links between controlling and value analysis] Controller Info*, 12–16.

SZÓKA, K. (2022): Sustainability Accounting and Reporting in the Post-COVID Times. In: Nedelko, Zlatko (szerk.) *6th FEB International Scientific Conference:* Challenges in economics and business in the post-COVID times Maribor, Szlovénia: University of Maribor (2022) 546 p. pp. 145-154., 10 p.

WALTON, M. (2018). *Versenyképességi indikátor jelentés—Feltörekvő középvállalatok 2017-2018. [Competitiveness Indicator Report - Emerging Medium Enterprises 2017-2018]* Deliotte Touche.

ZOLTÁN ANDRÁS DÁNIEL, TAMÁS MOLNÁR: CHARACTERISTICS OF ENVIRONMENTALLY CONSCIOUS SMES IN HUNGARY, WITH A FOCUS ON GENERATIONAL DIFFERENCES

Abstract

Climate change is the most important global challenge of our time. Combating climate change and mitigating its effects is a shared responsibility, and individuals, institutions and, of course, businesses must play their part. Micro, small and medium-sized enterprises are not a major force in terms of their relative economic weight, but their numerical size makes them visible in the economies of most countries. As in the more developed economies of the world, the Hungarian economy is characterised by a large number of micro, small and medium-sized enterprises, accounting for more than 99% of all enterprises. They employ around 2/3 of the workforce and account for more than half of GDP. Typically, the number of employees per enterprise is low and most SMEs operate as family, subsistence businesses.

The aim of our research is to provide a snapshot of the Hungarian SME sector, with a special focus on the relationship between environmental awareness and the generational characteristics of owners. We interviewed around 1500 businesses and part of our research focuses on this area.

We show the relationship between the demographic (mainly age) characteristics of the majority of the management, taking into account the characteristics of the sector, and the extent to which firms make a conscious effort to act in the interest of the environment. The generational characteristics and the environmental commitments of CSR activities will be discussed, and case studies of good practices in Hungary will be presented.

Introduction

The challenges of climate change will test people and economies. The fight against climate change is a struggle for individuals and societies, and the interconnection at both the micro and macro levels is an important link. The SME sector is one of the cornerstones, involving a large number of businesses with a prominent presence in the economies. However, they can be more than just one of the stakeholders, as there are also a large number of family businesses employing one or two people in the sector, which

Climate change and its challenges

Climate change is a global phenomenon that poses significant threats to the environment, economies and societies (Richardson et al, 2011). Rising global temperatures, extreme weather events, sea-level rise and other climate impacts have far-reaching consequences for businesses and economies worldwide (Misra, 2014). Businesses and economies face significant challenges in managing and adapting to the impacts of climate change, including physical, financial and regulatory risks. One of the most significant challenges that climate change poses to economies and businesses is the physical risks from extreme weather events and sea level rise. These physical risks can affect supply chains and the production and distribution of goods and services, leading to significant economic losses (Gasper et al, 2011). For example, severe weather events such as hurricanes, floods and droughts can disrupt supply chains by damaging critical infrastructure such as roads, ports and airports. This disruption can lead to delays, higher transport costs and reduced productivity, which can affect business operations and profitability (Wilhelm, 2013 and Wright &Nyberg, 2017). In addition, sea-level rise poses a significant physical risk to coastal cities and regions where many businesses and economies are concentrated. The risk of increased flooding and storm surges can cause significant damage to buildings and infrastructure, leading to substantial economic losses. The costs of restoring and rebuilding infrastructure following extreme weather events can be significant, putting pressure on public budgets and affecting economic growth (Nimura, 2013 and Kvadijke et al, 2010).

In addition to physical risks, climate change also poses financial risks to economies and businesses. These risks stem from the economic impacts of climate change and regulatory responses to reduce greenhouse gas emissions. For example, the transition to a low-carbon economy is likely to lead to displaced assets and reduced demand for fossil fuels (Monasterolo, 2020; Chenet, 2021; Battison et al, 2021). Companies whose business depends on fossil fuels could face significant financial losses as the value of their assets declines and demand for their products falls. In addition, climate change risks may also affect the financial sector, leading to credit risk, market risk and operational risk. For example, the increase in frequency and severity of extreme weather events could lead to higher insurance claims, which could affect the financial stability of insurers and reinsurers. The transition to a low-carbon economy could also affect the value of investments, leading to significant losses for investors exposed to high-carbon assets (Semeniuk et al, 2021; Ionescu, 2021).

Given the significant risks climate change poses to economies and businesses, it is essential to adopt strategies to adapt to the impacts of climate change. Adaptation strategies include measures to reduce the vulnerability of businesses and economies to the physical, financial and regulatory risks of climate change. Below are some adaptation strategies that businesses and governments can adopt. Risk assessment and management is a key step in adapting to the impacts of climate change. It involves identifying and assessing the physical, financial and regulatory risks that climate change poses to a business or economy. The process of risk assessment involves an analysis of the likelihood of different climate risks and their impact on business activities and the economy as a whole (Feng&Chao, 2020; Ghadge et al, 2020). Once risks have been identified, risk management strategies can be developed to mitigate or adapt to these risks. Risk management strategies can include measures such as diversifying supply chains, investing in resilient infrastructure and developing contingency plans to respond to extreme weather events. It is essential that the risk assessment and management process involves all stakeholders (Jones&Preston, 2011), including employees, suppliers, customers and local communities.

Building resilient infrastructure is a critical element of adapting to the impacts of climate change. This includes investing in infrastructure that can withstand the physical impacts of climate change, such as extreme weather events and sea-level rise. For example, businesses can invest in flood defences, back-up power systems and other measures to ensure that critical infrastructure remains operational during extreme weather events (Chirisa&Nel, 2022). Resilient infrastructure can also help reduce the costs of repairing and rebuilding infrastructure after extreme weather events. It is also essential to ensure that the design of new infrastructure takes into account climate change impacts and is resilient to future climate risks (Vallejo&Mullan, 2017).

Diversification of supply chains is another critical strategy for adapting to the impacts of climate change (Ghadge et al, 2020). This includes reducing dependence on a single supplier or region for critical goods and services. Diversification can help reduce the risk of supply chain disruptions due to extreme weather events or other climate impacts.

For example, a company may have several suppliers located in different regions to ensure that it can continue to operate even if a supplier is affected by extreme weather events. In addition, businesses can invest in local supply chains and sourcing of goods and services to reduce transport emissions and support local economies (de Oliveira&Jabbour, 2017).

Investing in renewable energy is a key strategy for adapting to the impacts of climate change. This includes a shift from fossil fuels to renewable energy sources such as solar, wind and hydro. Investing in renewable energy can help reduce greenhouse gas emissions and mitigate the financial risks of the transition to a low-carbon economy. Investing in renewables can also help businesses and economies become more resilient to the physical impacts of climate change (Sims, 2004; Quaschning, 2019; Edenhofer et al, 2011). For example, businesses investing in on-site renewables can reduce their dependence on the grid and ensure they remain operational in the event of power outages.

Cooperation and partnerships are essential to adapt to the impacts of climate change. This includes working with other businesses, governments and stakeholders to develop and implement strategies to reduce greenhouse gas emissions and adapt to the impacts of climate change (Forsyth, 2010). For example, businesses can work with suppliers and customers to reduce emissions throughout the

supply chain. Governments can also work with business and civil society to develop policies and regulations to encourage the transition to a low-carbon economy.

Small and medium-sized enterprises

Small and medium-sized enterprises (SMEs) play a crucial role in the economy of Europe and Hungary. SMEs are defined as enterprises with fewer than 250 employees, a turnover of less than €50 million and a balance sheet total of less than €43 million. SMEs can be further categorised as micro (up to 9 employees), small (10-49 employees) and medium-sized (50-249 employees). SMEs are typically owned and operated by entrepreneurs and play a significant role in creating jobs and stimulating economic growth. They are often flexible and agile, able to respond quickly to changing market conditions and customer needs. But SMEs also face specific challenges such as limited access to pumpkins, market barriers and regulatory burdens. SMEs are a vital source of employment and economic growth in Europe and Hungary. According to the European Commission, SMEs account for 99% of businesses in the European Union (EU) and provide two out of three private sector jobs. In Hungary, SMEs account for more than 99% of all enterprises and more than 60% of total employment. SMEs also contribute significantly to innovation and entrepreneurship. They are often the source of new ideas and technologies that drive economic growth and competitiveness. In addition, SMEs often collaborate with larger firms, universities and research institutions to develop new products and services (Mulhern 1995; Storey, 2016; Szerb&Ulbert, 2009).

Despite their important role in the economy, SMEs face a number of challenges that can hinder their growth and development. Access to finance is often a major challenge for SMEs, especially in the early stages of their development. Many SMEs struggle to access credit or investment from traditional sources such as banks and venture capitalists. Market barriers can also be a challenge for SMEs, especially in a globally competitive environment. SMEs may face high entry barriers or limited access to international markets, making it difficult for them to compete with larger firms. In addition, SMEs often lack the resources to invest in marketing and advertising, which limits their ability to reach potential customers. Regulatory burdens can also be a significant challenge for SMEs. Compliance with regulations can be costly and time-consuming, especially for smaller firms. In addition, SMEs may not have the resources to hire legal or regulatory experts, making it difficult to navigate a complex regulatory framework.The European Union has recognised the importance of SMEs and has taken steps to support their growth and development. The EU has implemented a number of initiatives to improve access to finance, reduce regulatory burdens and promote entrepreneurship and innovation. One of the most significant initiatives is the Small Business Act (SBA), which aims to create a more favourable business environment for SMEs in Europe. The SBA includes a number of measures such as improving access to finance, simplifying regulation and promoting entrepreneurship and innovation (Narada et al, 2020; Prassana et al, 2019; Gamage et al, 2020).

SMEs in Hungary

In Hungary, SMEs play a critical role in the economy, especially in rural areas. The Hungarian government has recognised the importance of SMEs and has taken a number of initiatives to support their growth and development. SMEs are a vital source of employment and economic growth in Hungary. According to the Hungarian Central Statistical Office, SMEs account for more than 99% of all businesses in Hungary and more than 60% of total employment. SMEs also make a significant contribution to innovation and entrepreneurship, which is the engine of economic growth and competitiveness. Despite their economic importance, SMEs in Hungary face a number of challenges that can hinder their growth and development (Péter, 2016; Szerb, 2010; Vajda&Magda, 2020). SMEs often face significant challenges in accessing finance, especially in the early stages of their development. Many SMEs find it difficult to access credit or investment from traditional sources such as banks and venture capitalists. Market barriers can also be a challenge for SMEs in Hungary. SMEs may face high barriers to entry or limited access to international markets, which makes it challenging to compete with larger firms. In addition, SMEs often lack the resources to invest in marketing and advertising, which limits their ability to reach potential customers. Regulatory burdens can also be a

significant challenge for SMEs in Hungary. Compliance with regulations can be costly and time-consuming, especially for smaller firms. In addition, SMEs may not have the resources to hire legal or regulatory experts, making it difficult to navigate the complex regulatory framework (Hegedűs, 2023; Móra, 2019).

The SME sector and climate change

The SME sector faces many challenges in addressing the impacts of climate change. Climate change poses significant risks to the operations of SMEs, including disruption to supply chains, damage to physical assets and increased operating costs. In this essay, we examine some of the challenges that SMEs face in addressing climate change and discuss possible solutions.

SMEs often have limited financial and human resources to address the challenges of climate change. Many SMEs lack the capital to invest in the infrastructure and technology needed to reduce their carbon footprint. They may also lack the expertise or knowledge to develop and implement effective sustainability strategies. Governments and other stakeholders can support SMEs with financial incentives, technical assistance and training programmes to help them develop and implement sustainability strategies. This may include grants, tax incentives or low-interest loans to support investments in renewable energy, energy efficient technologies and sustainable production processes. In addition, training programmes and workshops can help SMEs to develop the knowledge and expertise needed to adopt sustainable business practices (Bharati&Patra, 2022).

Many SMEs do not have access to reliable information on climate change and its potential impact on their operations. This can make it difficult for SMEs to develop effective strategies to mitigate the risks from climate change. Governments and other stakeholders can support SMEs by providing access to reliable and up-to-date information on climate change and its potential impacts on their operations. This can include online resources, webinars and workshops aimed at educating SMEs about the risks and opportunities associated with climate change. SMEs can face regulatory uncertainty and complexity in complying with environmental regulations. In some cases, SMEs do not have the resources or expertise to navigate the complex regulatory framework. Governments can support SMEs by simplifying regulations and providing guidance on compliance. This could include streamlining environmental regulations, providing clear guidance on reporting requirements, and technical assistance to help SMEs comply with regulations (Pyka&Pyka, 2021).

Many SMEs do not see the financial benefits of adopting sustainable business practices. In some cases, the costs of implementing sustainability measures may be higher than the potential financial benefits. Governments and other stakeholders can support SMEs by providing market incentives for sustainable business practices. This could include tax incentives for businesses that adopt sustainable practices, support for renewable energy production and support for sustainable supply chain initiatives. Access to green finance is often a significant challenge for SMEs. Many SMEs do not have the collateral or credit history data needed for loans for sustainable investments. Governments and other stakeholders can support SMEs by setting up financing mechanisms specifically targeted at green investment. These could include government loan guarantees, microfinance schemes and green bonds (Patra, 2022).

Green SMEs are businesses that recognise the importance of sustainable business practices and take proactive steps to reduce their environmental impact. They prioritise environmental sustainability alongside economic growth, recognising that the two can go hand in hand. Environmentally conscious SMEs bring a range of benefits, including cost savings, enhanced brand reputation and reduced regulatory risks. Adopting sustainable business practices can lead to significant cost savings for SMEs. For example, the introduction of energy efficient technologies such as LED lighting or smart thermostats can reduce energy consumption and utility bills. Likewise, investing in renewable energy such as solar panels or wind turbines can lead to long-term cost savings on energy bills. Consumers are increasingly concerned about environmental sustainability and are more likely to support businesses that prioritise sustainable practices. Being an environmentally conscious SME can help attract and retain customers who value sustainability. In addition, green SMEs can benefit from positive media attention and word-of-mouth referrals from satisfied customers.

Environmental standards are getting stricter and non-compliance can result in fines, legal sanctions and reputational damage. By adopting sustainable business practices, SMEs can reduce their regulatory risk and demonstrate their commitment to environmental sustainability. Environmentally responsible SMEs can provide a competitive advantage over other businesses in the same industry. By putting sustainability first, businesses can differentiate themselves from competitors and attract customers who care about sustainability. In addition, environmentally conscious SMEs are more likely to win contracts with larger companies that set sustainability targets and require their suppliers to meet certain environmental standards (Krawczyk, 2021).
Some examples of sustainable business practices that environmentally conscious SMEs can adopt (Istenes, 2022):

- Introduction of energy efficient technologies
- Reducing waste through recycling and waste reduction programmes
- Reducing water consumption through efficient plumbing and irrigation systems.
- Investing in renewable energy, such as solar panels or wind turbines.
- use of environmentally friendly materials and products
- Implementing sustainable supply chain practices, such as sourcing materials from sustainable sources or working with suppliers who are sustainability-minded.
- Offer environmentally friendly products or services

Generational differences

Generational differences are often discussed in different contexts, from the workplace to social attitudes and behaviours. A generation is usually defined as a group of people who were born and grew up around the same time and have similar cultural and historical experiences. There are several recognised generations, including Baby Boomers, Generation X, Millennials and Generation Z. Each generation has its own unique characteristics, values and attitudes that set them apart. In this essay, we will examine the differences between these generations and the factors that contribute to their separateness (). The majority of Veterans (born 1945 and before) do not understand today's world. Like all ordinary people, they were brought up in a parental and social pattern, and have seen no such pattern anywhere. Their lives were largely defined by socialism, further infected by one or two world wars. Their parents were full of pain, tragedy and bitterness, which obviously left its mark on this generation. They longed for nothing more than peace, tranquillity and family harmony. As in previous decades, the micro-family was the central source of community for them. The cohesive strength of the family was emphasised by society, and there was no question of questioning the importance of the family in the individual. Today's grandparents of the day don't even understand where their children-grandchildren run off to all day, why they change jobs from year to year, why they can't sit down to Sunday lunch to talk without some gadget. Surely the world is not going in the right direction, they might think. Baby Boomers are individuals born between 1946 and 1964. They grew up in an era of economic prosperity and social change, with the civil rights movement and the Vietnam War being the defining events of their youth. Baby Boomers are known for being hard-working and career-oriented, often defining themselves through their work. They value job security, financial stability and respect for authority. Baby boomers also have more traditional values and place a high value on family and community. Generation X includes people born between 1965 and 1980. They grew up during a period of economic uncertainty and social upheaval, with events such as the Cold War, the Challenger explosion and the fall of the Berlin Wall shaping their experiences. Generation X members are known for being independent and adaptable, often finding creative solutions to problems. They value work-life balance, personal development and autonomy. Generation X members are sceptical of authority and institutions and prefer informal networks and decentralised decision-making. Generation Y includes individuals born between 1981 and 1996. They have grown up in a world of rapid technological change and globalisation, and events such as 9/11 and the Great Recession have influenced their worldview. Millennials are known for being technologically savvy and connected, often using social media and other digital platforms to express themselves and connect with others.

They value flexibility, diversity and social justice. Millennials are also generally optimistic and idealistic, wanting to make a positive impact on the world. Generation Z includes people born between 1997 and 2012. They are the first generation to have grown up entirely in the digital age, with smartphones, social media and streaming services shaping their experiences. Generation Z members are known for being entrepreneurial and innovative, often using technology to create new products and services. They value authenticity, transparency and inclusiveness. Generation Z members are politically engaged and socially conscious, and strive to create a more just and equitable world (Prakash&Tivari, 2021; Mahmoud et al, 2020; Wolor et al, 2021).
Generational differences can have a significant impact on driving styles and preferences. To effectively manage a diverse workforce, it is important that managers understand the values and attitudes of different generations and adapt their leadership styles accordingly. By fostering a culture of respect, communication and collaboration, leaders can engage and motivate employees from different generations and build more effective and productive teams (Galdames &Guihen, 2022; Wolor et al, 2021).

Material and method

The database of the research was selected from the SME sector in Hungary. In total, data from 1471 companies were used for the analysis, based on a questionnaire survey. In addition to several background variables (gender, education, age, generation of the owner), we were interested in factors such as the extent to which environmental protection and the criteria of the circular economy are followed in the management and daily operation of the company. In this study, we sought to understand how each of these background variables is related to the company's efforts to manage energy, water, waste and renewable energy efficiently.
The answers to the questions can be measured on a nominal (nominal) or ordinal (ordinal) scale, so the association measures or rank correlation measures are suitable for the correlations between them. Among the association indicators, we used Cramer's "V" for our analyses, because this indicator gives easily interpretable results (between zero and one) for different numbers of variables (Molnár, 2015). Among the variables measured on the ordinal scale, we used Spearman's rank correlation coefficient.
Our hypotheses were:
H1: There is a correlation between ownership structure and the company's commitment to efficient energy, water and waste management and the use of renewable energy.
H2: There is a strong, positive correlation between the owner's education and the company's commitment to efficient energy, water and waste management and the use of renewable energy.
H3: There is a positive and strong correlation between the company's use of KIR, EMAS, ISO 14001 and its commitment to efficient energy, water and waste management.
H4: Younger generation of business owners are more concerned about environmental issues

Results

We found a significant correlation (P < 5%) between ownership structure (institutional, male, female, mixed) and the intention to use efficient and renewable energy (measured on a scale of zero to six) (Table 1). The strength of the correlation was medium (Cramer's V = 0.502) (Table 2).

Table 1 Pearson's Chi-square test output

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1485,018[a]	24	,000
Likelihood Ratio	30,261	24	,176
N of Valid Cases	1471		

Source: authors' own calculation

Table 2 Output of cross-tabular analysis

			Value	Approx. Sig.
Nominal	by	Phi	1,005	,000
Nominal		Cramer's V	,502	,000
N of Valid Cases			1471	

Source: authors' own calculation

It can therefore be said that the effective use of environmental considerations and resources depends on the ownership structure of the company. We thus consider our first hypothesis to be proven.

Our second hypothesis was based on an examination of the relationship between the highest educational attainment of the owners and the aspiration to use energy efficiently and to use renewable energy (Table 3).

Table 3 Output of the analysis of the relationship between the educational attainment of the management of the enterprise and the efficient use of materials and energy with rank correlation coefficient

			VEGETABLE	TOREKVES
Spearman's rho	VEGETABLE	Correlation Coefficient	1,000	,065*
		Sig. (2-tailed)	.	,015
		N	1422	1422
	TOREKVES	Correlation Coefficient	,065*	1,000
		Sig. (2-tailed)	,015	.
		N	1422	1422

Source: authors' own calculation

There is a significant relationship (p = 1.5%) between the highest educational attainment of the head of the firm and the firm's commitment to efficient use of materials and energy, but only a very weak correlation (ρ = 0.065). Thus, our second hypothesis is only partially confirmed.

Our third study examined the relationship between "the company's use of KIR, EMAS, ISO 14001" and "the company's efforts to manage energy, water and waste efficiently".

In this case, it was assumed that the drive for energy efficiency is manifested in the use of different environmental schemes by companies. Our hypothesis was confirmed, as SMEs with a stronger drive for energy efficiency are more likely to adopt an environmental management system. This is shown in Table 4.

Table 4 Output of the relationship between energy efficiency ambition and environmental management system implementation with rank correlation coefficient

			CHURCH	TOREKVES
Spearman's rho	CHURCH	Correlation Coefficient	1,000	,351**
		Sig. (2-tailed)	.	,000
		N	1422	1422
	TOREKVES	Correlation Coefficient	,351**	1,000
		Sig. (2-tailed)	,000	.
		N	1422	1422

Source: authors' own calculation

Our calculations show that there is a moderately strong relationship between the two factors (ρ = 0.351), which is supported by a reliable significance level (p < 1%).
Our study on generations and environmental issues did not yield any results, and we were unable to confirm our hypothesis. When examining the relationship between generations and "the company's use of KIR, EMAS, ISO 14001 systems" and "the company's efforts to manage energy, water and waste efficiently", the relationship did not prove significant in any of the cases. The cross-tabulation results by generation are illustrated in the following tables:

Table 5: Cross-tabulation of generations and environmental aspirations

			The company strives for efficient energy, water and waste management and the use of renewable energy				
			1	2	3	4	Total
Generation	V	Count	0	0	1	0	1
		% within Generation	0,0%	0,0%	100,0%	0,0%	100,0%
	B	Count	3	3	86	20	112
		% within Generation	2,7%	2,7%	76,8%	17,9%	100,0%
	X	Count	43	12	852	146	1053
		% within Generation	4,1%	1,1%	80,9%	13,9%	100,0%
	Y	Count	10	1	145	25	181
		% within Generation	5,5%	0,6%	80,1%	13,8%	100,0%
	Z	Count	1	1	66	7	75
		% within Generation	1,3%	1,3%	**88,0%**	**9,3%**	100,0%
Total		Count	57	17	1150	198	1422
		% within Generation	4,0%	1,2%	80,9%	13,9%	100,0%

Source: authors' own calculation
It can be seen that a close examination of the results shows that Generation Z is slightly more environmentally conscious, but the relationship is not significant.
Table 6: Cross-tabulation of generations and environmental schemes

			The company applies or operates KIR, EMAS, ISO 14001 systems to reduce its environmental impact				
			1	2	3	4	Total
Generation	V	Count	0	0	1	0	1
		% within Generation	0,0%	0,0%	100,0%	0,0%	100,0%
	B	Count	10	1	80	21	112
		% within Generation	8,9%	0,9%	71,4%	18,8%	100,0%
	X	Count	107	13	762	171	1053
		% within Generation	10,2%	1,2%	72,4%	16,2%	100,0%

	Y	Count	28	3	122	28	181
		% within Generation	15,5%	1,7%	67,4%	15,5%	100,0%
	Z	Count	5	0	56	14	75
		% within Generation	6,7%	0,0%	**74,7%**	**18,7%**	100,0%
Total		Count	150	17	1021	234	1422
		% within Generation	10,5%	1,2%	71,8%	16,5%	100,0%

Source: authors' own calculation

The results are similar for environmental systems, with Generation Z being the most prominent, but the results are not statistically verifiable.

Summary

It can be said that we found a significant correlation between ownership structure and environmental consciousness, and between owners' education and environmental consciousness. A similar relationship was found between environmental ambition and the environmental certification schemes used, with a weaker than medium correlation. Our hypothesis about generational environmental awareness was not confirmed because, although slightly younger generations showed stronger environmental awareness, the relationship was not found to be significant.

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Bibliography

BATTISTON, S., DAFERMOS, Y., & MONASTEROLO, I. (2021). climate risks and financial stability. *journal of financial stability*, *54*, 100867.

BHARATI, D., & PATRA, G. (2022). the Challenges For SMEs In Green Finance Initiatives Adoption. *journal of positive school psychology*, *6*(2s), 313-325.

CHENET, H. (2021). *climate change and financial risk* (pp. 393-419). Springer International Publishing.

CHIRISA, I., & NEL, V. (2022). Resilience and climate change in rural areas: a review of infrastructure policies across global regions. *Sustainable and Resilient Infrastructure*, *7*(5), 380-390.

EDENHOFER, O., PICHS-MADRUGA, R., SOKONA, Y., SEYBOTH, K., KADNER, S., ZWICKEL, T., ... & Matschoss, P. (Eds.). (2011). *renewable energy sources and climate change mitigation: special report of the intergovernmental panel on climate change*. Cambridge University Press.

FENG, A., & CHAO, Q. (2020). an overview of assessment methods and analysis for climate change risk in China. *physics and Chemistry of the Earth, Parts a/B/C*, *117*, 102861.

FORSYTH, T. (2010). Panacea or paradox? Cross-sector partnerships, climate change, and development, *Wiley Interdisciplinary Reviews: Climate Change*, *1*(5), 683-696.

GALDAMES, S., & GUIHEN, L. (2022). millennials and leadership: a systematic literature review. *total quality management & business excellence*, *33*(1-2), 146-162.

GASPER, R., BLOHM, A., & RUTH, M. (2011). social and economic impacts of climate change on the urban environment. *Current Opinion in Environmental Sustainability*, *3*(3), 150-157.

GHADGE, A., WURTMANN, H., & SEURING, S. (2020). managing climate change risks in global supply chains: a review and research agenda. *International Journal of Production Research*, *58*(1), 44-64.
HEGEDŰS, S. (2023). Examining the emergence and explanatory variables of hardship in the Hungarian SME sector. *ECONOMY AND FINANCE*, *10*(1), 57-79.
IONESCU, L. (2021). Transitioning to a low-carbon economy: green financial behavior, climate change mitigation, and environmental energy sustainability *Geopolitics, History, and International Relations*, *13*(1), 86-96.
ISTENES, K. A. (2022). GREEN CONTROLLING-A sustainable controlling in the transition to a circular economy GREEN CONTROLLING= Sustainable controlling in the transition to a Circular Economy.
JONES, R. N., & PRESTON, B. L. (2011) Adaptation and risk management, *Wiley Interdisciplinary Reviews: Climate Change*, *2*(2), 296-308.
KRAWCZYK, P. (2021). Non-financial reporting-standardization options for SME sector. *Journal of Risk and Financial Management*, *14*(9), 417.
KWADIJK, J. C., HAASNOOT, M., MULDER, J. P., HOOGVLIET, M. M., JEUKEN, A. B., van der KROGT, R. A., ... & DE WIT, M. J. (2010) Using adaptation tipping points to prepare for climate change and sea level rise: a case study in the Netherlands, *Wiley interdisciplinary reviews: climate change*, *1*(5), 729-740.
MAHMOUD, A. B., REISEL, W. D., GRIGORIOU, N., FUXMAN, L., & MOHR, I. (2020). the reincarnation of work motivation: millennials vs older generations. *international sociology*, *35*(4), 393-414.
MIMURA, N. (2013) Sea-level rise caused by climate change and its implications for society, *Proceedings of the Japan Academy, Series B*, *89*(7), 281-301.
MISRA, A. K. (2014) Climate change and challenges of water and food security, *International Journal of Sustainable Built Environment*, *3*(1), 153-165.
MONASTEROLO, I. (2020) Climate change and the financial system. *Annual Review of Resource Economics*, *12*, 299-320.
MÓRA, M. (2019). Tíz évvel a válság után: Gondolatok a szabályozás reformjáról. Gazdaság és Pénzügy, 6(4), 332-385.
MULHERN, A. (1995) The SME sector in Europe: A broad perspective *Journal of small business management*, *33*(3), 83.
Naradda GAMAGE, S. K., EKANAYAKE, E. M. S., ABEYRATHNE, G. A. K. N. J., PRASANNA, R. P. I. R., JAYASUNDARA, J. M. S. B., & RAJAPAKSHE, P. S. K. (2020). A review of global challenges and survival strategies of small and medium enterprises (SMEs). *Economies*, *8*(4), 79.
PATRA, D. (2022) The Challenges For SMEs In Green Finance Initiatives Adoption.
PÉTER, H. (2016). A magyar KKV szektor helyzete nemzeti és nemzetközi szinten. Csiszárik-Kocsir Ágnes (szerk.): Vállalkozásfejlesztés a XXI. században VI. Tanulmánykötet, Óbudai Egyetem, Budapest, 147-162.
PRAKASH, K., & TIWARI, P. (2021). millennials and post millennials: a systematic literature review *Publishing Research Quarterly*, *37*, 99-116.
PRASANNA, R. P. I. R., JAYASUNDARA, J. M. S. B., GAMAGE, S. K. N., EKANAYAKE, E. M. S., RAJAPAKSHE, P. S. K., & ABEYRATHNE, G. A. K. N. J. (2019). Sustainability of SMEs in the competition: a systemic review on technological challenges and SME performance. *Journal of Open Innovation: Technology, Market, and Complexity*, *5*(4), 100.
Puppim DE OLIVEIRA, J. A., & JABBOUR, C. J. C. (2017). Environmental management, climate change, CSR, and governance in clusters of small firms in developing countries: Toward an integrated analytical framework. *Business & Society*, *56*(1), 130-151.
PYKA, I., & PYKA, J. (2021). Corporate green investment imperative and risk of a credit crunch in Poland. *Zeszyty Naukowe. Organizacja i Zarządzanie/Politechnika Śląska*.
QUASCHNING, V. *Renewable energy and climate change*, John Wiley & Sons (2019).

RICHARDSON, K., STEFFEN, W., & LIVERMAN, D. (Eds.) (2011) *Climate change: global risks, challenges and decisions*, Cambridge University Press.
SEMIENIUK, G., CAMPIGLIO, E., MERCURE, J. F., VOLZ, U., & EDWARDS, N. R. (2021). low-carbon transition risks for finance. *wiley Interdisciplinary Reviews: climate change*, *12*(1), e678.
STOREY, D. J. (2016) *Understanding the small business sector*. Routledge.
SZERB, L. (2010). A magyar mikro-, kis-és középvállalatok versenyképességének mérése és vizsgálata. Vezetéstudomány-Budapest Management Review, 41(12), 20-35.
SZERB, L., & ULBERT, J. (2009) The examination of the competitiveness in the Hungarian SME sector: A firm level analysis, *Acta Polytechnica Hungarica*, *6*(3), 105-123.
VAJDA, A., & MAGDA, R. (2020). A kkv-k szerepe a versenyképességben, a magyar kkv-k összehasonlítása az EU vállalkozásaival. Logisztika Trendek és legjobb gyakorlatok kiadvány, 6(2), 50-54.
VALLEJO, L., & MULLAN, M. (2017) Climate-resilient infrastructure: getting the policies right.
WILHELM, K. (2013) *Return on sustainability: how business can increase profitability and address climate change in an uncertain economy.* FT Press.
WOLOR, C. W., NURKHIN, A., & CITRIADIN, Y. (2021). leadership style for millennial generation, five leadership theories, systematic literature review. *quality-Access to Success*, *22*(184), 105-110.
WRIGHT, C., & NYBERG, D. (2017). an inconvenient truth: How organizations translate climate change into business as usual. *academy of management journal*, *60*(5), 1633-1661.

ÁGNES CSISZÁRIK-KOCSIR – OSZKÁR DOBOS: THE PLACE AND ROLE OF RESEARCH, DEVELOPMENT AND INNOVATION PROJECTS IN THE LIFE OF SMES FROM THE PERSPECTIVE OF DIGITALISATION AND PROJECT THINKING

Abstract: In today's rapidly changing and rapidly transforming world, innovation is the only key to the growth of nations and economies. The rapid depletion of natural resources, the degradation of the environment and the limitation of further resources demand and call for new solutions that can only be achieved through innovation activities and initiatives. Nowadays, research, development and innovation are not only the prerogative of larger organisations, but also the lifeblood of smaller businesses. On a smaller scale, but slowly, we are getting to the point where every organisation must think of RDI activities as a core activity. Unfortunately, thinking in terms of innovation is not yet embedded in the day-to-day running of organisations, but the trends are improving and the picture is encouraging. The importance of innovation itself, and the recognition of its importance, is a good starting point, which needs to be reinforced by various means. The aim of this study is to present the attitudes and behaviour of Hungarian SMEs towards innovation in relation to company turnover and profit after tax. The study aims to identify those categories of SMEs that have already taken steps towards RDI projects and that can act as flagships for other enterprises to strengthen and promote their innovation potential.

Keywords: innovation, research, development, project, SME

1. Literature review

SMEs are a key driver of economic growth and overall employment in nations. Global competition forces these organizations to adopt an innovative approach to business management (Staniewski, 2008). The commercialization of developments and innovation results is of great importance (Radas & Bo, 2009). The main objective of innovation activity is the social and economic exploitation of the results achieved. Therefore, the exploitation of results should also be considered as a success factor for innovation projects. According to Porter (1985), innovation strengthens the competitiveness of countries, industries and firms and contributes to the profitability of firms. Moreover, innovation leads to improvements in the quality and continuous change of products, with a positive impact on productivity. This, of course, can have a positive impact on financial ratios, revenues and profits (Guinet & Pilat, 1999). From a cost perspective, the innovation activity of SMEs shows that the resources devoted to innovation are grouped around two main costs, R&D expenditure and the design and marketing expenditure necessary to bring a new product to market. In addition, of course, investment in training also plays an important role in the life of innovative organisations. This is in line with the innovation chain, whose activities range from basic research, through applied research, prototype development, to mass production and market introduction. Their relative importance varies according to the industrial sector and the type of innovation, but R&D is the most significant cost in most sectors, accounting for more than 50 per cent of innovation expenditure (Hall, 2010).

Innovation spending by firms and enterprises has an impact on their long-term financial performance Long-term and continuous innovation enables firms to succeed and gain a competitive advantage after difficult times and crises. It is important to analyse Hungarian small and medium-sized enterprises, to describe their attitude towards innovation and whether they consciously incorporate it into their operations. International research can strongly show that SMEs are interested and aware in this area. The market environment, and the close and dynamic competition, constantly dictates that actors have to improve their performance and, of course, stimulates RDI activities. The performance of organisations is highly correlated with their capacity to innovate (Minna 2020). This is accurately described by the main outcome and measure of research activity, namely publications. A large international survey of nearly 400 articles from 65 countries and nearly 1000 authors shows a steady increase in the volume of publications among SMEs (Sabando et al. 2022).

If we look specifically at innovation and its related keywords through research and publications, we can see a kind of steep increase in the number of works Researchers and authors are devoting more and more time and pages to organisational and business innovation, change management and organisational learning. (Montalván & Burbano et al. 2020). This extensive research probes European countries with outstanding scientific activity, such as Germany, Italy, France and the Netherlands, and it may therefore be justified to extend it to Hungary and to examine the attitudes of SMEs towards innovation. This research focuses on the management of SMEs, where the attitude and attitudes of managers have the greatest impact on innovation potential. The commitment of these important stakeholders is the most supportive of effective innovation activity. Therefore, it is worthwhile to focus on the assessment of managers' perceptions of the sector (Gomezel & Rangus, 2019).

This paper focuses on three areas and their interaction in the SME sector. These three pillars are innovation, research and development and project management. The interest in these topics has grown exponentially over the last two decades, as their presence and importance is visible in both the government sector and in corporate strategies, i.e. in the market. The drivers of innovation are new technologies, new business models and the resulting new industries that have led to outstanding productivity and GDP growth. Innovation and R&D have long been synonymous, used as quasi-synonyms in both industry and academia. However, much research and development in this field has shown that innovation is broader than R&D. (Filippov & Mooi, 2009) Although R&D is a very important and crucial part of innovation - as is evident from the expenditure - it is also understood in a much broader sense, including the related areas that play a role in bringing innovations to market and in their economic and social exploitation. In the meantime, it is safe to say that the 'projectisation' of the world is happening, or has already largely happened, all around us, as more and more fields and organisations organise their work into projects, and this is particularly true in the field of innovation, because of the funding and the specific outcomes expected. The history of R&D and project management, although not so well known, goes back a long way. Most project management tools have evolved from the management of R&D activities, often for military purposes (Lorell, 1995). The first use of project management tools can be traced back to the US defence research organisation DARPA (Defense Advenced Research Projects Agency) in the 1950s (Malcolm et al, 1959).

In the UK, the PRINCE2 model is a formal methodology for managing R&D projects in the public sector, demonstrating that the market is not the only one concerned with the field (UK OGC, 2005).

The distinction between R&D and innovation mentioned above allows us to distinguish R&D projects from innovation projects. Innovation is not a linear process with a constant upward slope, in many cases it is not necessarily technology-driven, and what distinguishes them from each other is that they are not necessarily the result of formal R&D inputs. Innovation is the identification and exploitation of new ideas and the use of existing knowledge in a form or combination not yet known, to produce a different outcome from that previously achieved. However, it is important to note that both innovation and R&D projects are different from, and more complex than, traditional projects because of their specificities. It is therefore necessary to examine innovation project management (IPM) as a specific area of managing innovation in projects. This specific area is caused by several factors, to mention a few as examples. One of the most important is perhaps the high novelty content due to the high risk and high degree of uncertainty of projects that needs to be addressed in the management. The exploitation of projects is important, because innovation can be understood and called successful if its results are exploited, and is therefore an important consideration from the very beginning of the planning phase. In other words, the criteria for project success take on a different aspect. The number of stakeholders is significantly larger and broader, which also creates a specific situation in this knowledge area of the project.

Within the framework of the present research, the innovation activities of Hungarian SMEs are approached through programme and portfolio management by extending project management. Such a broad understanding of project management covers the entire vertical of enterprise operations. Project management in the classical sense is itself responsible for implementation at the operational level. Its main task is to deliver the predefined result within the time and resource constraints. Programme management provides tactical leadership. Programme management is a defined set of interrelated projects, sub-programmes and programme activities that are managed in a mutually interdependent way, thereby generating additional benefits that could not be achieved by separate, autonomous, isolated project management (Fernandes et al. 2015). Portfolio management is therefore a longer-term, practically continuous activity, because new elements can be added with each strategic change or adjustment (Eckert & Hüsig, 2022).

Another important aspect that makes it worthwhile to look at research development and innovation through the lens of project management and extension is that it is clear that the RDI field is typically organised on a project basis. The RDI activities of market players usually start with applied research Szabó (2017) and each deliverable is assigned a dedicated timeframe with predefined resources. Even if the company covers the desired RDI outcome from its internal budget, the return on investment of the project is still essential for decision-makers. The situation is no different in the case where funding is provided from external sources, from public or corporate tenders, and the timing of the use of the resources and the outcome and payback must be precisely planned in order to obtain it. (Brink, 2017) In other words, in both cases under consideration, the temporary nature of the project, the dedicated time and resources, and the defined outcome result in a project with a temporary structure. It does not, of course, follow that all companies use a project management approach for RDI projects, or that such an activity cannot be carried out without it. The research shows that companies do not necessarily carry out RDI activities using formal project management methods. However, it has been shown that the effectiveness and success of project management can be enhanced through formalised project and programme management (Fernandes et al. 2020).

2. *Material and method*

The research results presented in this paper are the results of a primary research conducted in 2022. The research was conducted using a questionnaire survey and 180 evaluable questionnaires were used. The questionnaires were tested before sampling to ensure the most accurate research results. The questionnaire itself and the responses received provide a good basis for further research for further reflection. The questionnaire was a pre-tested, standardised questionnaire, which explored different aspects of research, development and innovation, focusing on different areas of project, programme and portfolio management. During the research, 211 questionnaires were returned, of which 31 were not assessable or incomplete, leaving 180 usable questionnaires. The survey examined items related to the RDI activity of enterprises and the state of innovation. The results presented in the present study were analysed by the number of employees and the sectoral and operational affiliation of the enterprises. The enterprises surveyed were classified as small and medium-sized enterprises. In the case of the statements presented in this study, respondents were asked to answer yes or no to the truth content of the statement, with the option to decline to answer (don't know/no answer). The results presented in this study were examined using cross tabulation analysis.

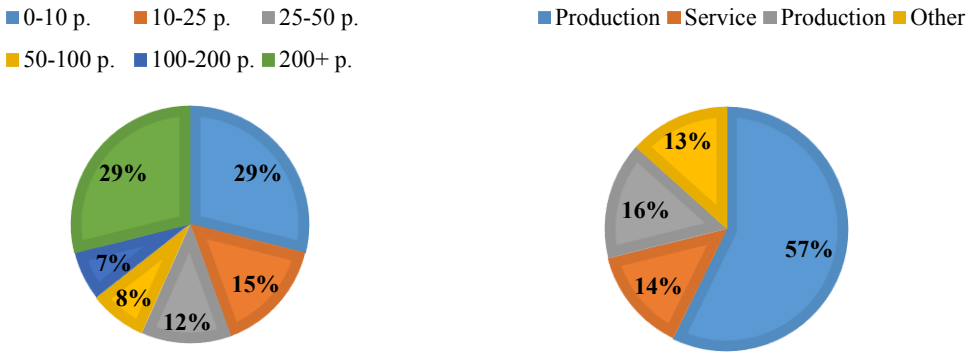

Figure 1. Sample composition by number of employees and area of operation

Source: own research, 2022, N = 180

3. *Results*

Firstly, we wanted to know how respondents could position research development and innovation projects within their own organisation. Overall, only one third of the companies surveyed could clearly position the place and role of RDI projects within their organisation. Around 10 percent could not answer the question, and almost 60 percent of respondents were negative about the place of RDI projects in their organisation.

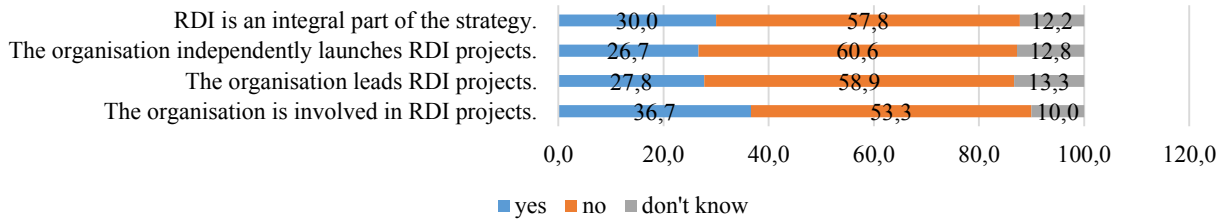

Figure 2. The place of RDI activities in the life of enterprises (relatív%)

Source: own research, 2022, N = 180

We then wanted to know how these responses were distributed by size category of business. The figure clearly shows that those companies that prioritised R&D and innovation projects were those that were in the larger size category, i.e. those with higher expertise and resources. In general, the proportion of enterprises in this category was around 50%, i.e. half of the larger organisations in the sample gave priority to innovation and innovation projects. For smaller enterprises, with less than 100 employees, this proportion is much lower, generally less than one third.

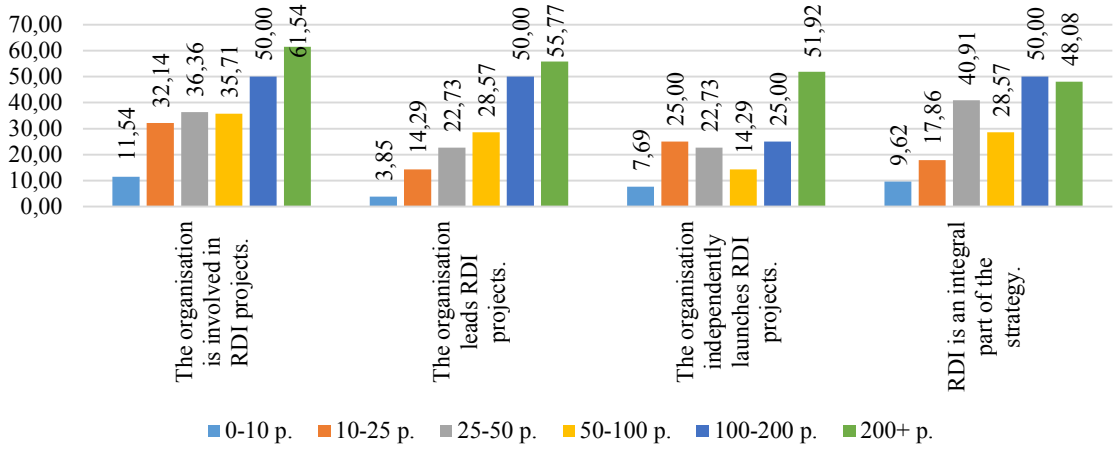

Figure 3. Place of RDI activity in the life of enterprises by enterprise size category (relative %)

Source: own research, 2022, N = 180

We also wanted to see the same picture based on the activity of businesses. Here we can say that there are no striking differences. In both manufacturing and services, as well as in production, about a third of enterprises pay particular attention to RDI activities. The proportion is clearly higher for participation in RDI projects, but much lower for self-managed projects. The same is true for the number of independent projects launched by the organisation. However, it is worth highlighting the range of enterprises working in services, which have the highest response rates for all questions, i.e. they can be considered to be among the most innovative organisations.

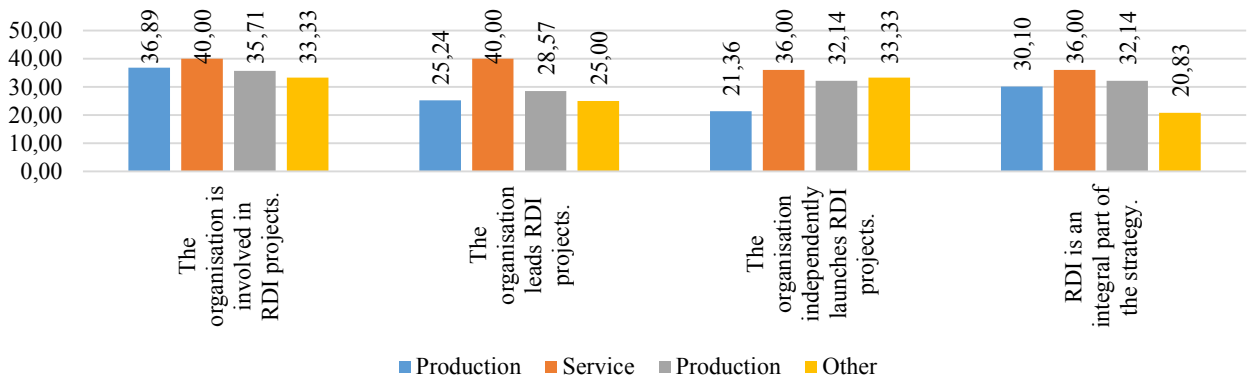

Figure 4. Place of RDI activity in the life of enterprises by business activity (relative %)

Source: own research, 2022, N = 180

We then wanted to look at the project, programme and portfolio management aspects of the research, development and innovation activities of the organisations. Unfortunately, we found an even lower positive response rate for these questions, with an average of around 25% of organisations answering in the affirmative. This shows that in the case of RDI projects, almost three quarters of the organisations do not have a separate programme and portfolio management system for their innovation projects, which is obviously related to the questions examined in the previous section. This situation is linked to the smaller number of projects launched or managed independently, as it is only worth considering launching programmes or portfolios when there are sufficient numbers.

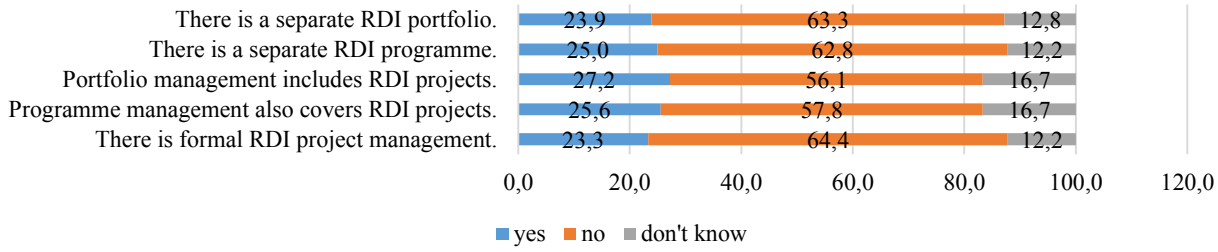

Figure 5. RDI project, programme and portfolio management in the life of enterprises (relative %)

Source: own research, 2022, N = 180

As in the previous studies, we also assessed the dimensions of programme and portfolio management along certain organisational characteristics. Once again, it can be said that the enterprises with the largest number of employees, i.e. the larger enterprises, are those with separate programme and portfolio management for RDI projects. In our case, this proportion reached 50 % in some cases and was around 40 % in others. The highest proportion of firms with formal RDI project management was found in firms with over 200 employees, while the highest proportion of firms with a separate RDI programme and portfolio was found in firms with between 100 and 200 employees. Firms in this size category were also in the majority in terms of programme and portfolio management of RDI projects. In other words, conscious project management for innovation projects was more evident in

organisations with between 100 and 200 employees, in relation to the number of projects they had launched.

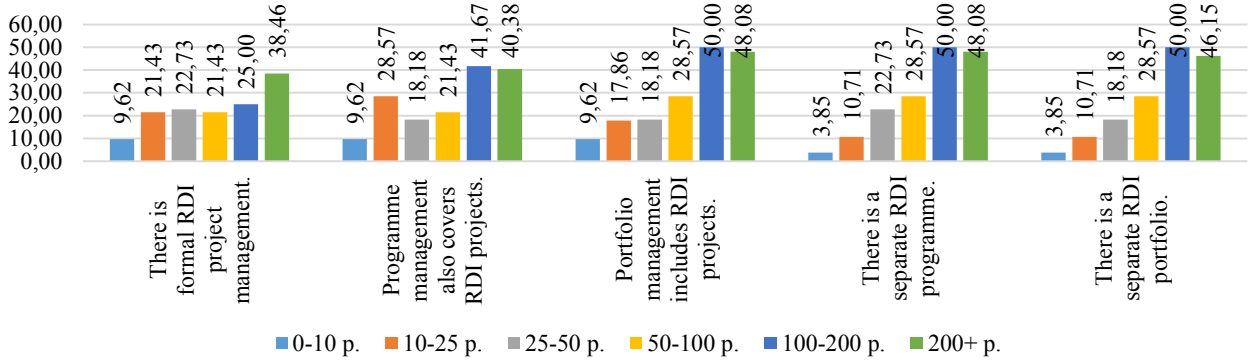

Figure 6. RDI project, programme and portfolio management in the life of enterprises by size of enterprise (relative %)

Source: own research, 2022, N = 180

If we look at the same questions in terms of the activities of the enterprises, we can see that, in this case too, it is the service enterprises that are in the lead in terms of programme and portfolio management. As in the previous case, there are no such wide variations as were observed when the questions were examined by size of enterprise. Service organisations have a large majority of separate RDI programmes and portfolios, followed by production organisations, which is also the case for programme and portfolio management for RDI projects. Interestingly, the highest proportion of enterprises in the other category with formal RDI project management is surprising compared to what has been observed in the past.

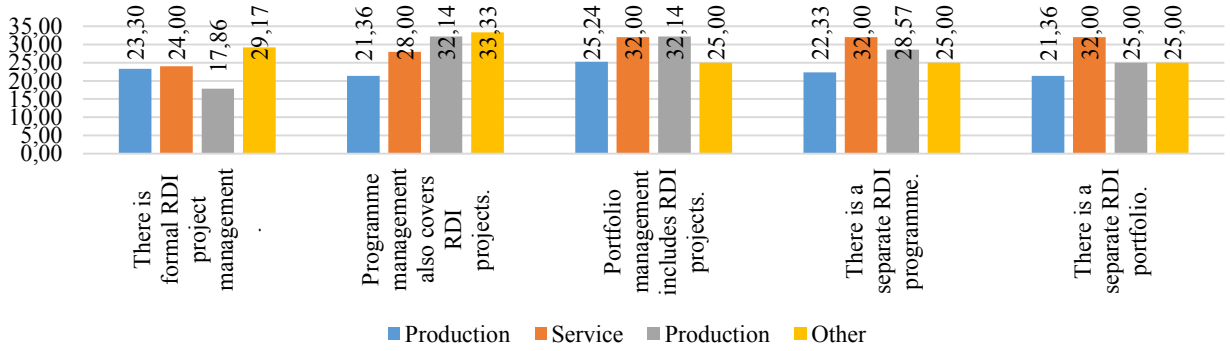

Figure 7. RDI project, programme and portfolio management in the life of enterprises by enterprise activity (relative %)

Source: own research, 2022, N = 180

4. Conclusions

Overall, the study suggests that there is room for improvement in the situation of RDI projects, especially when looking at the project, programme and portfolio management aspects. It can be seen that the Hungarian enterprises that participated in the survey are not yet sufficiently aware of the strategic positioning of RDI projects and that the proportion of enterprises that launch and manage RDI projects is not very high. This fact is certainly surprising and informative, as innovation and the development of innovation activities are vital in the 21st century. If we look at the technical side of RDI projects, a qualitative shift would be even more important there, allowing them to be treated as a programme or even as a portfolio. This obviously implies an increase in the number of innovation projects managed by the organisation. In the light of the above, it can be said that the innovation potential in Hungary needs to be significantly improved, which is a major challenge for the future. On the positive side, there are also awareness-raising programmes and initiatives aimed at involving young people in innovation activities. Building from the bottom up is expected to deliver the desired results in a few years and will be reflected in a higher share of SME activity.

REFERENCES

Eckert, T., Hüsig, S. 2022. Portfolio management: a systematic review and research agenda in regards to digital service innovations. Management Review Qarterly, 72(1), pp.187–230.

Fernandes, G., Pinto, E.B., Machado, R.J., Araújo, M., and Pontes, A. 2015. A Program and Project Management Approach for Collaborative University-industry R&D Funded Contracts. Procedia Computer Science, 64, pp.1065-1074

Fernandes, G., Leite, S., Araújo, M., Simões, A. C. (2020). Organizational Enablers to the Governance of Collaborative University-Industry R&D Programs. IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC) pp. 1-9

Filippov, S., and Mooi, H. 2009. Innovation Project Management: a research agenda. 6th International Conference for Innovation and Management (ICIM2009), Sao Paolo, 2009/12/08-10.

Guinet, J. and Pilat, D. 1999. Promoting innovation: does it matter? OECD Observer, 217/128, pp. 63–65.

Hall, B.H. 2010. The Financing of Innovative Firms. Review of Economics and Institutions, 1(1), pp. 1-30.

Lorell, M. 1995. Bomber R&D since 1945: The Role of Experience. Rand: Rand Monograph Report

Malcolm, D.G., Roseboom, J.H., Clark, C.E., and Fazar, W. 1959. Application of a Technique for Research and Development Program Evaluation. Operations Research, 7(5), pp. 646–669.

Minna, S. 2020. Innovation capability in SMEs: A systematic review of the literature. Journal of Innovation & Knowledge. 5(4), pp. 260-265

Montalván-Burbano, N., Pérez-Valls, M., Plaza-Úbeda, J. 2020. Analysis of scientific production on organizational innovation. Cogent Business & Management, 7(1), 1745073

Porter, M. E. 1985. Competitive Advantage: Creating and Sustaining Superior Performance. New York: Free Press.

Radas, S. and Božić, L. 2009. The antecedents of SME innovativeness in an emerging transition economy, Technovation, 29, pp. 438–450.

Sabando-Vera, D., Yonfa-Medranda, M., Montalván-Burbano, N., Albors-Garrigos, J., Parrales-Guerrero, K. Worldwide Research on Open Innovation in SMEs. J. Open Innov. Technol. Mark. Complex. 2022, 8, 20. https:// doi.org/10.3390/joitmc8010020

Slavec Gomezel, A., Rangus, K. 2019. Open innovation: it starts with the leader's openness. Innovation, 21(4), pp. 533-551.

Staniewski, M. 2008. The elements of Human Resources Management supporting knowledge management. Amfiteatru Economic, X (Special Iss. 2), pp. 283-291.

BEÁTA KÁDÁR, KRISZTINA PECZE, REGINA ZSUZSÁNNA REICHER, MELINDA MAJLÁTH:
PLACE MARKETING AS A RESEARCH TOPIC - SECONDARY RESEARCH RESULTS ON INTERNATIONAL PUBLICATIONS

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Abstract

Our study aims to present our research team's initial research and our study's first results. The economic changes of recent years and the pandemic have caused severe difficulties in the life of all municipalities, regardless of their size. However, small towns and villages whose primary source of income is based on tourism are facing severe problems. Marketing strategies often encourage over-consumption, so a poorly thought-out marketing campaign can be fatal for a municipality. After a good literature review, our research team aims to develop models that can provide practical results for these municipalities. To this end, we will first conduct a literature search. Our article presents a systematic review of the recent literature analysing the place, role and results of studies on marketing, including the area and position of municipalities and place marketing, in two well-known publication databases, Clarivate's Web of Science and Elsevier's Scopus, as a primary source. To this end, a systematic database analysis was carried out for 2000-2022, resulting in a keyword-based classification of published research, topics and methods. With this research, our main objective is to prepare a conceptual map that will help to collect and network the concepts that make up the subject of place marketing. Furthermore, it will clarify the sectors of place marketing and the possibilities of studying the territories. Our results show that the trends in place marketing linked to economic and social sustainability are also becoming more and more pronounced.
keywords: place marketing, systematic literature review, VOSviewer, analysis of literature, database research

1. Introduction

The concept of place marketing was introduced into the literature in the mid-20th century and has since developed into a very significant branch of marketing. Philip Kotler believes that he was the first person to write about this field, as he says in an email, an excerpt of which is translated by Benedek Nagy: "I believe I was the first to use the term place marketing. I always said that it was possible to market and promote goods, services, people, places, ideas and information" (Nagy, 2013). Place marketing as a concept was first used in the 1980s, and one of the most cited and influential works is Ashworth and Voogd's 'The Marketing of the City' (1990), which is considered a seminal work, with the city and it is making more liveable and competitive as its central theme. Another important work covering America, Europe and Asia is Kotler's work. It is this work that generalised the concept of place marketing, which from here on refers to the development of any inhabited area by marketing means (Kotler et al., 1993; Kotler et al., 1999; Kotler et al., 2002).

In Kotler's interpretation, place marketing "aims to create, maintain and change attitudes and behaviour towards particular places" (Kotler, 1986, p. 690). To this end, he suggests that regions and municipalities should proactively define their localities as attractive products for their various target groups (residents, businesses, tourists, investors), thinking like a business organisation rather than waiting for government programmes and assistance. The way to achieve this is through modernising infrastructure, encouraging local businesses, unique local attractions, and a service-friendly culture - and they also emphasise the importance of communicating these effectively (Kotler et al., 2002). The subject of place marketing can therefore be understood as an intertwining of regional economics and marketing.

Local marketing is, therefore, a branch of marketing, and within it is closer to nonbusiness marketing, as Dinya (2004) discusses in his article. Place marketing aims to make an area more attractive to residents, tourists, investors and business partners.

Pike (2009) is one of the first to discuss the tourism aspects of place marketing. This book deals with tourism place marketing and describes the methodology of integrated marketing communication (IMC). IMC is a communication strategy that aims to position a territory and communicate its attractions to external stakeholders.

This field of marketing has become very popular, with many eminent researchers and many of them working in practice as place marketing consultants. However, it is essential to mention Bill Baker, founder and CEO of Total Destination Marketing in Canada, a global destination marketing consultant and educator. He introduced the concepts of branding and destination in his studies on place marketing (Baker, 2017).

The first important aspect is the definition of "place" itself. Piskóti (2018) distinguishes within-place marketing between country, region, county, district and municipality marketing. These levels are interlinked, as the strategy of the larger unit determines - in part - the tasks of the smaller unit, and within each level, regions, counties, and municipalities compete with each other (Piskóti, 2018). An interesting novelty is that in some cases, research on the topic can also be directed at smaller units, such as city districts and some parts of municipalities, e.g. the Budapest party district focusing on tourism (Kiss et al., 2021).

In our previous research, we examined relevant publications in the Hungarian literature and research in the home country has shown that the topic is interdisciplinary in nature, with links to a number of disciplines (Majláth et al., 2022)

The focus of our present research is on the examination of international publications on the topic of place marketing, with a particular focus on the international databases WOS and Scopus. Our aim is to map the scientific frontiers and to examine the key concepts that appear most frequently in the context of place marketing. Based on the results of this analysis, we will attempt to identify sub-areas that will allow us to further break down the concept of place marketing into distinct parts and further explore it as a separate research area.

2. Material and Methods

We have chosen the methodology of systematic literature processing as the methodological framework for our research.

There are two types of methodologies that can be applied to literature research. One is the narrative method, and the other is systematic literary research. Narrative literature review articles are publications that present the scientific situation of a topic from a theoretical and contextual point of view, i.e. in context. These types of articles need to list the types of databases and methodological approaches used to conduct the review. It is instead a critical analysis. Table Main differences between systematic literature review and Narrative literature review (Cook et al., 1997)

1. Table Main differences between systematic literature review and Narrative literature review (Cook et al., 1997)

Features	Narrative literature review	Systematic literature review
Question	Broad	Specific
Source	Not usually specified, potentially biased	Comperative sources, explicit search approch
Selection	Not usually specified, potentially biased	Criterion-based selection is uniformly applied
Evaluation	Variable	Rigorous critical evaluation
Synthesis	often qualitative	Quantitative*
Inferences	sometimes evidence-based	Usually evidence-based
*A quantitative synthesis that includes a statistical method is a meta-analysis		

Sourse: own editing based on literature review

A systematic literature review, on the other hand, is a well-designed review that answers a specific research question, using a systematic and explicit methodology to identify, select and critically evaluate the studies included in the literature review. They are prepared using strict methodological rules (Rother, 2007)

This method is a way of synthesising information from the literature using scientific methods, providing a qualitatively new, more reliable result. It focuses on a clearly defined question or set of questions and uses systematic methods to find relevant research. The selection and critical appraisal of these studies and the analysis of the data from the studies included in the review allow researchers to conduct literature searches faster and more efficiently, even with the help of artificial intelligence, an analytical software (Moher et al., 2009). The advantage of a systematic literature review is that it is comprehensive and unbiased. It helps reduce the risk of bias and error in the review process. The use of standardised and rigorous methods in the review leads to more excellent reliability of findings. This approach ensures that the review is repeatable and the findings are reliable. Regular reviews can identify research gaps and areas where further research is needed. This information can provide direction for future research and help improve the quality of evidence in a particular area (Tricco et al., 2018). However, it has the disadvantage of being time and resource intensive. A systematic review is a time- and resource-intensive process that requires a team of experienced researchers. The process involves several steps, including searching for studies, screening studies and extracting data. If researchers conducting the process are not careful, publication bias can occur in reviews, where studies with negative or inconclusive results are less likely to be published. This can result in an incomplete picture of the available evidence. Conflicting results may be identified in the literature, making it difficult to draw conclusions. Conflicting findings may arise due to differences in study designs, populations, interventions and outcomes. The quality of the studies included may affect the overall quality of the review and the strength of the conclusions drawn. Studies of low quality or with a high risk of bias can introduce errors into the review process (Higgins, 2011)

In order to avoid the aforementioned biases, we concentrated our analysis on two scientific databases, with several researchers working in parallel on both databases and then synthesised and refined the results. In designing, structuring and conducting our research, we strictly follow the methodological recommendations and steps associated with the prism model to ensure that the results of our research contain valid information. To this end, we have defined the exact research area and the databases to be investigated, analysed their interfaces and the search conditions they contain, and then developed the appropriate search system to ensure a level playing field. Our researchers carried out the studies in isolation in order to compare and validate their results. In each of the two databases chosen, two researchers were examined separately. We have limited our analyses to a period of 1 week (03-09 April 2023), as both databases are constantly changing. This was done in order to minimise possible discrepancies. We used software (VOSviewer) to visualise the collected literature and to investigate the correlations, groups and relationships. According to the methodology, the following statistical

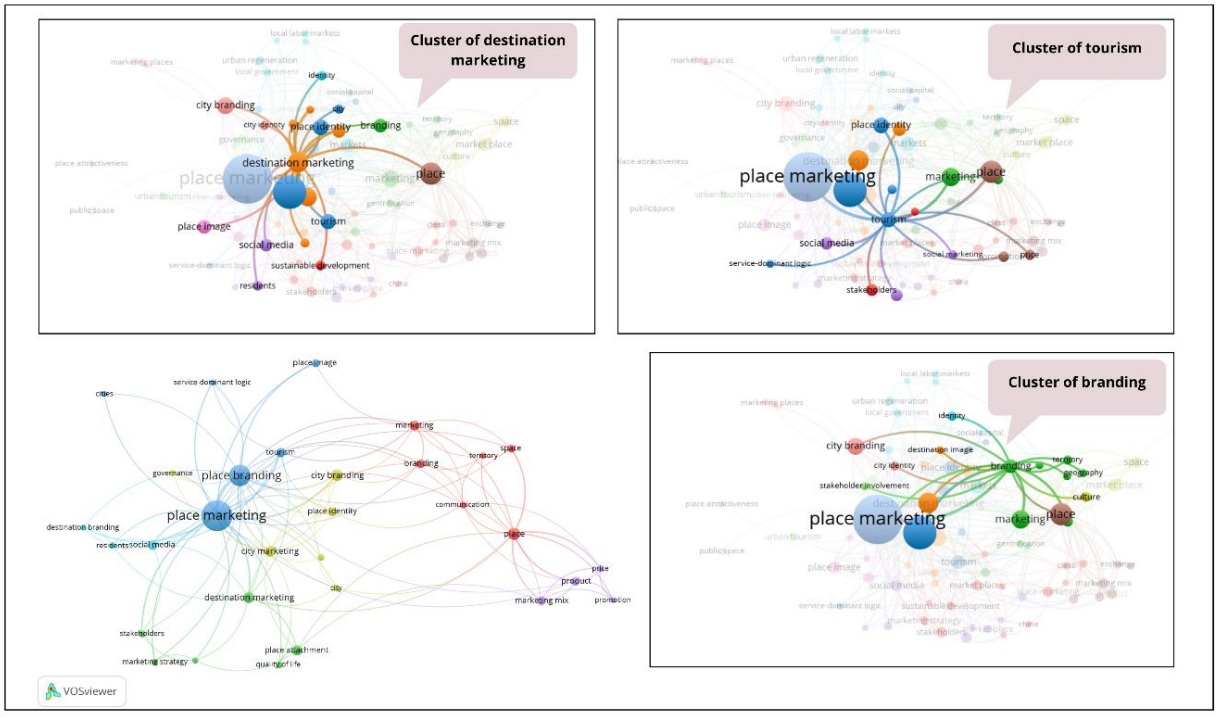
analysis, as well as content analysis, will allow us to exclude additional elements from the literature found by following a predefined path. The ultimate aim of the research is to identify relevant literature related to the identified clusters, process it through interpretive reading and incorporate the information contained in it into our subsequent research.
In this paper, we present the results of the first step of the research, in which the content analysis and targeted narrowing of the literature are not yet done.

3. Results and Discussion

Our research was conducted in Web of Science and Scopus databases between 1-15 April 2023. The Web of Science Core Collection consists of six online indexing databases. Coverage is from 1900 to the present day, with over 53 million records. Scopus databases cover 27 million documents. With 23 million documents, CWTS WoS is smaller than Scopus. The selected core discipline included publications under the concept of marketing. Based on our research agreement, the keywords of the scientific publications were searched. The WOS database returned 137130 publications for keyword marketing. With the same settings, the Scopus database showed 204165 hits. In total, we started with 340,000 hits. This has been narrowed down in both databases.
The results are plotted using VOSviewer version 1.6.19.

3.1. Exploring the Web of science database

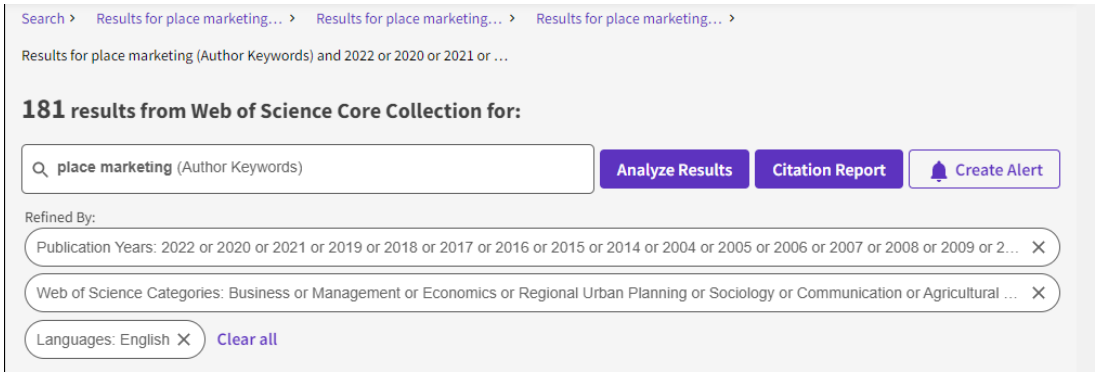
Since the aim was to discover important keywords around the concept of place marketing, the first step was to find them. Even before looking for any narrowing or keyword pairs, the first thing we did was to search the WOS database for all the studies that had placed marketing among the keywords given by the authors. A total of 447 such hits were identified by WOS, downloaded and analysed using the Vosviewer software described earlier. Looking first at the keywords, the result is shown in the first figure:



1. Figure: Vosviewer analysis, all keywords that reach at least three co-occurrences and clusters
Sourse: own editing based on research results

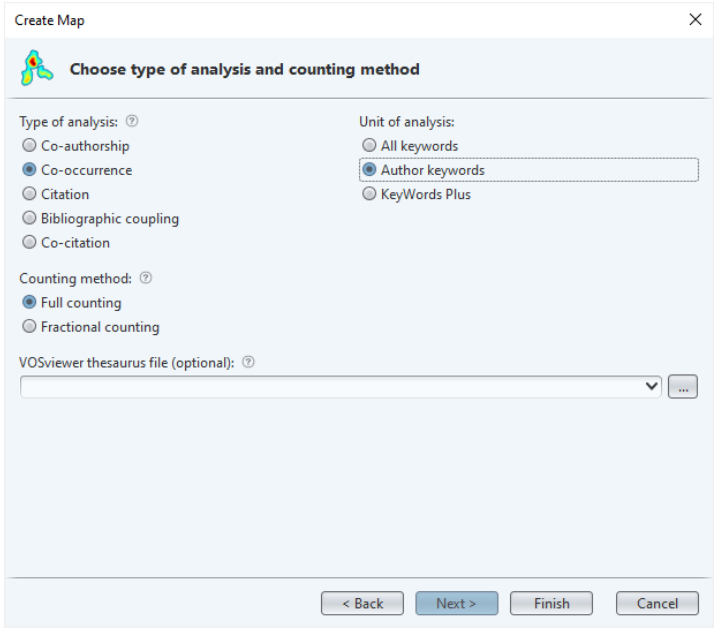
The first figure shows that the software separates 11 clusters with a co-occurrence value of 3. The relationship between the individual keywords is almost opaque, but even here, the larger clusters can be recognised and can be highlighted. Our aim is to narrow down and find keywords that have a strong relationship with the term location marketing, so we have narrowed it down further.

The Web of Science Core Collection database mainly includes studies on this topic after 2000. We believe that studies older than that are not necessarily relevant for such a dynamically evolving discipline. We, therefore, set the period of analysis to 2000-2022 and focused only on English language studies. Due to the nature of the research, it is clear that we searched for keywords in the studies, taking into account the keywords that the author provided. We also narrowed down the disciplines considered according to the WOS categories: management, business, economics, agricultural economics policy, regional urban planning, communication, and sociology.



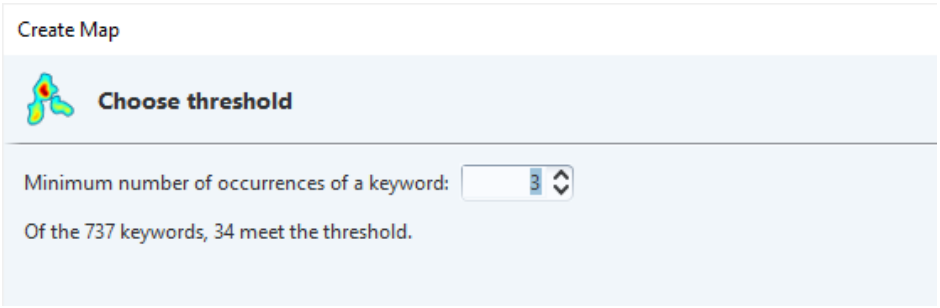
2. Figure: The WOS search criteria
Source: Web of science

For the place marketing keyword, WOS returned 181 results, which can be seen in Figure 2. This database was scanned into the Vosviewer application, where we started the analysis based on the following settings (Figures 3, 4):



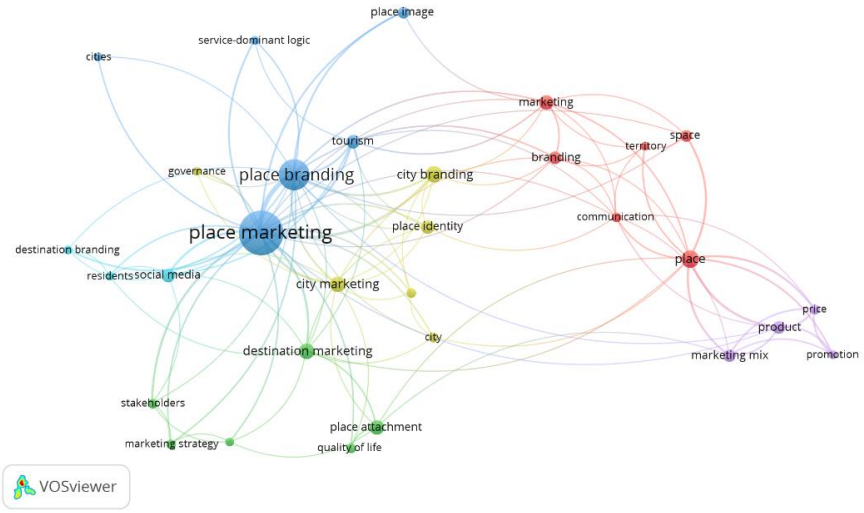
3. Figure: Vosviewer configuration
Source: Vosviewer softver

By ticking the co-occurrence option, we check the co-occurrence of keywords, again making sure that the keywords provided by the authors are taken into account. We set the minimum number of co-occurrences to 3, 5, and then 6 to see which keywords are retained even under these conditions.



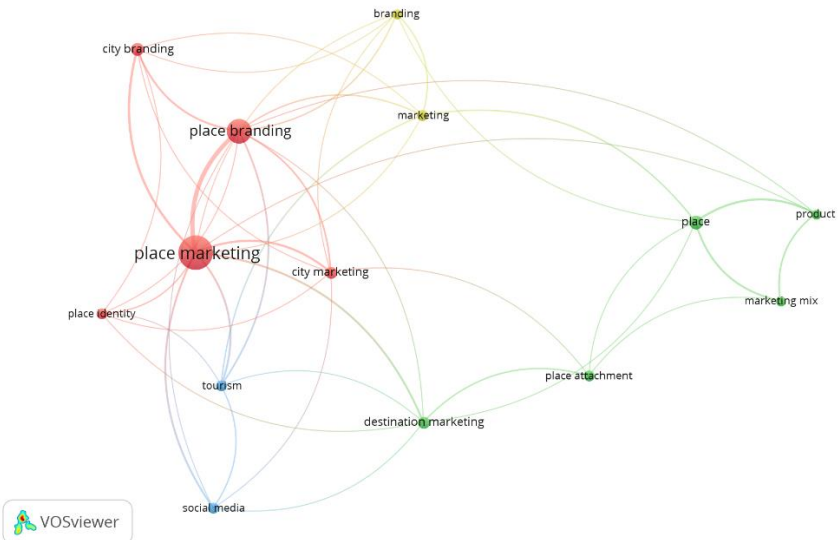
4. Figure: Minimum number of Co-occurrence

The result, presented in Figures 5 and 6, shows very clearly the emergence of keywords related to place marketing:



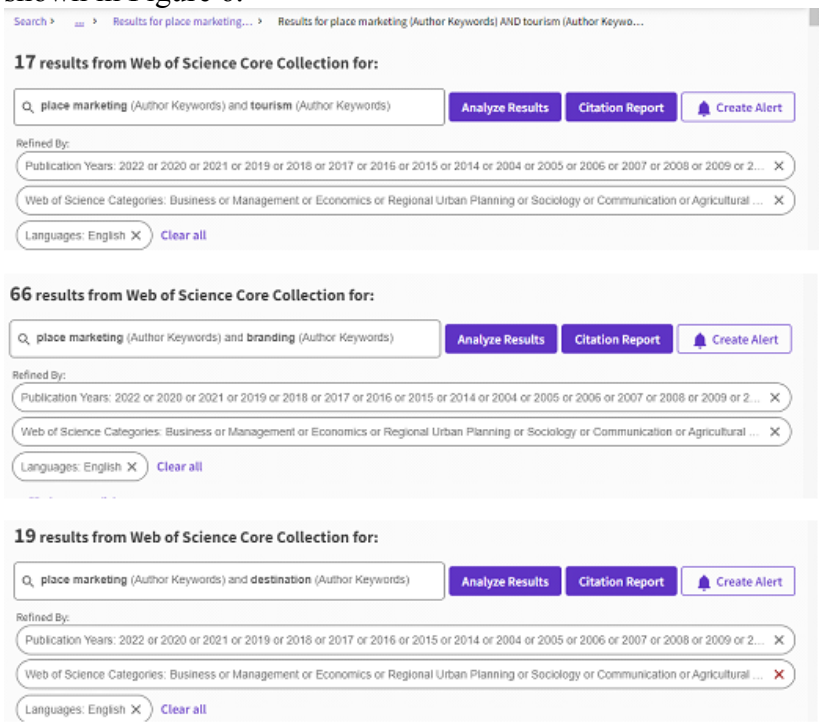
5. Figure: Voswiever diagram for co-occurrence 3
Sourse: own editing based on research results

In Figure 5, we can see that there are more clusters here, and although the more important keywords are highlighted, we felt that they were still confusing and vague, so we made further clarifications and narrowed them down.



6. Figure: Voswiever diagram for co-occurrence 6
Sourse: own editing based on research results

In Figure 6, you can already discover the related keywords and the clusters associated with them. Based on this figure, we have concluded that the keywords that should be used together with the term place marketing in the WOS are tourism, branding and destination, as these are the main keywords of the three large clusters and are strongly linked to the concept of place marketing in "multiple strands".
We then returned to the WOS database and adjusted the search as follows: period 2000-2022, continuing to consider only papers published in English from the WOS categories management, business, economics, agriculture economics policy, regional urban planning, communication, sociology, and this time those where the author keywords include place marketing and tourism or place marketing and branding or place marketing and destination together. The search settings are shown in Figure 6.

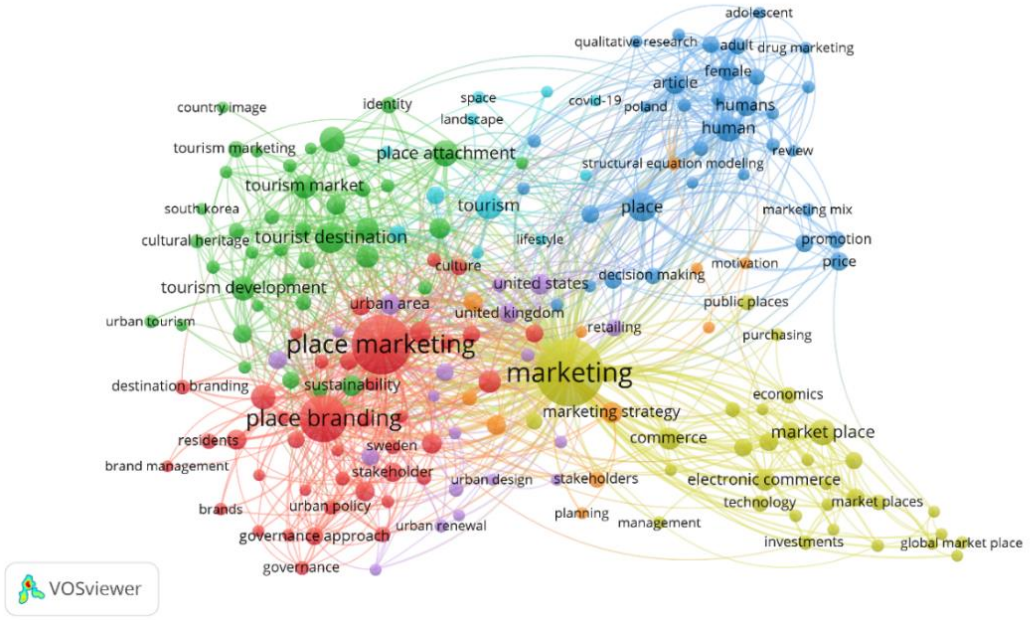


7. Figure: WOS search results for 1+3 keywords
Source: Sourse: own editing based on WOS website

Applying the filtering method shown in Figure 7 and searching for the co-occurrence of the given keywords, we downloaded 102 papers from the WOS database, which we will also examine using the Vosviewer software, looking at the authors' citations, the citation relationship between them, etc. However, the scope of this study does not allow this, and we plan to use the list generated by the method described above as a basis for further publications.

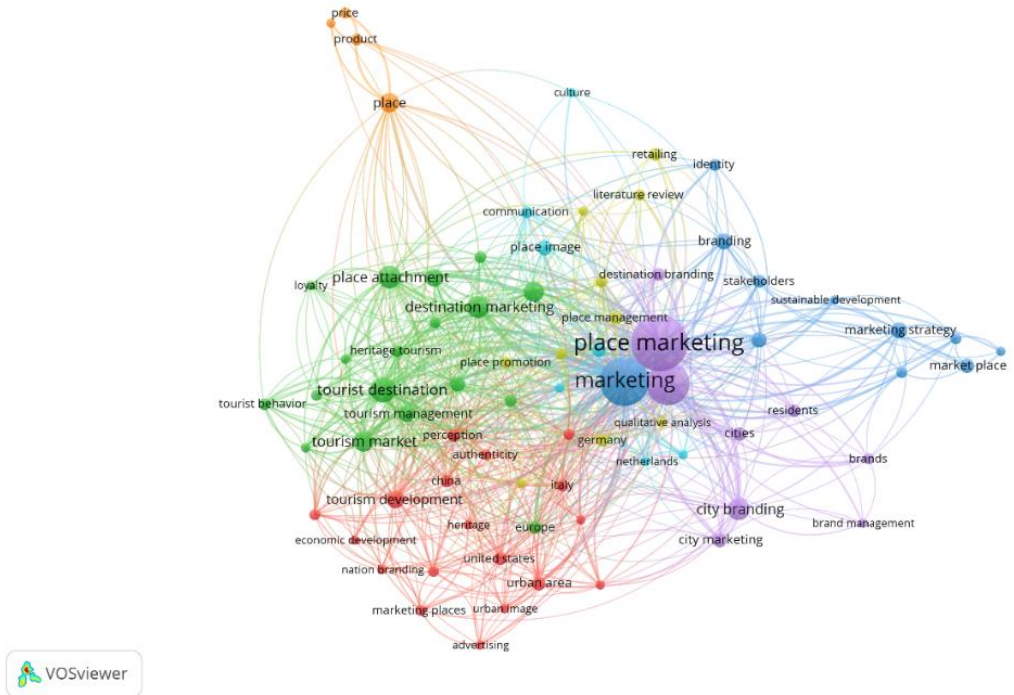
3.2. Mapping the Scopus database for place marketing research

We have also used the Scopus database to explore the topic of place marketing. The Scopus database contains over 27 million documents, making it a comprehensive source of information for researchers. Here too, we followed the same path in terms of the searches we ran on the two databases. Taking into account the differences between WoS and Scopus, we aimed to use the same narrowing criteria. In the first search, starting from a broad perspective and without narrowing down, we searched the database for the keyword "place marketing", which resulted in 674 publications between 1979 and 2023. Here again, the publications obtained were analysed using the Vosviewer software and the same settings. The figure shows that place branding appears as a central concept alongside the keywords marketing and place marketing.



8. Figure Vosviewer graph based on the 674 publications obtained without filtering
Sourse: own editing based on research results

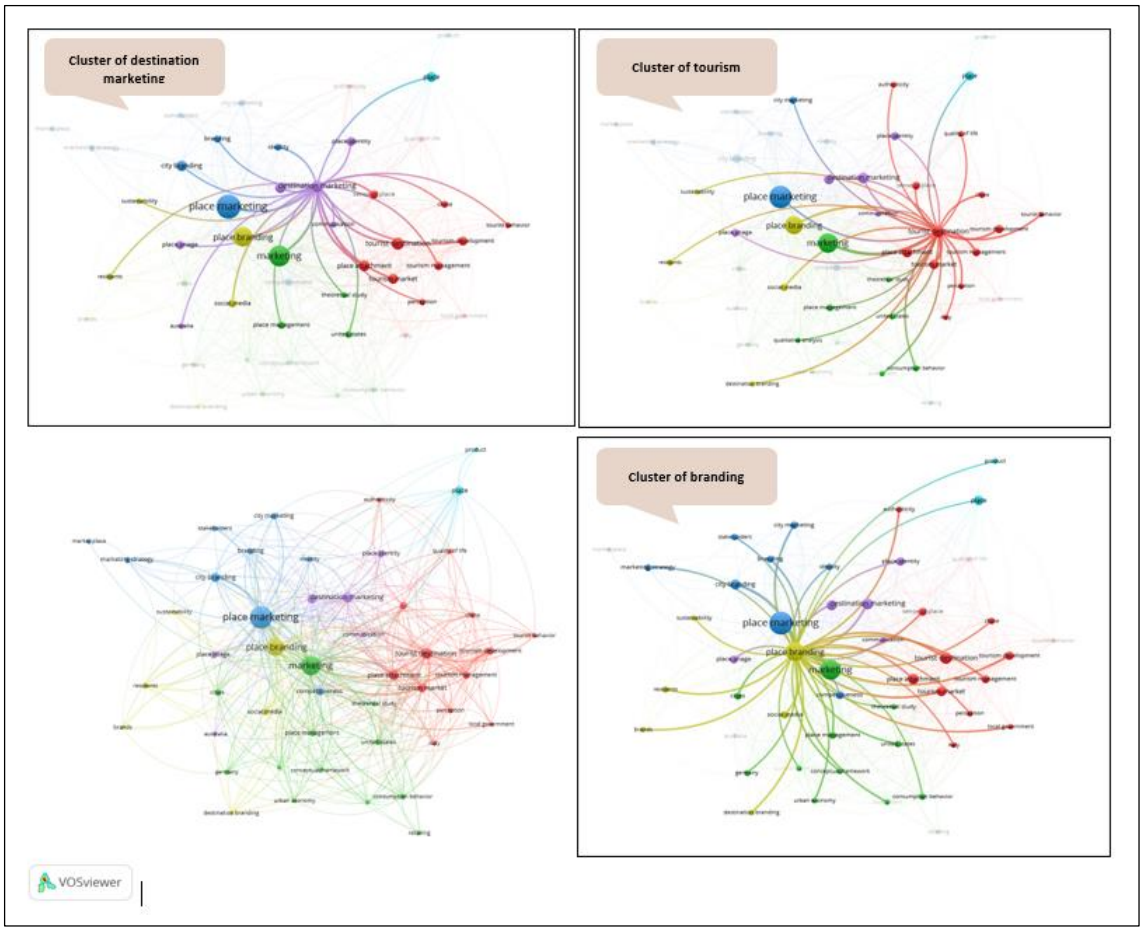
We then applied the Scopus database to the standardised narrowing criteria. The narrowing criteria applied were limited to papers published between 2000 and 2022, to Business, Management and Accounting, and to Economics, Econometrics and Finance, and to papers published in English. The narrowing down resulted in 353 items. This was then transferred and plotted in VOSviewer to obtain the picture shown in Figure 9. By identifying 77 keywords, VOSviewer created 7 clusters, which are separated by colour in the following figure. Two of the clusters are more strongly drawn around the keywords (1) tourist destination and (2) tourism development. Both clusters have 18 elements, almost double the number of elements in the other clusters. This suggests that these two areas are relevant to our research. The cluster centred on place branding, which emerged in the previous Figure 8, appears after the narrowing down as more of an integrating cluster, which is related to the other clusters.



9. Figure Vosviewer graph based on 353 publications as a result of the filtering
Sourse: own editing based on research results
Dividing the period under review into two parts, we found that the number of publications on place marketing has increased significantly over the last decade: 257 publications were published between 2012 and 2022, compared to 92 publications between 2000 and 2011.
The search options are shown in Figure 10.

10. Figure: Scopus search results for two parts of the period under review
Source: Scopus website

For the content analysis of the documentary analysis, it will be sufficient to focus on the shorter period. As we have seen above, the related keywords were grouped by VOSviewer into three main clusters in publications from 2000-2022, which we wanted to confirm further by examining the results for the period 2012-2022. The Vosviewer results for the period as a whole and for the three clusters are illustrated in the following figure.



101. Figure: Vosviewer cluster analysis
Sourse: own editing based on research results

Based on our runs, the three clusters can be defined as follows:
Tourism cluster:
This cluster contains publications dealing with the marketing of tourist destinations and the use of place marketing to attract tourists and is particularly relevant in the context of the COVID-19 pandemic, as many tourist destinations have been severely affected by travel restrictions and a decline in tourism. Place marketing can play an important role in attracting visitors once travel resumes and can help rebuild the tourism sector. A search of the keyword pairs place marketing and tourism using the uniform narrowing criteria in Scopus resulted in 78 publications for the period 2000-2022.
Destination cluster:
This cluster contains papers on the marketing of cities and regions as destinations for visitors, businesses and residents and is relevant for cities and regions that want to attract businesses and residents. Place marketing can help to create a unique identity for a place and highlight its unique selling points that can be attractive to businesses and residents. A Scopus search for the keyword pair destination and place marketing yielded 68 publications between 2001 and 2022.
Brand- Branding cluster:
This cluster includes works on branding and branding to create a unique identity for the municipality and to attract investment and tourism and highlights the importance of creating a strong brand identity for the municipality. This can help differentiate it from other places. For this cluster, 131 items were found in Scopus for the period 2001-2022, with no such keyword publication in 2000.

4. Conclusion

In our research, we used a systematic literature search method to map the scientific works on the topic of municipal marketing described by keywords in the WOS and Scopus databases. Our results were visualised using the VOSviewer program. Taking advantage of the benefits of database research, we tried to avoid the potential for errors due to the specificities of the method. The aim of our research is to map out the research areas around the concept of settlement or place marketing and to define these boundary areas in order to explore these sub-areas in more detail in the future. Our secondary aim is to identify areas that have not been the focus of research so far. The results of the research show that there is a growing interest in the subject of place marketing. The number of publications has increased dramatically over the last ten years, indicating that more and more scholars and practitioners are recognising the importance of this field. The three main groups of related keywords indicate that there are multiple approaches to place marketing and that academia has yet to develop a comprehensive understanding of the subject. The results of this research provide valuable insights for understanding the purpose and methodology of place marketing, with an essentially three-pronged approach to marketing a place "as a destination" through "branding" "for tourism".
Through the research presented in this paper, many details of the literature have been explored, and key players publishing on the subject internationally have been identified. It is hoped that in the continuation of this research, the most important and most cited literature identified here will be further explored to identify more precisely the areas that have not yet been studied in depth in the field of tourism marketing and to focus on these areas in future research.

5. References

1. ASHWORTH Gregory John - VOOGD, Henk (1990) Selling the City: Marketing Approaches in Public Sector Urban Planning. Belhaven Press, London.
2. BAKER Bill (2017) "Destination Branding for the Small City: How to Create Effective Destination Brands" In M. Kavaratzis & G. Warnaby (Eds.), Handbook of City Branding (pp. 191–202). Routledge.

3. Deborah J. COOK, Cynthia D. MULROW, R. Brian HAYNES (1997) Systematic Reviews: Synthesis of Best Evidence for Clinical Decisions Ann Intern Mend Volume 126, Issue 5 Page: 376-380 https://doi.org/10.7326/0003-4819-126-5-199703010-00006
4. DINYA László – HETESI Eezsébet – VERES Zoltán. (szerk.). (2004) Non-business marketing és menedzsment. Budapest, KJK-KERSZÖV Jogi és Üzleti Kiadó Kft.
5. HIGGINS Julian P. - GREEN Sally (2011) Cochrane Handbook for systematic reviews of Interventions (Vol. 4). John Wiley & Sons.
6. KISS Kornélia- MOLNÁR-CSOMÓS Ilona- KINCSES Fanni (2021) Buli van? – Mitől lehet vonzó Budapest VII. kerülete a hazai fogyasztók számára? Turizmus Bulletin, 21(4), 43-51. doi: 10.14267/TURBULL.2021v21n4.5 –
7. KOTLER Philip – HAIDER Donald – REIN Irving (1993) Marketing Places: Attracting investment, industry and tourism to cities, states and nations. New York, Maxwell Macmillan Int.
8. KOTLER Philip – ASPLUND,Christer. – REIN Irving – HAIDER Donald (1999) Marketing Places Europe. London, Pearson Education Ltd.
9. KOTLER Philip – HAMLIN Michael Alan – REIN Irving HAIDER Donald (2002) Marketing Asian Places. Singapore, John Wiley & Sons.
10. KOTLER Philip (1986) Principles of Marketing, Prentice-Hall
11. KOTLER Philip – HAIDER Donald – REIN Irving (2002) Marketing Places: Attracting Investment. Industry, and Tourism to Cities, States, and Nations, The Free Press, New York. ISBN 978-0-7432-3636-2
12. MAJLÁTH Melinda - REICHER Regina Zsuzsánna - PECZE Krisztina, et al. (2022) Helymarketing, mint kutatási téma: szekunder kutatási eredmények a hazai publikációkra vonatkozóan In: Szegedi, Krisztina (szerk.) Szemelvények a BGE kutatásaiból Budapest, Magyarország : Budapesti Gazdasági Egyetem 254 p. pp. 167-172., 6 p. doi: 10.29180/978-615-6342-49-2_19
13. MOHER David - LIBERATI Alessandro, TETZLAD Jennifer, et. al. (2009) Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. Annals of Internal Medicine, 151(4), 264–269. doi: 10.7326/0003-4819-151-4-200908180-00135
14. NAGY, Benedek (2013) A turisztikai helymarketing Székelyföldön: az imázs-és márkahasználat tudományos megalapozása (Vol. 4). Editura ISPMN, Cluj, Romania.
15. PIKE, Steven (2009): Destination Marketing: An Integrated Marketing Communication Approach. Butterworth-Heinemann, Oxford.
16. PISKÓTI István (2018) Bács-Kiskun megye marketingstratégiája 2018-2024, vitaanyag. https://docplayer.hu/116012446-Bacs-kiskun-megye-marketingstrategiaja.html (Letöltve 2022. nov. 13.)
17. ROTHER Edna Terezinha (2007) Revisão sistemática X revisão narrativa Acta paul. enferm. 20 (2) Jun 2007 doi: 10.1590/S0103-21002007000200001
18. TRICCO Andrea C. - LILLIE Erin - ZARIN Wasifa, et. al. (2018) PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Annals of internal medicine, 169(7), 467–473. doi: 10.7326/M18-0850

RÓBERT BAGDI, ANITA MONDOK: SZEGED AND ITS REGION DESTINATION: PAST AND PRESENT. RECOVERY FROM THE CORONAVIRUS EPIDEMIC BASED ON STATISTICAL DATA

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MONDOK, Anita PhD, College associate professor, University of Debrecen

Abstract
In 2016, the government fundamentally overhauled the organisation and management of tourism in Hungary, with several new elements. The most important of these was the publication of Act CLVI of 2016, which provided for the state's responsibilities in the development of tourism regions. In autumn 2020, the system of destinations was further developed, which meant not only a revision of the designations, but also the definition of eleven tourist areas, with six new ones being added to the five previously designated. The newly designated areas include Szeged and its region, which consists of seven settlements. The designation as a destination was justified by the 392,000 guests registered in 2019 and the almost 862,000 nights spent by them. The 260,000 domestic and 132,000 foreign visitors to the region paid a rounded HUF 5 billion for commercial accommodation. The most important foreign markets in 2019 were Romania (19.6 thousand visitors), Serbia (17.3 thousand visitors) and Germany (14.3 thousand visitors).
The year 2020, with the outbreak of the coronavirus epidemic, has had an unprecedented impact on world tourism. The last three years have been dominated by the coronavirus, so the statistical analysis in this article quantifies the recovery from the epidemic. In 2022, the destination recorded a total of 546,244 domestic overnight stays and 297,230 overnight stays abroad, already exceeding the pre-pandemic period. The analysis reveals the direction of development and the changes in the qualitative and quantitative characteristics of tourism in the examined region.

Key words: destination, tourism development, tourism region, COVID-epidemic

Introduction

A remarkable change to the system of tourism was brought to Hungary in 2016. In the spring, the Hungarian government decided to renew the Hungarian tourism system, dissolve the Hungarian Tourism Ltd., and establish the Hungarian Tourism Agency. The key element proved to be Act CLVI in December 2016 focusing on the development of tourist destinations. The new Act formed an idea of destination (tourism area) and important tourism developing areas. These newly official destinations became the frame of tourism development during the following years instead of the nine tourist regions. By the end of 2017, only five new official destinations were published in the Hungarian Official Gazette (Magyar Közlöny). The Government decided the official destinations based on three main indicators. The first is 'attractiveness': number of attractions, number of visitors, number of restaurants, protected natural areas, and World Heritage Sites. Secondly, the 'tourism indicators': guest nights, number of guests, incomes, the total capacity of hotels, guest nights for temporary residents, the proportion of foreign tourists, the average length of stay, and the sum of the local tourism tax that was used. The third type of indicator was the 'geographical and infrastructure' indicator such as the number of Tourinform Offices, local destination management organisations (DMOs), transport system connections, and the number of settlements.
Lake Balaton and Sopron-Fertő were proclaimed to be destinations at the same time in December 2016; next, the 'Tokaj, Upper River Tisza, and Nyírség' destination was formed in February 2017; fourthly Debrecen with Hortobágy World Heritage Landscape, finally the Danube Bend were determined (both in August 2017). Budapest, the most popular Hungarian destination, with around 10 million overnights spent at tourist accommodation establishments, had not been added as a part of the system.

In autumn 2020, the system of destinations was further developed, first the concept was changed indicating it with eliminating the important and the developing words from the names. But it was not only a revision of the designations, but also the definition of eleven tourist areas, with six new ones being added to the five previously designated. Budapest also remained out from the reform, but it gives its name (Graeter Budapest) to the destination formed around it. Bük and Sárvár; Győr and Pannonhalma; Gyula region; Eger region; Pécs region; Szeged region was nominated to a destination.

In terms of characteristics of these destinations two facts seem to be realised, firstly not all territories of Hungary will be nominated a destination. The Hungarian Government understands that not every settlement has enough sights and accommodations to take part in tourism and make a profit. Secondly, the mosaic localization is allowable; because it seems that the only important feature is that tourist can reach all settlements within an hour by car and tourists can spend a few days at the destination.

Material and Methods

This study fills a niche in the field of examining the new destinations in Hungary as results for the whole are summarised based on data provided by the Hungarian Tourism Agency and partly by the Hungarian Central Statistical Office (in Hungarian as known as Központi Statisztikai Hivatal, abbreviated form is 'KSH'). The focus of this paper is to discuss the results of a much-needed case study investigating the COVID-19 pandemic effect on Szeged region. Secondly, evaluating the statistical data we can determine the coherency of this region.

Regarding the territorial extension of Szeged region into the Government Decree 429/2020. (IX. 14.), it consists of only 7 settlements all in Csongrád–Csanád County, except the town of Mezőhegyes (Békés County). The county seat and most densely populated[45] settlement, Szeged, became a town in 1247 (Dudás – Bajmócy, 2012:2). Among the seven settlements of the destination only Ópusztaszer (with around 2 thousand inhabitants) does not have the status of a town. Szeged region has a highway connection (M5) with Budapest, and with Serbia, the border crossing point in Röszke is around 15 kilometres from Szeged. The town has a second highway (M43) connection toward east, to Romania, which was under construction between 2005 and 2015.

Szeged and its surroundings were left out of the newly defined important tourism development areas in 2016, and if we want to find the reasons for this, the research papers and the press of the past decades can help us. In 1995, Csilla, Jandala and Pál, Gubán, describing tourism in Csongrád County, said that 'the county is basically the same as other areas in the country' and 'offers a wide range of things with the same emphasis'. The essence of their professional opinion on the county seems to be that "with the exception of Ópusztaszer, the county's attractions are not suitable to represent the county" (Jandala–Gubán, 1995:15). If you read the press of the last half century, it is easier to understand the tourism situation of the city of Szeged. In 1973, for example, the Hungarian newspaper Magyar Nemzet called South Great Hungarian Plain as a 'tourism white spot' (A Dél-Alföld idegenforgalmi fejlesztése, 1973:5). This could perhaps have been explained by the fact that transit traffic[46] was always strong in the region, but this was not reflected in the number of overnight stays (Jandala–Gubán 1995:17). The only event that the general public could identify Szeged with during the socialist era was the Szeged Open-Air Festival, which was first held in 1931 and then discontinued between 1939 and 1959. From the 1960s, however, attendance increased and by 1973 the press reported that it had become internationally known. With a capacity of 7,000 people, a total of 80,000 people saw the performances in one summer. The growing popularity of the event is shown by the fact that in 1985 72–75% of the audience came from other towns in the country, and 5–8% was

[45] 157,372 inhabitants on 1st January 2022.

[46] As far as the spending habits of Turkish transit passengers are concerned, they "don't spend anything, they don't even fill up the tank" and they bring food with them.

foreigners (Az idegenforgalom eredményei és távlati eredményei a Csongrád Megyei Tanács előtt, 1985:1).

It is striking to see today that the development of accommodation during the socialist era was virtually synonymous with the creation of campsites. In 1972, a new campsite was opened in Szeged, but the following year the County Council also considered the development of campsites in other settlements of the county (e.g., Hódmezővásárhely, Makó, Mártély and Csongrád). A common feature of the campsites in Csongrád County was that they were not located on the banks of the Tisza, but when the river flooded, the high water would flood them (Szatmári, 1976:17).

In the 1970s, Ópusztaszer occupied a special place in the plans of Csongrád County in terms of tourism, because according to tradition, the first "national assembly" was held here after the conquest of Hungary, and in memory of this, the land division began here in 1945. The settlement (Ópusztaszertől a Medico-völgyig, 1993:5)[47] therefore had to be made suitable[48] to receive the Feszty Panorama (The Arrival of the Hungarians) (Szatmári, 1976:18), but the painting itself also had to be restored (Polner, 1989:2). The preparations, the phases of the work, took years or decades to complete. Ópusztaszer was finally declared a museum site in 1980 (Az idegenforgalom eredményei és távlati eredményei a Csongrád Megyei Tanács előtt, 1985:1).

The Csongrád County Council only put the issue of tourism on its agenda every few years (after 1979, for example, the next time was in 1985), so the fact that greater use of the medicinal waters[49] (Ráczalmási, 1986:35–36) was discussed at the Executive Committee meeting is a sign of the search for tourism, as until then only agriculture had used this resource (Egyre több külföldi érkezik, 1980:4). It did not help the cause of tourism that in 1985, the County Council President, in response to a question at the meeting, stated that there would be no growth in tourism facilities in the next 5 years, for financial reasons. Even in the last decade of state socialism, the town had been deprived of substantial funds for tourism, for example, between 1980 and 1987, the state provided a total of 2 million forints for the development of this infrastructure and 1.5 million for propaganda (marketing) costs. By the second half of the 1980s, the press had already pointed to the fact that there were 16 tourism-related organisations in the town, but no cooperation between them, as a weakness in the field of tourism (Ülést tartott a Szeged Városi Bizottság, 1987:1).[50]

From 1989, the changed political atmosphere was reflected in the fact that the members of the Memorial Committee of the National Park of Ópusztaszeri National Monument were no longer only delegated by the state party, such as Mátyás, Szűrös as the President of the National Assembly, but also by the MDF and the Bishop of Vác. By the end of the Kádár regime, the visitor centre in Ópusztaszer had not been completed, but it was still being considered as a rural venue for the millennium celebrations in connection with the World Exhibition to be jointly organised by Vienna and Budapest (Polner, 1989:2). As regards the financial situation of the project, the Minister for Culture said at this inaugural meeting that ‘I know that the financial situation is not favourable, but we have to finish the work’. The Finance Minister then promised to provide the funds to complete it. The years of political transition also did not accelerate the development of tourism in the region, and it seems typical that even in 1992 the most important objective for the establishment of a visitor centre

[47] The importance of the settlement for state socialism is shown by the fact that it did not appear as a heading in the New Hungarian Lexicon.

[48] Even the most basic elements of tourist infrastructure were missing, and it seems typical that in 1976, it took three years of work to put up a signpost to Ópusztaszer, where archaeological excavations were already underway. More than a decade later, at a memorial committee meeting in 1989, one contributor remarked, "if we want something, we should at least have an Austrian-style toilet".

[49] In the mid-1980s, there were about 500 thermal wells in the country, of which about one fifth were in Csongrád County.

[50] The meeting was also attended by Antal Apró, a member of the Hungarian Socialist Workers’ Party Central Committee, which shows that the central government has not completely forgotten about the city.

and park in Ópusztaszer was ‘to clarify the development guidelines, the specific image and the legal status of the memorial park’. Despite the unresolved situation, the authorities envisaged 8–10 million visitors (Tizenötből egy. Ópusztaszer idegenforgalmáról, 1992:1). The restoration of the Feszty Panorama was finally completed in just 1995 (Ópusztaszer a millecentenáriumra készül, 1995:8).

As a consequence of all these events, it is not a particularly shocking fact that between 1985 and 1997 the number of overnight stays in Szeged fell by 65%, while the number of nights spent by foreigners (mainly citizens of former socialist countries) fell by 52%. In 1991, a total of 160,000 guests arrived in Csongrád County, spending a total of 350,000 nights (half of which in campsites). In terms of quality accommodation, the highest hotel category in Szeged was a three-star hotel. The room occupancy rate in the city was 36.6% (Panek, 1997:9).

In the second half of the 1990s, tourism prospects had not improved either, as can be demonstrated by numerous examples. In early 1997 the County Tourist Office was reorganised without anyone from Szeged taking over the tourism responsibilities. At that time, the city spent HUF 50 million on cultural programmes, for example HUF 40 million on the Szeged Open-Air Festival, whereas in 1997 it took 40 days to set up the only tourist information pavilion in the city. According to external experts, the city did not do everything to develop tourism in the previous years, and thus failed to take advantage of opportunities such as tenders. MATUR’s Csongrád County organisation calculated that in 1997 the town did not even try to win 50 million forints worth of tenders (Sándor, 1992:23–26). The city did not even make use of the financial support for a tourist office provided by the Ministry of Industry, Trade and Tourism. MATUR proposed setting up a public utility company to run the town’s tourism, but this was rejected on money-saving grounds. The city’s programmes were thus advertised by competing companies. It was also raised as a problem that the exact dates and information for events to be held in the city should have been given in August for the following year, which was not practically done. As a consequence, only 2 events in Szeged could be included in the calendar of tourism events distributed to 100,000 copies at Hungarian diplomatic missions abroad. In the meantime, Ópusztaszer was attracting half a million visitors a year, raising the question of whether it could take over the leading position in the county. In its case, however, the human, intellectual and organisational conditions for sustainable tourism had to be put in the settlement (Juhász, 1994). The slow development of Ópusztaszer’s infrastructure seems to be characterised by the fact that the road linking Pusztaszer and Ópusztaszer was completed in 2009 (Több vendéget és több napra várnap Ópusztaszerre, 2009:23).

The organisation and coordination of tourism in the county took a step forward from 2000, for example when the County Council took over the running of the Tourinform Office and staff began to coordinate the tourism task lists of the county’s municipalities, which also required the preparation of the county’s attractiveness map (N. Rátz, 2000:7). Part of the city centre of Szeged was renovated in the early 2000s (Dudás – Bajmócy, 2012:1–18). In 2008, the 100% municipality-owned Szeged and its Region Tourism Destination Management Ltd. was established, which essentially coincided with the first round of TDM establishment in Hungary (Aubert et al, 2017:17). Until 2014, Szeged was typically ranked 15th in terms of the number of overnight stays among the Hungarian settlements, and then moved up to 10th place (Gyurkó, 2022:27.). The city now participates in several tenders, including international heritage tourism projects (Frauhammer – Szentgyörgyi, 2022:152–170).

In the last decade, several scientific researches have been carried out on the tourism in Szeged and its surroundings. Among the most important results, we highlight some facts that are considered to be typical. In 2008, Tünde Juray submitted her doctoral thesis "The city as a tourist space, using Szeged as an example". Her results include a survey of the local population, using a questionnaire to determine the way locals use the space, and the identification of a mental map (Juray, 2008:86–104).

A recent image survey of Szeged showed that locals and temporary visitors have a similar positive perception of the city (Török, 2022:78–80), although the city has a green space of 25m² per capita, which is better than Budapest but below many other county towns (Karancsi et al, 2016:704).
According to a survey conducted in 2019, the proportion of non-locals among the audience of the Szeged Open-Air Festival is over 50%, typically coming from Csongrád-Csanád, Bács-Kiskun and Pest Counties, as well as from Budapest. 83% of the visitors arrive in Szeged by car, 95% organise their own travel, but 44% do not stay overnight in Szeged, while another 32% stay only for one night (Husz – Tolnai, 2022:42).

Apart from Szeged and Ópusztaszer, other settlements in the destination have been the focus of scientific interest in rarer cases. One of the few exceptions is Mórahalom, which in 1997 became the third town in Csongrád County to receive a Tourinform Office. The town has been represented at the travel fair since 1999, while the planned development of the spa has been gaining momentum since 2001. Thanks to the permanent improvements, 312,000 guests arrived in 2009. The Thermal Pension, which was opened in 2002, has attracted guests from the middle third part of the country. As a result of the development of the accommodation, tourist tax revenues increased by a factor of 5,000 times between 2001 and 2008 (Martyin – Boros, 2012:148–153).

The dataset assessed it the next section was provided by the Hungarian Tourism Agency on demand. As the dataset contributed to the period of 2020-2022, the previous years were supported by ANOVA-data tables accessible on the Central Statistical Office website (https://statinfo.ksh.hu/Statinfo). Microsoft Excel was used as the platform of statistical assessment and data visualisation.

Results and Discussion
The tourism characteristics (number and nature of attractions, tourism infrastructure and superstructure) of the seven settlements of the Szeged and its region, namely, Hódmezővásárhely, Makó, Mezőhegyes, Mórahalom, Ópusztaszer, Sándorfalva and Szeged show significant differences. The regional level data provided by the Hungarian Tourism Agency show the extent and pace of change in tourism supply and demand, taking into account that the data for 2020 were significantly influenced by the closures caused by the COVID pandemic.

Processes in the period 2020-2022
In 2020, accommodation properties were closed during the months of March to May due to government efforts to stop the pandemic. Many units used the forced closures for restructuring, renovation and service upgrades, activities that were not possible during the high season. The significant difference between the number of operating accommodation units in 2020 and 2021 reflects this frequent closure (Table 1). In the summer of 2022, accommodation units that undertook heating and lighting efficiency upgrades due to the energy crisis reduced the number of operating units, but this reduction did not undo the available capacity data because units with higher occupancy rates did so during the pandemic closures and opened their doors for the season. The room occupancy rate started to increase as travel became possible and the full-year occupancy rate was close to the 2019 figure, but cannot be evaluated efficient (mainly due to the significant seasonal effect).

Year	Number of operating facilities	Number of available guest nights	Number of sold guest nights	Room occupancy rate (%)
2020	629	1084816	234562	22%
2021	710	1145106	304084	27%
2022	707	1240533	433234	35%

Table 1 Data on accommodation facilities in Szeged and its region 2020-2022 (capacity data for commercial accommodation facilities are given for 31 July of the year under review)
Source: Compiled by the authors based on the dataset provided by the Hungarian Tourism Agency

The differences in tourism characteristics between the municipalities in the region are also reflected in the capacity of accommodation facilities. Hódmezővásárhely is an important educational, economic, cultural and artistic centre of the South Great Plain region. The historic town has many attractions, such as the town centre with its Art Nouveau buildings, the town spa and sports swimming pool, and the picturesque surroundings of the Tisza River basin. Leisure and business tourists are catered for by one four-star and three three-star hotels, as well as guesthouses and private accommodation. Following the COVID period, the number of commercial accommodation establishments has been reduced to two-thirds of its previous level. In 2021, the number of rooms per accommodation unit was 22 and the number of beds per room was 2.6.

Makó is an attractive destination for leisure travellers, with the Maros River floodplain and the spa. Its architectural heritage includes neoclassical, baroque and eclectic buildings, but modern architecture is also represented with buildings designed by Imre Makovecz. The town has repeatedly been the most flowery settlement in Hungary. The Makó onion is a Hungaricum. In addition to one four and one three-star hotel, numerous apartments and guest houses await visitors. The supply of commercial accommodation in 2021 is down 20% compared to 2019. The number of rooms per accommodation unit in the municipality in 2021 was 16, while the average number of beds per room was 2.7.

Mezőhegyes is famous for its National Stud Farm, so it is mainly involved in equestrian tourism. A hotel is also operated by the Farm, and few private guest houses can be found in the town. In 2019, the 5 commercial accommodation establishments offered 77 rooms (average 15.4 rooms/unit) and 329 beds (average 4.3 beds per room). Data for 2021 are not available at municipal level.

Mórahalom has built its leisure tourism on its spa and is mainly visited by families and senior citizens. In addition to one 4-star and one 3-star superior hotel, there are guesthouses and private accommodation providers in the municipality. The reduction in commercial accommodation supply by 2021 is moderate, at only 17%. In 2021, the 5 commercial accommodation establishments offered an average of 31 rooms, with an average number of beds per room of 2.4.

The tourist character of Ópusztaszer is defined by the National Historical Monument as a national attraction. The Pallavicini Castle is a medical institution and is not open to visitors. The accommodation facilities in the municipality are limited. Of the 5 commercial accommodation establishments operating in 2019, only 3 were still operating in the summer season in 2021, providing 33 rooms and 96 beds (average 2.9 beds per room).

The tourism attractiveness of Sándorfalva is based on the Lake Fehér (White) and the Pallavicini Castle which is proper for leisure travellers for short stays. Accordingly, its accommodation supply is limited to private accommodations. Municipal data are not available due to the lack of commercial accommodation units.

Szeged is a dynamically developing city with a great historical past, located on the banks of the River Tisza. It is a popular destination for both leisure and business tourists, thanks to its proximity to the Serbian and Romanian borders. Many Hungaricums are also linked to the settlement. Among its events, the Szeged Youth Days and the Szeged Open-Air Festival are outstanding. Its spa and wildlife park make it an ideal destination for families. The choice of commercial accommodation in the city is overdominant in the tourism region, both in terms of quality and range. The COVID pandemic has left a significant impact on the city's commercial accommodation supply, with the number of units falling to 74.5% of 2019 levels by 2021. The number of capacities fell even more sharply, by 31%. In 2021, the average number of rooms per unit was 34, while the number of beds per room was 4.15, which shows that the county seat's accommodation offer is also suitable for the youth and family tourist segments.

Although restrictions due to the pandemic have significantly curtailed foreign travel, there has been no proportional change in the number of foreign visitors or overnight stays in the period of 2020-2022 (Figure 1).

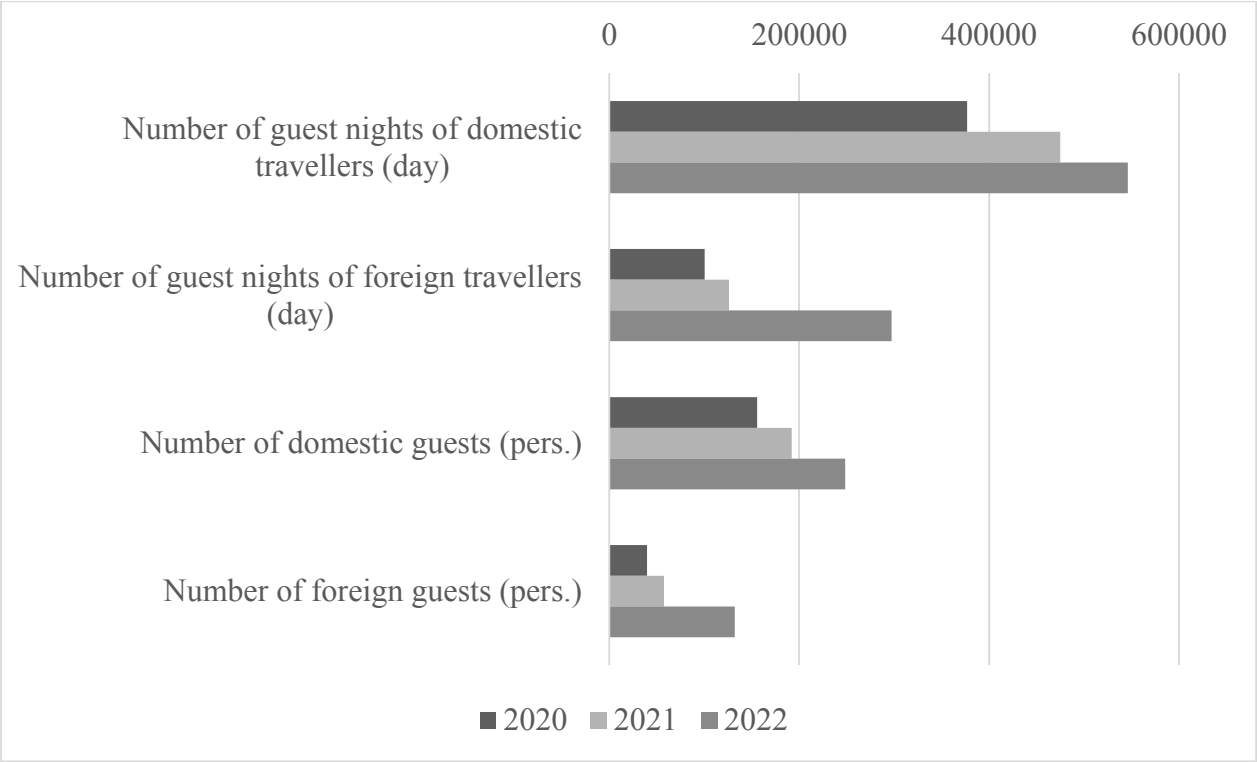

Figure 1 Number of guests and guest nights in the tourism destination of Szeged and its region in 2020-2022
Source: Compiled by the authors based on the dataset provided by the Hungarian Tourism Agency

The average length of stay in the region differs from the national average: in 2020, the year most affected by COVID, the average length of stay of foreigners was longer than that of Hungarian travellers seeking safe domestic locations (Table 2). The ratios reverse in 2021 and then become even shorter: in 2022, both Hungarian and foreign travellers stayed on average only 2.2 days in accommodation in the region.

Year	Average length of stay of domestic guests (days)	Average length of stay of foreign guests (days)
2020	2.4	2.5
2021	2.5	2.2
2022	2.2	2.2

Table 2 Average length of stay of travellers in accommodation facilities in the Szeged and its region
Source: Compiled by the authors based on the dataset provided by the Hungarian Tourism Agency

The tourism revenue from domestic and foreign guests reached HUF 12,644,321.7 thousand in 2022 (Figure 2), which means that the revenue per guest amounted to HUF 53.5 thousand. This level of spending was only 40.5 thousand HUF in 2020, the pandemic period.

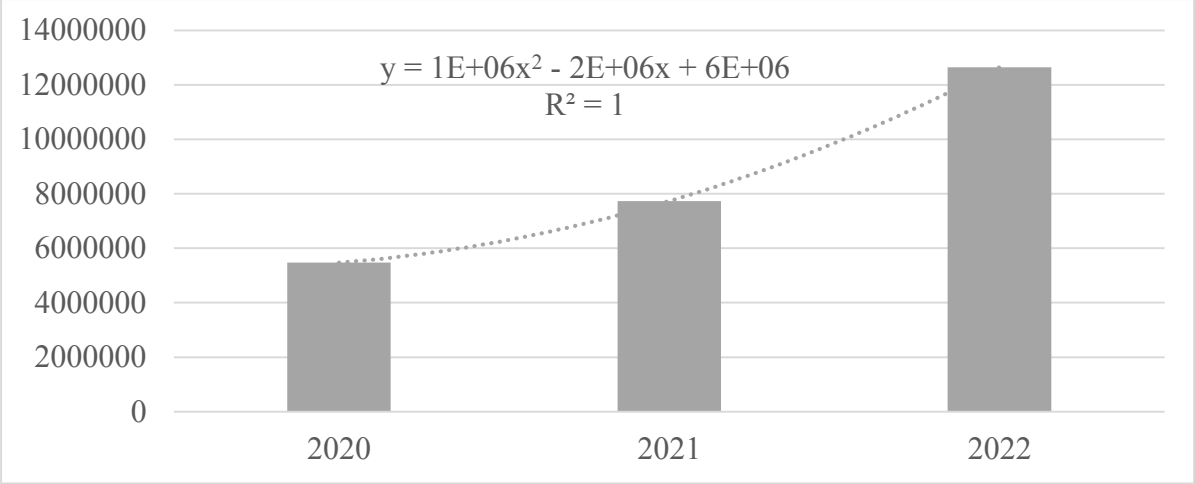

Figure 2 Tourism revenue (in thousands HUF) in the period 2020-2022 in the destination of Szeged and its region in 2020-2022
Source: Compiled by the authors based on the dataset provided by the Hungarian Tourism Agency

Regarding the last three years, Romania, Serbia and Germany were the best sending countries. Among the guest nights generated by the region, the lesser-known sending markets are also worth highlighting, showing that tourists from other parts of the world have also come to Szeged and its surroundings, where transport is a challenge. Visitors have come from Inner Asia, such as Tajikistan, Kyrgyzstan, Uzbekistan, the Pacific region, such as Guam, Kiribati and Nauru, Africa, such as Chad, Djibouti and Zambia, and even from the Arctic regions, Greenland and Antarctica.

Results of year 2021 (recovery from the pandemic)
In 2021, 256,000 visitors came to the Szeged and its region tourism area, spending 629,000 nights. Based on this, 3% of the total tourist traffic outside the capital is generated by this region. The destination is popular among the domestic visitors, as 79% of the guests accommodated in commercial accommodation units coming from Hungary. In 2019, the share of domestic visitors was only 67%, which shows that travellers in the COVID epidemic period found the Hungarian tourism offer safe and by getting to know their home destinations they prefer not to cross the country borders. Despite this fact, the region was only the ninth most popular of the 11 tourism regions.

In 2021, 256 thousand guests spent a total of 629 thousand guest nights in Szeged and its region, which shows a 22% increase in the number of guests and a 20% increase in the number of guest nights compared to the results of 2020. Signs of recovery are confirmed by the fact that the region achieved 74% of the 2019 guest arrivals in 2021. In 2021, domestic guest traffic reached 88% of the 2019 result, compared to only 46% of foreign tourists.

Among the settlements of the tourism region of Szeged and its region, Szeged was the dominant one in terms of the number of overnight stays with 404 thousand, followed by Mórahalom (92 thousand), Makó (50 thousand) and Hódmezővásárhely (43 thousand). Hotels accounted for 47% of all nights spent in the region, while private and other accommodation also played a significant role. A further 39% of the total was spent in this type of accommodation, another 11% in boarding houses and only 2-2% in community accommodation and campsites. The annual average room occupancy rate was 22% in 2020, improving to 27% in 2021, but still showing significant monthly fluctuations. After the closures were vanished, capacity utilisation reached 52% in July and 53% in August.

The revenue generated by accommodation units was HUF 7.73 billion, 41% higher than in 2020. The Hungarian travellers also took advantage of the Széchenyi Recreational Card, HUF 1.2 billion spent on the card system.

The most important sending countries of foreign visitors were the neighbouring countries; the Romanian guests spent 21,182 guest nights in the region. The other main countries in order of number of guest nights were Serbia (19,707), Germany (17,827), the Czech Republic (7,022), Austria (6,689) and Ukraine (5,901). In 2021, Ukrainian visitors had the longest average length of stay of 8 days.

The Hungarian Tourism Agency purchases the mobile cell phone data from telecom operators, providing data on the tourism characteristics of each tourism regions. Based on these data, the tourist region of Szeged and its surroundings recorded 31% more one-day visitors in 2021 than a year earlier, with a particularly strong increase in the spring period, which was still affected by the COVID epidemic closures. 77% of the day visitors to the region were domestic (89% were from neighbouring counties), while Germany and Romania being the main foreign sending countries (Hungarian Tourism Agency, 2022).

In 2021, the most popular attractions were the Hagymatikum in Makó, the area around the Szent Erzsébet Spa in Mórahalom, the area around the Carriage Museum in Mezőhegyes and the area around the New Synagogue and Cathedral in Szeged. In case of the first three attractions the share of foreign visitors was negligible (below 7%), but for the Szeged attractions it was around 16% and 17% respectively. Because of the low distance foreigners from Romania were the most frequent visitors around the Hagymatikum and the Carriage Museum, as well as Serbians next to the Szent Erzsébet Spa in Mórahalom. In case of the New Synagogue in Szeged visitors from Austria and at the Dome in Szeged from Germany were the most dominant (Hungarian Tourism Agency, 2022).

Results of year 2022

In 2022, the number of guests registered in Szeged and its region increased by 52% to 380,000, spending a total of 601,000 nights (a 40% increase compared to the previous year). 65% of the guests were still domestic travellers, who arrived in the region 29% more than in 2021. The number of guest nights they generated was 15% higher compared to the previous year. The number of foreign visitors was 129% higher than in 2021, while the number of guest nights spent by foreign visitors was 137% higher than in 2021, although the outstanding performance, they still did not outnumber domestic visitors.

In 2022, Szeged was the most visited settlement in the tourism region with 563 thousand registered guest nights, followed by Mórahalom with 139 thousand, Makó with 80 thousand and Hódmezővásárhely with 53 thousand. This means that Szeged, the seat of the county, accounted for two thirds of the total number of guest nights in the tourism region. As in the previous year, hotels accounted for a significant share of guest nights (56%), while private and other accommodation accounted for 29% of the total. Just 10% were spent in boarding houses, 3% in community accommodation and 2% in campsites in 2022. On this basis, there was no significant difference in the proportion of accommodation requested, with visitors preferring hotels offering a higher level of service. The room occupancy rate in the tourism region was 35%, which was much higher (60%) achieved by the hotels for the year as a whole.

In 2022, the revenue generated by hotels was HUF 12.6 billion, 63% more than in 2021. The share of Széchenyi Recreational Card spending was 9.5%.

Romania remained the most important tourist generating destination with 53,900 guest nights, slightly ahead of Serbia (53,064 guest nights), while Germany, Austria and the Czech Republic were other major destinations in 2022. Refugees from Ukraine, fleeing the war, did not appear in the region in significant numbers because of its distance from eastern-western transit routes. In 2021, Turkish visitors had the longest average length of stay of 11 days.

The largest share of domestic visitors came from the capital city (25%) and Pest County (19%), while Bács-Kiskun (8%) and Csongrád-Csanád (7%) counties were even more important among the sending

areas. This shows a strong restructuring compared to the previous year, when traffic was almost exclusively from passengers from neighbouring counties. The presence of capital city travellers in the region, thanks to good road transport, provides an opportunity for further development.

Assessing the age distribution of passengers in 2022, the highest proportion of passengers is in aged 45-54 (22%), followed by 35-44 (20%), 25-34 (16%) and under 18 (15%). Based on mobile cellular data, the two most popular destinations in the region for the whole of 2022 were the Hagymatikum in Makó and the Szent Erzsébet Spa in Mórahalom (Hungarian Tourism Agency, 2023), this fact is confirmed by the age cohort data, which indicate a strong regional presence of the family segment in particular.

Conclusion

The COVID-19 pandemic hit tourism operators unprepared, and the industry had to find solutions to handle the unprecedented loss of traffic due to administrative restrictions without warning. However, the tourism industry not only lost a significant part of its revenues with the pandemic, but also had to face a change in travel habits. As a result, the post-epidemic period will continue to be affected by closures and the need for traveller safety, which are challenges not only for local but also for global players.

This is no different in the case of Szeged and its region, one of the domestic tourism regions, which has just been created to face the most serious challenge of the recent period of the tourism industry. A positive outcome is that domestic destinations have clearly become a preferred places to travel during periods affected by pandemic closures. In addition to the popular and well-known tourism areas, small, dispersed, rural offerings have been appreciated, providing benefits to a region with a diverse mix of attractions and a rural character (e.g., spa tourism, equestrian tourism, cultural tourism, gastronomy tourism).

In the same way, the emphasis on individual needs and the avoidance of mass tourism is an opportunity for the region. Realising all this will require the region to have an affinity with changing, digitally challenging consumer needs, changing lifestyles, environmental and health and safety concerns. The region's specific location also allows it to exploit its border location by marketing communication towards Serbian and Romanian visitors, as shorter distances are perceived as safer by travellers.

The ongoing tourism developments in Szeged, the development of the Szeged cycle path network, the expansion of the tourism services of the Szeged Partfürdő or the development of the Szeged Green City in the area of Vértó and its surroundings show the ambition to achieve all these. The county seat is promoting leisure tourism by building an elephant house in the zoo, which will also include a system of nature and cultural exhibits from South and South-East Asia. The Ferenc Móra Museum and Castle in Szeged is also being developed for tourism reasons with an interactive natural history and exhibition of Ferenc Móra.
In terms of digital content development, Makó and Ópusztaszer are good examples: both municipalities offer free downloadable apps to help travellers with tourist information.

References

Aubert, Antal et al (2017): Paradigmaváltás(ok) a hazai turisztikai desztinációk fejlesztésében és menedzselésében. *Turizmus Bulletin*, Vol. 17(1–2), pp. 15–25

Dudás, Renáta – Bajmóczi, Péter (2012): Szeged kulturális gazdasága. Manuscript

Frauhammer, Krisztina – Szentgyörgyi, Anna (2022): A REDISCOVER projekt szerepe szeged zsidó örökségének reprezentációjában. *Targum*, Vol. 2022(1), pp. 152–170

Gyurkó, Ádám (2022): Magyarország vendégforgalmának teljesítményértékelése területi és keresleti szempontból 2019 és 2022 között, különös tekintettel Eger városának turisztikai teljesítőképességére. *Turisztikai és Vidékfejlesztési Tanulmányok*, Vol. 7(4), pp. 20–32

Hungarian Tourism Agency (2022): MTÜ turisztika trendriport, Szeged és térsége, 2021. Accessible on https://igyutazunk.hu/cikkek/mtu-turisztika-trendriport-szeged-es-tersege-2021, accessed on 12 April 2023

Hungarian Tourism Agency (2023): MTÜ turisztikai trendriport, Szeged és térsége turisztikai térség, 2022. Accessible on https://igyutazunk.hu/cikkek/mtu-turisztikai-trendriport-szeged-es-tersege-turisztikai-terseg-2022, accessed on 12 April 2023

Husz, Anikó – Tolnai, Edina (2022): A színház és a turizmus szinergiája – új lehetőség a turizmusban. *Turizmus Bulletin*. Vol 22(4), pp. 36–45

Jandala, Csilla – Gubán, Pál (1995): Csongrád megye turizmusának marketingkoncepciója. *Kereskedelmi Szemle,* Vol. 36(7), pp. 15–19

Juhász, Erzsébet (1994): Az ópusztaszeri térség jövőképe. Nemzeti zarándokhely, virágzó turizmussal. *Új Magyarország*, 6 December 1994, p. 12-14

Juray, Tünde (2008): A város, mint turisztikai tér, Szeged példáján. Doctoral (PhD) thesis. University of Szeged, Szeged, Hungary

Karancsi, Zoltán et al (2016): A városi parkok és szerepük az idegenforgalomban Szeged példáján. In: Pajtókné Tari Ilona – Tóth Antal (2016): *Magyar Földrajzi Napok 2016. Konferenciakötet*. Eger, Magyar Földrajzi Társaság, Agria Geográfia Alapítvány, Eszterházy Károly Egyetem, pp. 695–708

Matyin, Zita – Boros, Lajos (2012): A turizmus szerepe Mórahalom fejlődésében. *Közép-Európai Közlemények 17,* Vol. 5(2), pp. 145–158

N. Rátz, Judit (2000): Vendégcsalogató értékek. *Délmagyarország*, 11 August 2000, p. 7

Panek, Sándor (1997): Elszigetelődik a fesztiválváros? *Délmagyarország*, 19 July 1997, p. 9

Polner, Zoltán (1989): Sok üzenete van Ópusztaszernek. *Csongrád Megyei Hírlap*, 21 August 1989, p. 2

Ráczalmási, György (1986): A Csongrád megyei idegenforgalom. *Népfront*, Vol. 1986, pp. 35–36.

Sándor, Judit (1992): Csongrád megye idegenforgalmáról. *Kereskedelmi Szemle*, Vol. 33(11), pp. 23–26

Szatmári, Károly (1976): A szegedi városi idegenforgalmi hivatal. *Turista magazin*, 1976(12), pp. 17-20

Török, Réka Szabina (2022): Szeged város imázsának élménymarketing alapú vizsgálata. *Turisztikai és Vidékfejlesztési Tanulmányok,* Vol. 7(2), pp. 72–82

A Dél-Alföld idegenforgalmi fejlesztése (1973), *Magyar Nemzet*, 13 September 1973, p. 5

Az idegenforgalom eredményei és távlati eredményei a Csongrád Megyei Tanács előtt (1985), *Csongrád Megyei Hírlap*, 25 October 1985, p. 1

Egyre több külföldi érkezik (1980), *Csongrád Megyei Hírlap*, 16 July 1980, p. 4

Ópusztaszertől a Medico-völgyig (1993), *Kisalföld*, 14 August 1993, p. 5

Ópusztaszer a millecentenáriumra készül (1995): *Délmagyarország*, 14 February 1985, p. 8

Tizenötből egy. Ópusztaszer idegenforgalmáról (1992), *Délmagyarország*, 19 December 1992, p. 1

Több vendéget és több napra várnap Ópusztaszerre (2009), *Magyar Hírlap*, 28 May 2009, p. 23

Ülést tartott a Szeged Városi Bizottság (1987), *Délmagyarország*, 28 April 1987, p. 1

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MÁRTA KÓRÓDI, ORSOLYA SAVELLA, RÓBERTNÉ BAKOS: ANALYSIS OF THE CHARACTERISTICS OF TYPES OF TOURISTS BASED ON THEIR EXPERIENCE BEHAVIOR

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ABSTRACT
Proper identification of tourist segments in the tourism services market is one of the decisive factors in the success of experience management. Tourism products offer certain groups of tourists a combination of services that cover their needs during their entire stay and provide them with an experience. In order for the product development process to be successful, it is not only necessary to know these needs, but also to form homogeneous demand groups well, so that the elements corresponding to the specific segments can be compiled into a package. In addition to their consumer behaviour, this also requires an assessment of their experience attitude. The experience attitude that plays a role in the travel decision is based on the experience concepts, which are shaped by the experience promises of service providers. Concepts of experience have a significant influence on travel motivations, and on tourist's travel behaviour too. The study analysing the methods of experience management makes an attempt to assess the experience attitude by analyzing more than six hundred elements. In addition, it is looking for relationships between travel experiences and behaviour, as well as experience expectations. As a result of the study, the characteristics of the tourist type by their experience behavior are well illustrated, which can be useful for product development.

KEYWORDS
tourism experience management, travel decision, segmentation

INTRODUCTION
In order to more precisely delineate the needs of tourists and to ensure the success of product development, it is necessary to establish and continuously maintain the segmentation criteria system at the destination level, or at least at the product level, to modify it in accordance with environmental changes, and to define homogeneous demand groups based on them. With the rise of the experience-centered approach, it is worth considering the inclusion of the experience attitude, which determines the tourist's experience behavior, among the segmentation aspects.
Due to the headway of destination management methods, the psychographic tourist typification method associated with Plog, which has been valid for three decades, was supplemented with aspects that also take into consideration the life cycle of the destination, which were accepted by many tourism researchers (Piuchan 2018). How experiences are perceived between the allocentric and psychocentric personality poles of tourists have specific characteristics, the same potential content of experience evokes dynamic feelings in allocentric tourists, while in the case of psychocentric travelers it remains below the stimulus threshold.
When modeling the travel decision (Scott et al. 2014), among the many rational factors, less tangible, subjective factors, such as experience expectations, play an increasingly important role. Thus, when delimiting the segments in experience planning, it is also worth taking into account the aspect of experience attitude, and applying a kind of integrative approach recommended in tourism management (Pender – Sharpley 2005).

Segmentation of the market can be carried out according to grouping and descriptive properties. The former can be based on individual experience or research results, the latter on certain characteristics (e.g. social media use). Tourism is primarily characterized by geographical, demographic, psychographic, behavioural and product-based segmentation. There are also segmentation aspects specific to tourist trips, such as motivation, number of guests, length of stay, method of travel, distribution channels (Lőrincz – Sulyok 2017). However, as a result of the change in the consumer market, groupings based on new criteria have come to the fore. The success of segmentation is shown by the ability to stand out from competitors. Its essence lies in the offer adapted as precisely as possible to the needs of consumers, which also makes it unique at the market level (Personen et al., 2011). A unique, personalized offer requires a deeper understanding of the given consumer base, which can be achieved beyond traditional indicators by exploring the factors influencing behaviour. These include personality, attitude, lifestyle, product advantage and motivation. Motivation can be defined in many ways, yet in tourism it refers more to the internal drivers that inspire an individual not only to travel, but also to visit a particular destination, a particular attraction or event. Lifestyle segmentation aims to explore the influencing factors that influence consumer behaviour and purchasing habits (Füller – Matzler 2007). The advantage of lifestyle segmentation is that, unlike traditional principles, in a wider range, in addition to everyday activities, the opinions of consumers may also be relevant (Csóka – Hegedűs– Törőcsik 2020). Its effectiveness is even manifested in the fact that communication can be formulated more accurately by knowing the needs and expectations learned by lifestyle. In contrast, segmentation according to product advantages aims to anticipate future consumption preferences, on the basis of which the development of a supply that meets expectations can be made, however, the disadvantage of the method was that the mapping of travellers takes place before the trip, while the question relates to the time of the trip, and that the development of trends also implies a change in specific preferences. (Vargas et al. 2021).

In addition to demand, segmentation can also appear on the supply side in the case of programmes according to special accommodation needs (e.g. adult-friendly), demographic (e.g. young people) and target group-specific (e.g. interest) characteristics (Sziva 2016).

Theoretical grouping regarding motivations takes distinction between "push" and "pull" types (Crompton 1979). "Push" motivations make the traveler shove off from everyday life, "pull" motivations are impulsive, and the attractiveness of the destination affects the potential tourist. When generating the travel decision, these characteristics must also be taken into consideration. Motivation is influenced by the tourist's attitude, which is determined by his personality and needs (Hofmeister-Tóth 2006). Necessity fulfills its motivating function by provoking action to eliminate the feeling of lack. Consumer behavior during necessity satisfaction includes the decision-makings of the consumption process and the consumer's behavior (Fodor et al. 2012). The motivations underlying needs are determined by the mental and emotional processes of consumer behavior (Kiss 2016), which also includes experiential behavior. The motivations can also be deduced from Cohen's tourist categories (wanderer, explorer, individual mass tourist, organized mass tourist) (Puczkó-Rátz 2002). Ferner (1994) defined the various types of European holiday-makers, taking into account the lifestyle that forms the basis of motivation. He distinguished the young pleasure holiday-maker, the young family, a cautious, relaxing holiday-maker, an experience demanding holiday-maker and a classical cultural holiday-maker. Typification of tourists also follows market changes (Mester 2005), namely the demand and supply trends. From the travel decision-making process' point of view, the traveler decides on the place, mode of transport, accommodation, duration, time and method of the organization (Horner-Swarbrooke 2007), for which he takes into account the offered product elements and experience content.

In addition to motivation, factors influencing the travel decision include discretionary income and free time, which are dependent on the individual's personality. Beyond that, the tourist's personal motivation, social and economic environment, due to the impulses derived from them are crucial too. (Lőrincz–Sulyok 2017.) Taking all these factors into account, the coordination of several decision-making areas support the travel decision. After the necessity for travel has arisen, the potential tourist must decide on the product, service, and attractions they wish to utilise. Further important decision

factors about the desired trip are the selection of the destination to be visited, the decision on the mode of transport and on the mode of the participation, whether it is an independent or organized form. (Jancsik–Jászberényi–Kökény 2019).
Travel behaviour is a series of actions carried out by tourists in a given destination, including interactive communication processes. Its determinants include income, social status, socialization, fashion, and personality (Gonda 2016). The study of travel behaviour is timely in terms of identifying changing needs. It is a complex process, influenced by both external and internal factors. Age can be a key factor, the stages of which need to be treated separately according to income, leisure, family and health status, as well as along which the separation of generations also takes place (Shukur 2022). Taking into account life stages and generational boundaries is necessary to maximize the effectiveness of targeted communication. In addition to the difference in their travel needs/expectations, a thorough knowledge of their information-gathering habits is also a decisive factor in the realization of the promise of experience formulated for them. The development of technology is not only the existence of a particular device (infocommunications), but also the use of their preferred travel-related platforms. Formal information on social networking sites, photo and video sharing portals (facebook, twitter, instagram), blogs, tourist websites are mainly used by generations Y and Z. The preferred forms of orientation for younger age groups are also shared in 'social media' – individual, friendly experiences, opinions, videos –, but their content is more informal (Süli et al. 2019).
The tourist is an element of the subsystem of tourism with his ideas, attitudes, feelings, values, motivation and consumer habits, interpreted more broadly, his consumer behavior, which influence his travel decision. Along the lines of experience concepts, the experience attitudes that develop in relation to travel can be based on real experience pledges, or they can be ideas that are far beyond reality. Tourists' main travel motivations (stress-free relaxation, desire for activity, desire for intense experience and connection-making) can all have experience content, which appear with different weight and priority level in the individual's decisions, that is to say tourists have a unique experience attitude.
The tourist experience stem from the uniqueness of the services offered, from the tourist's feeling that differs from the day to day feelings, and is therefore extremely personal, both in terms of the sensation and its intensity. (Zátori 2018) The interest-based motivation required for travel decisions requires the creation of an experience concept and the formation of an experience attitude in the experience-centered approach, taking into consideration the various methods of tourism management (attraction management, product management, destination management, visitor management, etc.).
The experience centric approach appeared as a part of innovation management in tourism (Zátori 2016), which made it possible to grasp and define the experience in the first decade of the millennium. With the concept of experience innovation, he also defined the need for continuous renewal and experience planning. The experience is associated with actors participating in the provision of tourist services, but at the same time, the actors are judged differently according to their contribution to the acquired experience. Therefore, experience design, interactivity and customization are an important phases of service providers' experience management activities, contributing to how service providers can make experiences memorable (Zatori – Smith – Puczko 2018).
Understanding the tourist experience has been an important scientific task for a long time, a science that can be considered a frontier area from the tourism's point of view, such as sociology and cognitive psychology, has also dealt with it. The desire for a touristic experience stems from an inherent interest, which can come from the interference of novelty and/or familiarity, namely the known but not experienced, or the unknown can also motivate travel, with a greater proportion of the former. Another interesting connection is that travellers prefer to explore the experience of unknown destinations in a familiar social environment, namely with travel companions (Larsen et al. 2019). In order to maximize the sense of experience, it is therefore necessary to strengthen the application of tourism role theory, and individual roles are fundamentally influenced by belonging to segments.

MATERIAL AND METHOD

Consumer behavior studies are based on large-scale measurements. The factors influencing the travel decision can be explored before or after the trip. Attitude tests - whether they refer to motivation or the experience - typically belong to the first phases, while it is more appropriate to perform an analysis of the entire experience behavior after the trip. None of the methods is free from limitations, in the former one the reality content of the ideas, in the latter the emotional relationship linked to the realization can result in credibility problems.

In this research, we attempted to apply the former method through a sample of 630 entries (cleaned, containing complete answers), which we plan to expand in the future depending on the results. The questionnaire research was executed between the 10.01.-10.31.2021. online and on paper using a self-filling method, which was done by the help of interviewers (students majoring in Tourism and Hospitality at the University of Debrecen), in the former case the distribution was done by sharing links on a social portal or by e-mail.

Seven variables that play a role in the travel decision-making are analyzed according to 26 criteria in the segment ability. The criteria include the travel experience expressed in annual travel frequency, the method of the organisation of the trip according to the intensity of use of the package offers. The two topics were presented to the respondents as simple multiple-choice questions. Two ranking questions apply to the basic motivation of the trip and the degree of the desire to gain experience. Two questions regarding the self-identification assess the planning and thehabits of traveling together, as well as their organization, and finally, the gender that usually plays a different role in the travel decision is determined. When processing the database, descriptive statistical methods and cross-analysis methods were used to analyze correlations and segmentability on the MS Excel interface.

RESULTS AND DISCUSSION

The 630 respondents who completed the entire questionnaire successfully identified themselves and created preference rankings in terms of travel habits, motivations, and experience attitudes. Due to the large number of items in the sample, the distribution by gender is favorable, but in accordance with the characteristics of arbitrary sampling, female respondents are in a higher proportion, their share among the respondents is 61.6%. The relatively high rate of male respondents is also positive because, as a group-forming criterion, it is possible to identify the similarities and differences in the experiential behavior of the genders.

In terms of travel behaviour, the frequency of travel was determined first, the travel routine and experience will probably also be related to the experience attitude. Based on the single choice between the four forms of behaviour, the largest proportion (41.1%) of the respondents rarely, 1-2 times a year, take part in a trip that includes an overnight stay. The characteristics of the examined sample correlate to the travel frequency of the Hungarian population, very frequent trips per year are characteristic of only 10.6% of the respondents (Figure 1).

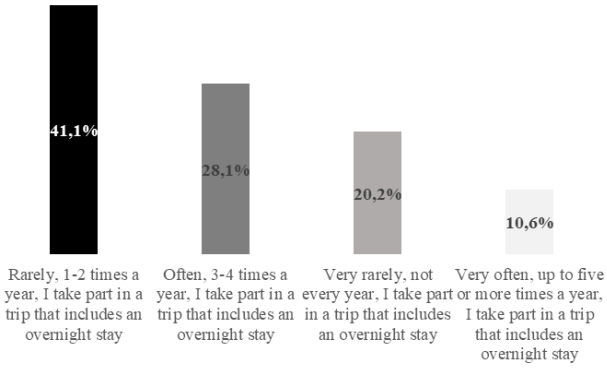

Figure 1: Distribution of respondents based on annual travel frequency (%), (n=630)
Source: authors' survey and editing, 2021.

Table 1: Relationships between travel frequency and respondents' gender (%), (n=630)

Gender / Travel frequency	Female	Male	Average distribution
Very frequent	8.2	14.5	10.6
Frequent	27.1	29.8	28.1
Rare	41.8	40.1	41.1
Very rare	22.4	16.5	20.2

Source: authors' survey and editing, 2021

Regarding the frequency of travel, the answers differ in the case of the two extreme behaviors, with a higher proportion of men identifying with very frequent travel. The equalization of this is not even, because the proportion of women is higher for the very rare number of trips. In the mid category, no marked difference can be identified by gender.
The choice of the method of travel organization is the circumstance that influences the travel decision, the more the tourist organizes his trip independently, the greater his expectations of experience arise as a result of the reviewed experience promises. Out of the four possible answers, the largest proportion (45.4%) of the respondents identified that they organize their own trip based on their travel experiences, they research it thoroughly, but they have to spend a lot of time on such preparation. Among the mid two categories, the more common (25.7%) is the traveller with some experience who chooses from packages, and the experienced traveller (19.1%), who organizes his trips easily, almost out of routine. 9.8% of respondents ask for help only for organization (Figure 2).

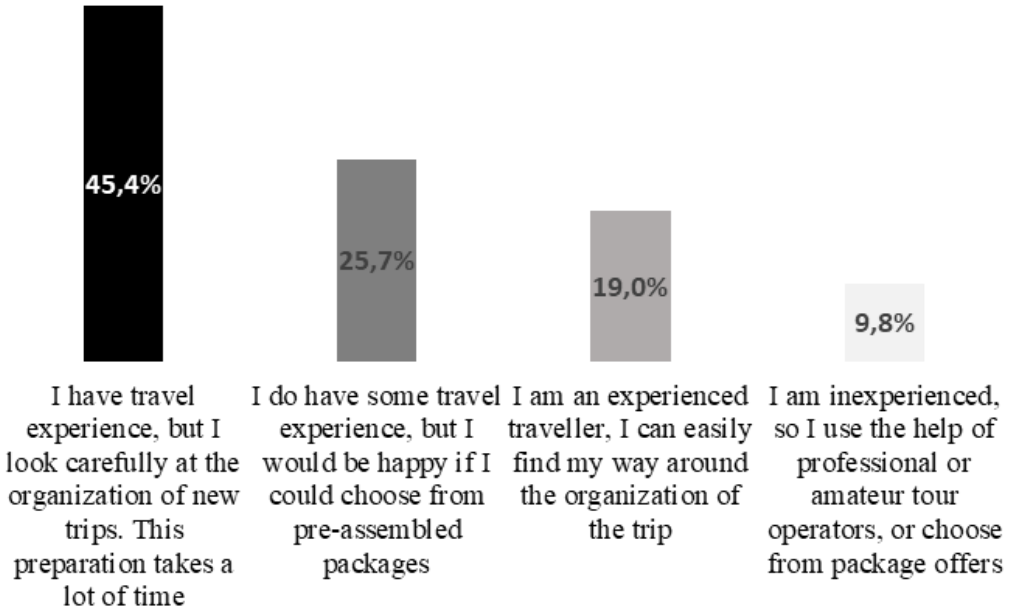

Figure 2 : Distribution of respondents according to the choice of travel organization method (%), (n=630)
Source: authors' survey and editing, 2021

Examining the relations, the choice of the method of travel organization is somewhat different for female and male respondents and for those who travel more often/less often (Table 2).

Table 2: Relationships between travel organization, travel frequency and respondents' gender (%), (n=630)

Travel frequency / Travel organization	Very frequent		Frequent		Rare		Very rare		Average distribution	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
I am an experienced traveller, I can easily find my way around the organization of the trip	5,8		7,3		4,9		1,1		19,1	
	3.9	8.7	4.6	11.6	5.2	4.5	0.8	1.7	14.4	26.4
I have travel experience, but I look carefully at the organization of new trips. This preparation takes a lot of time	3.0		14.6		20.2		7.5		45.4	
	2.6	3.7	16.0	12.4	19.6	21.5	9.0	5.0	47.2	42.6
I do have some travel experience, but I would be happy if I could choose from pre-assembled packages	1.6		5.1		13.0		6.0		25.7	
	1.5	1.7	5.6	3.7	13.9	11.6	6.2	5.8	27.6	22.7
I am inexperienced, so I use the help of professional or amateur tour operators, or choose from package offers	0.3		1.0		2.9		5.7		9.8	
	0.5	0	0.5	1.7	3.1	2.5	6.7	4.1	10.8	8.3

Source: authors' survey and editing, 2021

In the group of respondents who consider themselves to be experienced travellers and easily find their way around the organization of the trip overall (26.4%), as well as in the categories of very frequent travellers (8.7%), frequent travellers (11.6%) and very rarely travellers the incidence of men is above average (1.7%). Only women who rarely travel represent a higher than average proportion (5.2%). Most men chose this answer option. In the group of correspondents with travel experience, but who are usually thoroughly preparing for a new trip, the distribution of categories is equalised between genders, in the case of very frequent travellers (3.7%) and in the case of infrequent travellers, men (21.5%), in the case of frequent travellers (16.0%) and very infrequent travellers (9,0%) the proportion of women is above average. Overall, this behaviour is above average for women. Regarding the pre-organised packages in overall women tend to favour them more (27.6%), among the frequent (5.6%), rare (13.9%) and very rare travellers (6.2%) the proportion is also dominated by women, men who travel often gained only a minimal share in terms of this (1.7%). Women use the help of professional or amateur tour operators in three categories, so their overall choice is also above average (10.8%). Men who travel often represent an above-average proportion of respondents (1.7%). It can be concluded that men are more independent in terms of travel organization, women prepare more thoroughly and they also prefer package offers.

When ranking the four main travel motivations, the respondents most desire variety, to get out of everyday life, to a different environment, to other activities. Second in the ranking is the need for activity, getting to know new destinations, where they want to see as much as possible. The third motivation is stress-free relaxation, calm rest, and lastly the need to establish contact, to get to know people in the visited area (Figure 3).

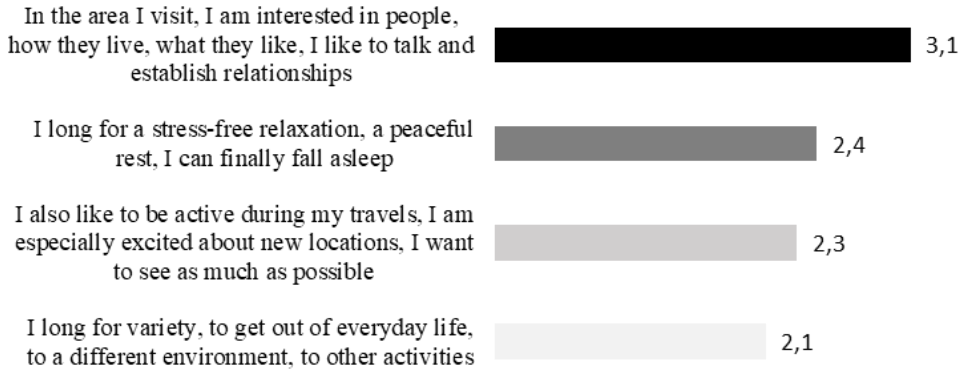

Figure 3: Average ranking of touristic motivations, (n=630)
Source: authors' survey and editing, 2021

The cross-analyses revealed that the motivation group of those who want stress-free relaxation and peaceful rest was chosen by men who travel very rarely and typically have no experience in organising trips. Women, who travel rarely, wish for diversity, for a break from everyday life, and for a change of environment, but at the same time they want to be assured of interesting, various leisure time activities by asking for organizational help. The need for activity and the excitement of new locations as a motivating factor is a typical choice for men who travel often and can easily organize their trips independently. The desire to make new connections and the interest in the people living in the visited area are more typical of men who rarely travel and have less travel experience.
The impact of experience on travel decisions is characterized by a ranking of experience attitudes (Figure 4). Respondents are primarily looking for experiences that they can have in company, the company guarantees the experience for them. The second element of the ranking is the intellectual experiential attitude, that is, the acquisition of new knowledge, skills, knowledge is an experience for those who prioritize it, they love beauty both in nature and in culture. Thirdly, they like to travel to places that offer unique, special, exotic experiences that they cannot even imagine in their place of residence. At the bottom of the ranking is the adrenaline attitude, that is, those who choose it are looking for experiences during the trip that are exciting, adventurous.

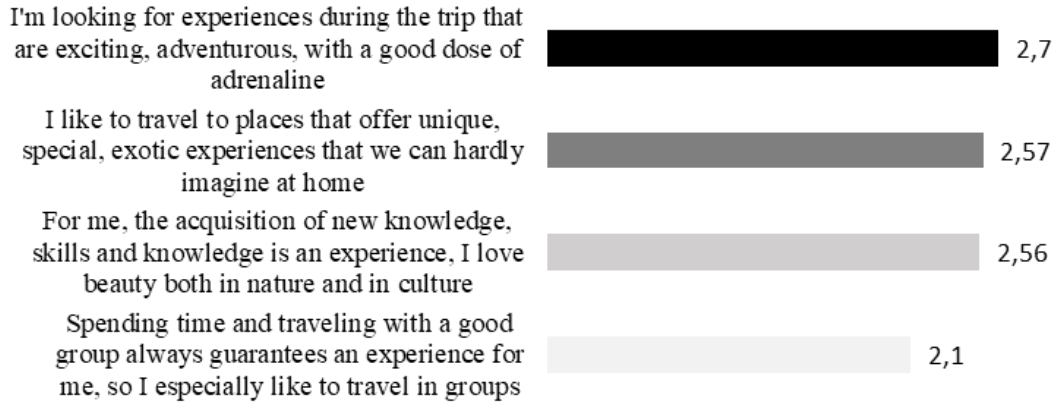

Figure 4: Average rank of experience attitudes involved in travel decision (n=630)
Source: authors' survey and editing, 2021

In the course of cross-analyses, the following segments were drawn with the highest incidence rates by criterion. Those who consider excitement, adventure and activities with high adrenaline levels to be experiences are mainly men who travel very often, who have no problem organizing travel on their own and have a higher proportion of their motivation to travel with the desire to connect. The intellectual experiential attitude, such as the acquisition of new knowledge, skills, knowledge, the love of beauty in nature and culture is mainly characteristic of women. This group belongs to the very rare travellers who are happy to use help with travel arrangements, but at the same time, as a motivation to travel, the need for activity appears in their decisions, which harmonizes well with the desire to get knowledge. The social experience attitude is more typical of men who buy luggage and rarely travel, whose motivation to travel is identified as a need for variety. Presumably, they plan the trip together thoroughly, although not part of the attraction, but joint activities. The segment, which hunts for unique, special, exotic experiences, includes women who travel frequently and prepare well for the trip, who do not despise the physical strain for this experience. The set experience expectations do not include the need for stress-free relaxation for either group, even though it was not last in the ranking. This may be due to a deficiency in the database in terms of age composition, older travellers, or its marginalisation may indicate a trend.
In terms of experience design, the largest proportion of respondents (42.2%) are limited to viewing only the most typical attractions, but they also want to feel the atmosphere of the place, so they do not rush. Also, a large proportion (31.7%) chose the option (31.7%) to definitely visit what is definitely to be seen in that place, for fear of not getting there again. Nearly a fifth (17.3%) of those surveyed do not plan ahead, and then the locals, or at the hotel, will tell them what to do and how to get there. The least typical experience planning behaviour (8.7%) is to organize with a travel agency and rely on a tour guide, because they believe that this expertise can make the most of a trip. If we break down these results according to experiential attitudes, the determinant nature of the social experience is striking (fig. 5). They do not want to experience the excitement and adventure alone in the same proportion as in the other cases, but this may also be justified by the need to organize adventure and extremity, and spontaneity is also a low proportion when visiting exotic places.

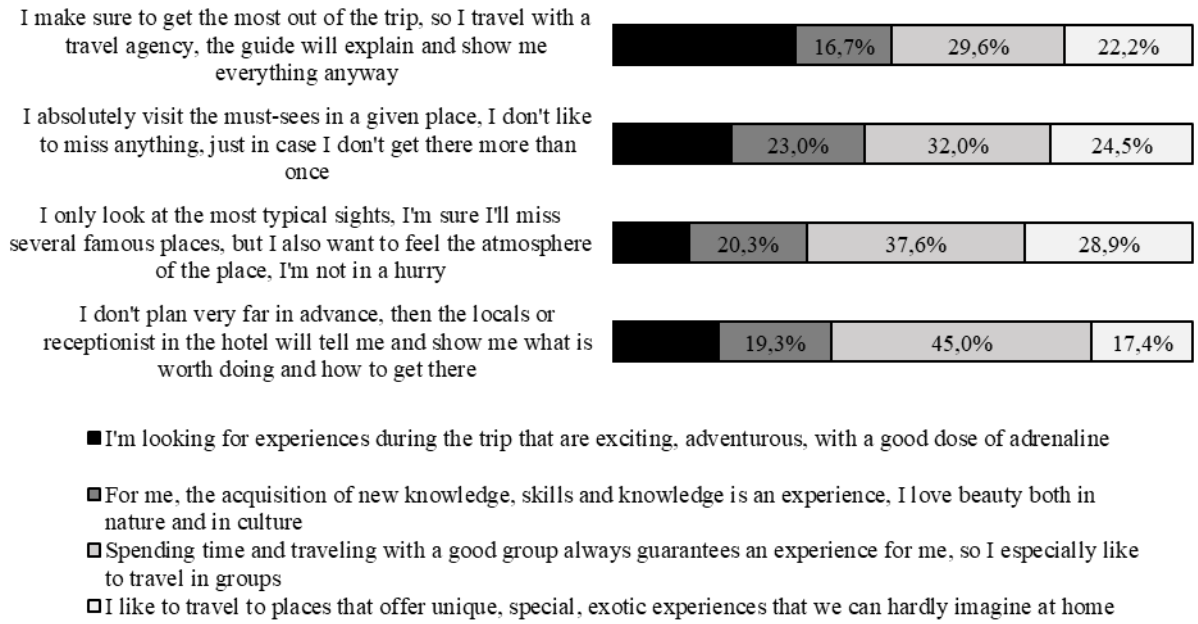

Figure 5: Relationships between experience expectations and experience attitudes (%), (n=630)
Source: authors' survey and editing, 2021

Due to the prioritization of the social experience, the analysis of the last question, the details of travel habits and age can also carry interesting results. Of the four categories of co-travellers, the highest mention rate is with young adults' preferred friends, or as a pair of trips, planning in public space (47.3%). The presence of family travellers, parents and siblings, shared experiences was typical in 36.3% of the respondents. The two other categories, which may have been due to the distortion of the sample composition, represented a much lower proportion, on the one hand, ad hoc and very planned pair travellers (9.5%) and, on the other hand, older but sociable travellers who therefore liked package holidays (6.8). The relationships between travel planning and experience behaviour by gender are presented in Table 3.

Table 3: Relationships between co-travellers and travel planning (%), (n=630)

Co-travellers / Planning of the trip	Young adult traveller	Family traveller	Traveling as a couple	Senior traveller
I make sure to get the most out of the trip, so I travel with a travel agency, the guide will explain and show me everything anyway	3.3	13.0	21.4	9.5
I absolutely visit the must-sees in a given place, I don't like to miss anything, just in case I don't get there more than once	3.0	15.1	13.8	4.6
I only look at the most typical sights, I'm sure I'll miss several famous places, but I also want to feel the atmosphere of the place, I'm not in a hurry	0.8	1.9	4.9	1.9
I don't plan very far in advance, then the locals or receptionist in the hotel will tell me and show me what is worth doing and how to get there	1.6	1.7	2.1	1.3

Source: authors' survey and editing, 2021

The largest proportion of couple travellers like to be sure and use travel agency or guide assistance, and their consumer behaviour is similar to that of ageing travellers. Older people also strive for safety when planning and organizing a trip, they like guided trips, their secondary segment is the group of people who maximize utility and want to see everything. Travelers with families want to see all the important sights at the visited location, a secondary segment can be considered experience maximizers due to the organization of a travel agency. Young people are also sure they want to make the most of the trip, but a similarly striking secondary segment can be identified as the all-in-one view, just in case you don't get to the scene again.

CONCLUSIONS

Travel planning, travel habits, experience expectations and attitudes, and results of surveys of motivations provided many opportunities to segment respondents. While the distribution of choice of experience attitudes varied, travel planning also showed relative autonomy, with the organization likely shifting toward travel agencies for safety and utility maximization reasons, even for younger travellers with a group of friends. Of course, this no longer means exclusively companies with a branch network and office space. OTAs (Online Travel Agency) can provide the same services, which seems to be suitable for young people. The other phenomenon is the social nature of travel, which can be grasped and emphasized in the case of social experience and co-travellers. The segments limited by the experience expectations and experience attitudes should be taken into account during product development and the compilation of packages. In the case of package offers, it is convenience rather than price advantage that can justify a high rate of choice. The undoubted advantage of

segmentation is targeted communication, which can be facilitated by segments based on the aspects of motivations and experiential behaviour.

REFERENCES

1. COHEN Scott A. – GIRISH Parayag – MOITAL Miguel (2014) Consumer behaviour in tourism: Concepts, influences and opportunities, *Current Issues in Tourism*, 17(10), 872-909, https://doi.org/10.1080/13683500.2013.850064
2. CROMPTON John (1979) Motivations for Pleasure Vacation. *Annals of Tourism Research*, 6(4), 408-424. https://doi.org/10.1016/0160-7383(79)90004-5
3. CSÓKA László – HEGEDŰS Réka – TÖRŐCSIK Mária (2020): Az életstíluscsoprtok sportcélú utazásai, *TVT Turisztikai és Vidékfejlesztési Tanulmányok*, 2020 V(1). 34 – 46. https://journals.lib.pte.hu/index.php/tvt/article/view/4751
4. FERNER Fritz-Karl (1994): *Idegenforgalmi marketing*. Műszaki Könyvkiadó, Budapest. pp. 34-35. ISBN 963 160 449 7
5. FODOR Mónika – FÜREDINÉ KOVÁCS Annamária – HORVÁTH Ágnes – RÁCZ Georgina (2012): *Fogyasztói magatartás*. Perfekt Kiadó, Budapest pp. 13-18. ISBN 978 963 394 678 7
6. FÜLLER Johann – MATZLER Kurt (2007): Customer delight and market segmentation: An application of the three-factor theory of customer satisfaction on life style groups, *Tourism Management*, Vol.29 (1), pp.116-126. https://doi.org/10.1016/j.tourman.2007.03.021
7. GONDA Tibor (2016): *A turisztikai termékfejlesztés elméleti alapjai*, PTE KPVK, Pécs, p. 36. ISBN 978-963-429-108-4, https://mek.oszk.hu/16600/16658
8. HOFMEISTER-TÓTH Ágnes (2017): *A fogyasztói magatartás alapjai*. Chapter 3.3.1. Budapest, Akadémiai Kiadó Kft. ISBN 978 963 05 9889 7 https://mersz.hu/dokumentum/dj241afma__61/
9. HORNER Susan – SWARBROOKE John (2016): *Consumer behavior in tourism*. Part 3: Typologies of tourist behaviour. Butterworth-Heinemann, Linacre House, Oxford, https://doi.org/10.4324/9781315795232
10. JANCSIK András – JÁSZBERÉNYI Melinda – KÖKÉNY László (2019): *Az utazásszervezés új dimenziói*. Akadémiai Kiadó, ISBN 978 963 05 9953 5; ISSN 2732 1495 https://mersz.hu/dokumentum/m523utszerv__20
11. KISS Mariann (2016): *Alapmarketing*. Chapter II.2.B Akadémiai Kiadó Kft., Budapest. ISBN 978 963 05 9827 9 https://mersz.hu/dokumentum/dj152a__16/
12. LARSEN Svein – WOLFF Katharina – DORAN Rouven – ØGAARD Torvald (2019): What Makes Tourist Experiences Interesting. *Frontiers in Psychology* 10:1603. https://doi.org/10.3389/fpsyg.2019.01603 PMID: 31447718; PMCID: PMC6692482.
13. LŐRINCZ Katalin – SULYOK Judit (ed.) (2017): *Turizmusmarketing*. Akadémiai Kiadó, Budapest https://doi.org/10.1556/9789634540601 https://mersz.hu/hivatkozas/dj277tm_62_p3/#dj277tm_62_p3
14. MESTER Tünde (2004) Turisztikai trendek Európában. *Turizmus Bulletin* VII(4) 79-87. https://mtu.gov.hu/documents/prod/T_bulletin_2003_04.pdf
15. PENDER, Lesley – SHARPLEY, Richard (ed.) (2005): *The Management of Tourism*. SAGE Publication Ltd, London. pp.8-9. ISBN 0 7619 4021 9
16. PIUCHAN, Manisa (2018): Plog's and Butler's Models: a critical review of Psychographic Tourist Typology and the Tourist Area Life Cycle. *Turizam*. 22(3) 95-106. https://doi.org/10.5937/turizam22-18835
17. PUCZKÓ László – RÁTZ Tamara (2001): *A turizmus hatásai*. Aula Kiadó Kft., Budapest pp. 29-31. ISBN 963 9345 11 3
18. SHUKUR, Atakishiyeva Leyla (2022): Behavioral characteristics of consumers of tourism products, International, *Journal of Innovative Technologies in Economy*, 1(37), https://doi.org/10.31435/rsglobal_ijite/30032022/7786
19. SÜLI Dorottya – TÓTH Bettina – NAGY Gyula – MARTYIN-CSAMANGÓ Zita (2019): *Az utazással kapcsolatos attitűdök és vélemények Magyarországról mint turisztikai desztinációról az*

Y és Z generáció körében, In: CSAPÓ János, GONDA Tibor, RAFFAY Zoltán (ed.): Turizmus, fogyasztás, generációk, Pécsi Tudományegyetem Közgazdaságtudományi Kar, Pécs, pp. 20-34. ISBN: 9789634293880 http://publicatio.bibl.u-szeged.hu/15449/13/30673169.pdf
20. SZIVA Ivett (2016): Turisztikai desztinádók márkázása I. - Hazai desztinádók márkapozícionálása, *MARKETING & MENEDZSMENT* 2016 (3-4). 114-123. https://journals.lib.pte.hu/index.php/mm/article/view/890
21. VARGAS, Elena Parra – DE-JUAN-RIPOLL, Carla – PANADERO, Marta Bueno – ALCANIZ, Mariano (2021): Lifestyle segmentation of tourists: the role of personality, *Heliyon*, 7. https://doi.org/10.1016/j.heliyon.2021.e07579
22. ZÁTORI Anita (2018): *Élménymenedzsment a turizmusban*, Akadémia Kiadó, Budapest. ISBN 978 963 454 232 2 https://mersz.hu/hivatkozas/m370emt_1_p4/#m370emt_1_p4
23. ZATORI Anita – SMITH Melanie – PUCZKO László (2018): Experience-involvement, memorability and authenticity: The service provider's effect on tourist experience, *Tourism Management*, 67, 111-126. ISSN 0261-5177, https://doi.org/10.1016/j.tourman.2017.12.013. https://www.sciencedirect.com/science/article/pii/S0261517717302765
24. ZÁTORI Anita (2016): *Experience-Centric Approach and Innovation*, In: SOTIRIADIS Marios – GURSOY Dogan. (eds.): The Handbook of Managing and Marketing Tourism Experiences, Emerald Group Publishing Limited, Bingley, pp. 21-44. https://doi.org/10.1108/978-1-78635-290-320161002

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MÁRTA KÓRÓDI:
SPECIFIC FEATURES OF THE SERVICE PROFILE OF QUALIFIED MEDICAL SPA HOTELS IN HUNGARY

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ABSTRACT

Medical spa tourism is based on the trust of the guest, who trusts in the power of nature and the expertise of doctors. Qualified medical spa hotels are a kind of guarantee for the guest in the field of medical spa services. They are located in a health resort, using natural healing factors in their own medical department, or provide therapeutic options under medical supervision as a service of another medical institution. However, qualification does not mean evaluation or ranking, but the acceptance of the registration application by fulfilling the requirements. Hotels with a wellness profile can also offer medical spa services, just as medical spa hotels can also provide wellness services. The third branch of health tourism, medical tourism, which typically does not use natural healing agents, can appear in the profiles of both hotels. The resulting diversified service offer raises the question of how typical the medical service offer of medical spa hotels is, and whether specific service profiles can be determined based on the service mix. The results of the evaluation forms of the research based on the observational method analysing the offer of the forty qualified medical spa hotels operating in Hungary provide an opportunity for this categorization. Descriptive statistical methods make it possible to group hotels on the basis of deviations from the average, standard deviations, and concentration, separating those with a medical spa profile, those with a wellness profile, those with a balanced profile, and those without marked profile characteristics. When considering the reasons for the differences, in addition to supply (economy, organization) and demand (changing clientele), marketing communication aspects also arise.

KEYWORDS

health tourism, medical spa hotels, medical position, wellness position, qualification

INTRODUCTION

Health tourism is one of the most dynamically developing tourism products of the beginning of the third millennium, a kind of manifestation of the appreciation of health. This is true for both prominent product groups, wellness and medical tourism, although there is no doubt that the rate of development of the former far exceeds that of the latter. At the same time, the desire to heal is just as strong a motivation as the desire for fitness or beauty. In addition, the medical services can be paralleled with the awareness of illness, which some of the guests try to avoid, while they would like to use the treatments. The problem can be solved by using the name wellness instead of the medical adjective, recommending the procedures as wellness treatment instead of supported medical treatment as unsupported. Wellness guests are also more open to medical wellness treatments instead of medical treatments, due to its connection with illness and advanced age.

Among other things, due to the emotional background of the interpretation of the concept of the clientele, a kind of reorganization can be experienced in terms of the service mix of medical hotels, which can also be justified by multi-legged position. It is a strategic decision for medical spa hotels to maintain a clean profile, to specialize in medical treatments that best suit their capabilities (curative factor, personal and technical capacity for treatment). The other direction of development could be

the assumption of a mixed profile based on the curative factor, expanding the original with new segments and new services. The downward trend in the number of treatments can be explained by a number of external effects, the uncertainty associated with the general recession also has a dampening effect on demand, and the pace and extent of the post-pandemic recovery also fall short of expectations. At the same time, the appreciation of health and the desire to preserve it influence the use of natural methods. The increase in musculoskeletal problems of the aging society requires the renewal of the organization of spa treatments with the optimal and efficient use of curative factors. The combined consideration of optimization and efficiency predicts a price increase for subsidized treatments with an unchanged subsidy content, and a decrease in the number of medical guests, which makes the expansion of the profile more and more impossible to postpone. The reorganization of the international market (the lack of Russian, Belarusian and Ukrainian guests) requires communication renewal and an active appearance affecting new markets, before which the composition of the service mix and the modification of the image must be decided. In this period full of problems, the situation analysis study was made on the elements of the service mix and the communicated profile of the qualified medical spa hotels, so that even the name itself is misleading by inserting the commonly used term „spa" into the names of the hotels.

The National Tourism Development Strategy 2030 Tourism 2.0 (2020) (hereafter NTDS) calls medical tourism a product with unique features and traditions, the advantage of which is services with a favourable price-value ratio. At the same time, the document states that the domestic demand for health tourism is also eroding, and the domestic spa culture is constantly disappearing. The domestic senior target audience that goes to the spa is narrowing, it does not represent a sufficient size of paying demand, so it is not possible to build on it in the medium and long term from a tourism perspective. Most of the classic spa services and treatments associated with spa culture are not attractive to young people.

THEORETICAL BACKGROUND

The literature was compiled from concepts related to medical services and other treatments offered in health tourism in accordance with the interpretations after the turn of the millennium. A well-defined and important part of health tourism is medical spa ourism, which was dominant until 2005, because all trips motivated by the use of medical or spa treatments belonged to this category. Then, in the development documents, wellness tourism became distinguishable from medical tourism, broadening the interpretability of health tourism. Medical spa tourism has also become differentiated, medical tourism has become separable, which primarily offers clinical procedures and surgeries based on non-natural curative factors (Boros – Printz-Markó – Priszinger 2011). Wellness tourism has also become differentiated, the leisure and recreational nature has been expanded with the holistic approach, promoting the harmony of the spirit in addition to the body, and the medical wellness branch, which also includes therapies (MT ZRT 2014; Smith –Puczkó 2010).

However, according to the latest interpretation of health tourism, clinical medical tourism is completely separate, but at the same time, this new approach leaves the relationship between medical spa and wellness tourism unchanged (Fábián 2021). From the point of view of natural curative factors as a resource, this interpretation is clearer.

The systematics is complemented by the wording, interpreted as medical spa tourism, for example, a temporary stay outside the permanent residence, in a medical resort or medical facility, the purpose of which is to cure an existing illness by applying medical remedies (Donka – Sztrunga 2018). This is the purpose of medical spa tourism facilities, which offer health, medical and tourist services to guests. It can be divided into several parts: disease prevention, medicine and rehabilitation. Among the medical and tourist services typically based on natural curative factors (medicinal water, medical cave, medical mud, medical climate), the main focus is on medicine, which is complemented by more general tourist services and attractions (OEFS 2007).

Medical tourism includes visits to health resorts based on natural curative factors and services based on curative factors (spa baths, sanatoriums). In this concept, the focus is on health centres, which are

based on concentrated health technology and knowledge. Medical services are becoming more and more independent. The tourist's motivation in medical spa tourism is healing and rehabilitation, they primarily require medical treatments, but they also have a demand for leisure services (Bakucz et al. 2016).
Medical tourism means the use of services available at a medical service centres or a medical resort, usually with a specified minimum length of stay, typically for the purpose of curing specific diseases. Medical tourism is also characterized by the fact that guests (persons who often consider themselves to be patients rather than tourists) use the given services with a medical prescription (Boros – Mondok – Várhelyi, 2012). Treatment and prevention are characteristic. It is financed by mixed domestic and foreign health insurance companies, and the medical tourist can pay for his stay and services himself. In medical tourism, the cure, treatment, or follow-up of a specific disease is typically connected to the use of remedies based on natural curative factors (medicinal water, medicinal cave, medicinal mud, microclimate), which are primarily available in spas, medical institutions, or medical institutions (Győri et al. 2013). Medical tourism was formulated as a complex product in the past as well as today. As an attraction, the central role is played by the preservation and improvement of the state of health.
The range of medical services in Hungary is limited to spas, hotels and medical institutions, because the certification guarantees the guest and patient a proven therapeutic effect. Many hotels label their medical spa services or spa services with the same name "spa". Since the term is a collective category, it is correct to use it in both contexts. A spa is a type of health service centre, a facility offering traditional and other complementary medical services within the framework of a health institution. Spa (Sanus Per Aqua) means health by water, a collective term that includes facilities that have a positive effect on guests, such as calming, healing, making the users healthier, more beautiful and more balanced. According to the ISPA (International Spa Association) definition: an institution providing a wide range of health, wellness and beauty treatments and services provided by professionals, with an emphasis on nutrition and awareness (Vámosiné 2013). Types of spas related to medical tourism, e.g. the medical spa, which is a combination of hotel and medical services, in which classic medical interventions (e.g. medical treatments for musculoskeletal diseases) and new trends in medicine (microdermabrasion, plastic surgery, etc.) can play a role. Another featured spa is the mineral spring spa, which offers medical treatments based on hot spring water. Both the physical (high temperature, buoyancy) and chemical (richness of minerals, trace elements) properties of natural spring water are used during the treatments (Gonda 2016).
The guarantee of availability of medical services is the qualification of medical hotels. The primary superstructure of medical tourism is made up of medical hotels and catering facilities, and the secondary superstructure is made up of retail units, banking and other personal services. The medical function also plays a significant role in the concept of the medical spa hotel as a hotel profile. A medical spa hotel is a hotel that meets the requirements set for the hotel, and also provides its guests with therapeutic opportunities, mainly by using natural curative factors in its own medical department, involving the additional services of an independent or other medical institution, under medical supervision, and meets the conditions set out in the Decree on Natural Curative Factors (74/1999 (XII. 25.) EüM decree on natural curative agents).
In terms of qualification, spa hotels belong to the group of spa institutions. In addition to the mandatory classification as a hotel, they must meet the requirements related to the use of the name spa institution and must go through a licensing procedure, as a result of which they can use the name referring to the medicinal nature of the institution carrying out healing or rehabilitation activities with the use of natural curative factors. The owner of the institution can submit the application for the license to the Government Office of the Capital City of Budapest with pedigree data and supporting documentation. Many specialized authorities participate in the procedure. There are currently 42 qualified medical spa hotels in the register (*Gyógyszállók, 2023*).

MATERIAL AND METHOD

In-depth interviews of hotel decision-makers performing product development tasks, as well as website monitoring in the case of hotels that display the offer on their websites, can be considered an adequate method for uncovering the problem indicated in relation to the profile-specific composition of the service mix (Boncz 2015). In the research, the latter was applied, that is, a content analysis of the range displayed on the websites of the systematically selected sample was performed (Lehota 2001; Gyulavári et al. 2017) striving for objectivity, which was ensured by an evaluation sheet tested in advance with a testing procedure. The measurement was conducted in March 2023, and can be considered a snapshot of the current situation at that time regarding the services of qualified medical spa hotels in Hungary. The created evaluation form contained 40 aspects, among which the treatments supported by the OEP for the insured patients (the medicinal pool bath, the medicinal water bath, mud wrap, weight bath, carbonated bath, medical therapeutic massage, underwater water jet massage, underwater group therapeutic exercise and the complex spa medical care) were summed up with a double weight, and the measurement of specialist care was separated by specialty. During the pre-testing, five wellness hotels in the largest health resorts were selected (Park Inn by Radisson Zalakaros Resort & Spa, Bonvital Hotel Wellness & Gastro, Hévíz, Saliris Resort Egerszalók, Hotel Atlantis Hajdúszoboszló, Wellness Hotel Gyula). Based on the experiences of the trial measurement, the number of criteria to be qualified was reduced, for example, with complex spa care due to the lack of complexity and comparability, and by combining specialist care into one criterion, so eight services were weighted into account. And eight, including two other, unnamed medical services, with a single weight, resulted in the 24 points available for the medical spa profile.

In the case of wellness treatments, the aromatherapy sauna has been merged into the Finnish sauna, and the fitness into the active movement therapy. On the other hand, it increased with two other treatments that were not mentioned in terms of the topic. The three types of sauna, salt cabin, whirlpool, neck and back massager, fitness and movement therapy and alternative massages were taken into account with double weight. Thus, the maximum score of the wellness profile became 24 points. Thirty-two measurement aspects were finalized.

During the measurement, two hotels (Gróf Apponyi Castle Hotel and Thermal Hotel Gara) could not be taken into account due to their indefinite closure and unavailability of services. Hotels that are temporarily closed or under renovation will display their services due to the upcoming opening, which has reduced the number to forty items. Several simple descriptive statistical methods were used for the analysis (Kóródi 2011) with Microsoft Excel support.

The analysis began by summing up the scores obtained during the evaluation, ranking the hotels, calculating the average health tourism potential and creating groups based on the deviation from the average, and then continued with the interpretation of the hotels' position. Examining the services provided the opportunity for ranking and proportion analysis, similar to the summation of occurrence values. By separating the services according to their medicinal and wellness nature, an opportunity arose for a complex analysis. Depicting the deviation of the average rating values according to the two criteria from the average, he divided the examined hotels into groups characteristic of the quarters of the coordinate system. The resulting positions can influence decisions about development directions.

RESULTS AND DISCUSSION

Based on the scores obtained for the evaluated services, the examined qualified medical hotels can be divided into five categories according to the service potential compared to the average (Figure 1), they can be classified into outstanding, above average, average, below average and insignificant groups. In terms of their territorial location, the hotels in Hévíz and Sárvár are dominant at the beginning of the ranking, but there are also hotels in the below-average groups from the same areas, so the service potential does not depend solely on the specificity of the medicinal water. The relative deviation of the range of services is high (0.335), divided into medical and wellness-type services,

the average occurrence of the former is smaller (13.35) and the relative deviation is larger (0.54), the latter is higher on average (15.53), on the other hand, its standard deviation is lower (0.32), which, from the point of view of the topic, may also predict a better use of the opportunities inherent in wellness services.

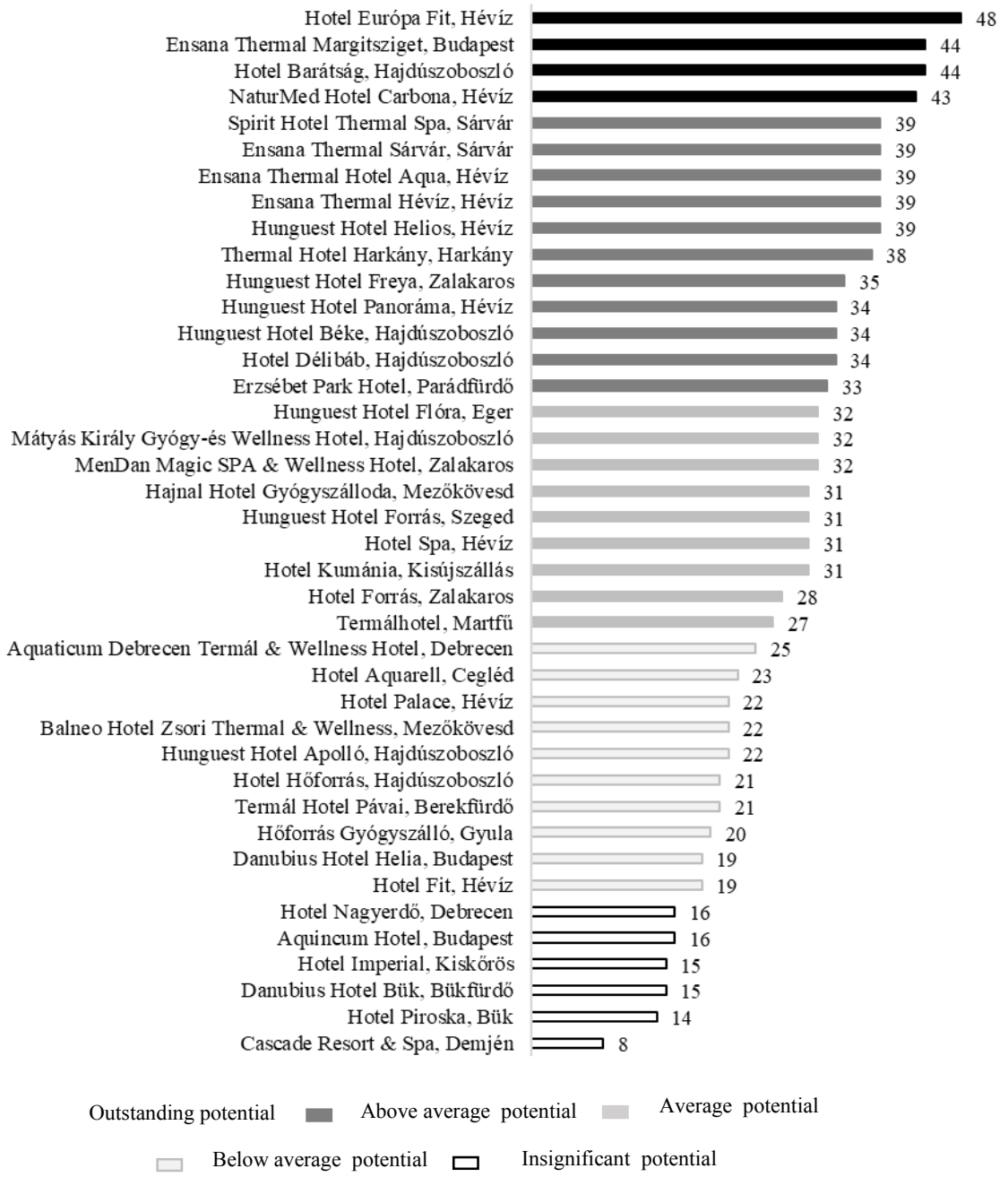

Figure 1: Specific service potential of qualified medical spa hotels in Hungary (n=40)
Source: author's compilation (n=40)

Medical and wellness services are also significantly concentrated, nine to nine of the sixteen services cover nearly three-quarters of the offered services, according to the ranking of medical services, the spa with medicinal water, specialist care, mud wraps and medical therapeutic massage belong to the top quartile. In the case of wellness services, the frequency of alternative massages, Finnish sauna, whirlpool/jacuzzi and steam bath is outstanding. At the end of the ranking are the changing baths and lifestyle counselling, with little occurrence, even though their therapeutic usefulness is unquestionable (Figure 2), (Figure 3). Examining the concentrated occurrence of services, the

cumulative value sums calculated from the ratings and the cumulative frequencies show a strong concentration (GINI index: 0.554), i.e., most of the services occur in highly rated hotels.

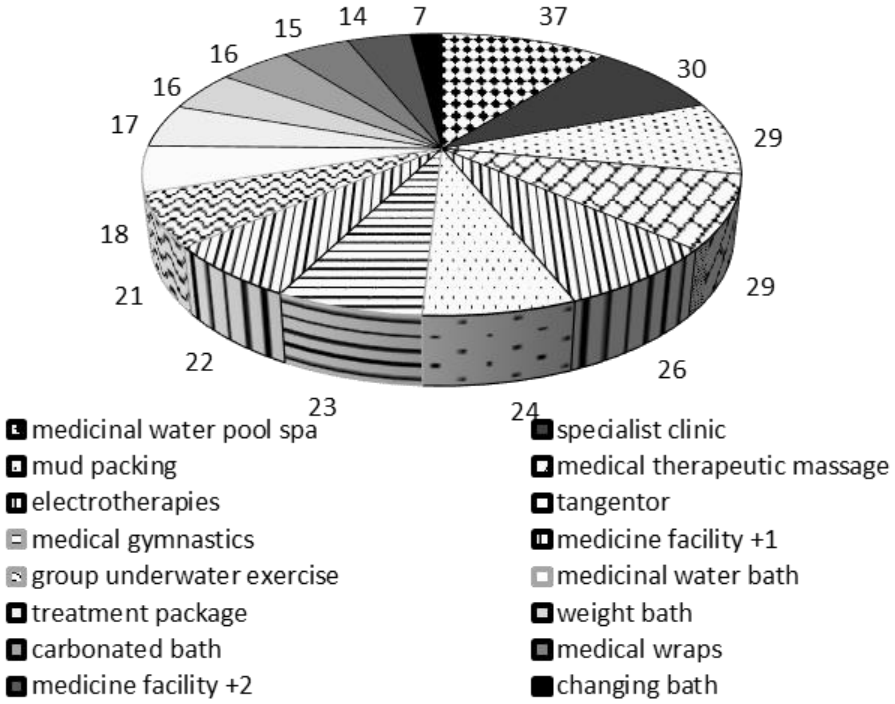

Figure 2: Occurrence of medical-specific services in the qualified medical spa hotels in Hungary
Source: author's compilation (n=40)

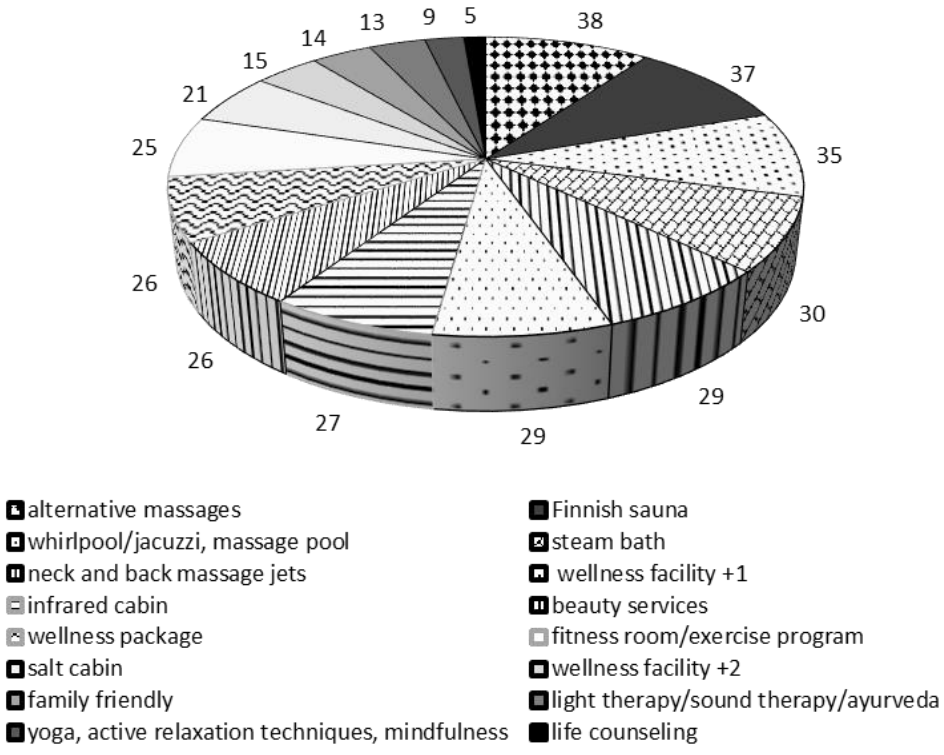

Figure 3: Occurrence of wellness-specific services in qualified medical hotels in Hungary
Source: author's compilation (n=40)

The appearance of services in the offer is a strategic decision, the provision of material and personal conditions has an organizational and management consequence. Therefore, the therapeutic potential and wellness potential of each hotel resulting from the evaluation of the selected medical and wellness services also indicate the market effects. Considering the average of both indicators as an axis, conclusions can be drawn about the profile of the hotels according to their services based on their location relative to the average. In the coordinate system (Figure 4), the individual points indicate the position of the hotels, there are only two hotels in the same position with the coordinates (15;16) Hotel Kumánia in Kisújszállás and Hajnal Hotel Gyógyszálloda in Mezőkövesd. The unique position of hotels also makes it possible to identify the primary competitors.

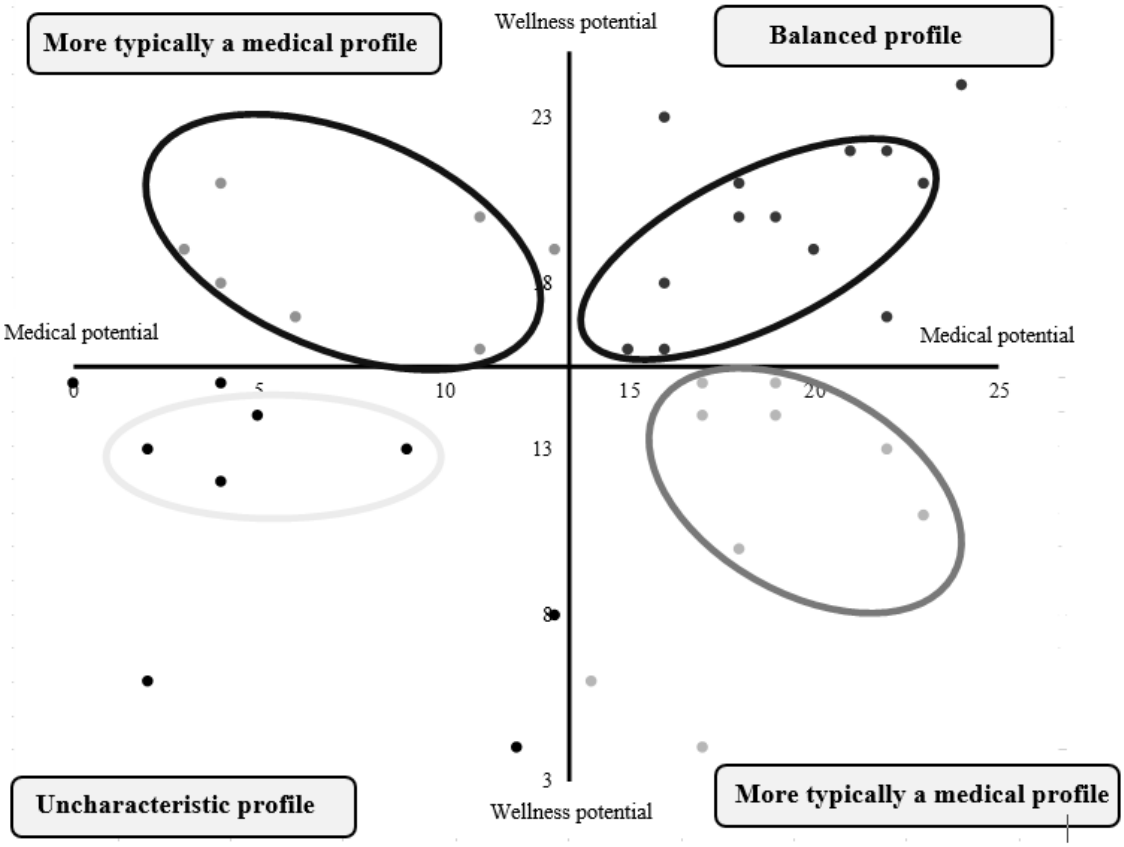

Figure 4: Medical and wellness profile characteristics of the qualified medical hotels in Hungary
Source: author's compilation (n=40)

In relation to the axes formed by the average of the potentials, the hotels that achieve an above-average rating for both medical and wellness services can be considered to have a balanced profile. This includes 14 of the forty hotels (35%) in a varied territorial distribution, but with a dominance of Hévíz. Hotels with a high therapeutic potential, but a lower than average wellness potential (9 hotels) are among those with a more typical therapeutic profile, these are without exception providers of large spas, including those from Hévíz, Hajdúszoboszló, Zalakaros, Gyula (Table 1). Hotels with above-average wellness potential, but below-average spa potential, were included in the "typically wellness profile" group (7 units), 1 hotel each of the spa resorts was placed here. The below-average medical and wellness potential does not show a marked profile character, so 10 hotels were classified in the "uncharacteristic profile" group, several of which can complement their own services with existing services in the settlement, which does not exclude the choice of the guest.

Table 1: Profile characteristics of the qualified medical hotels in Hungary based on the occurrence of specific services

Balanced profile		**More typically a medical profile**	**More typically a wellness profile**	**Uncharacteristic health tourism profile**
Ensana Thermal Hotel Aqua, Hévíz	Hunguest Hotel Béke, Hajdúszoboszló	Hotel Délibáb, Hajdúszoboszló	MenDan Magic SPA & Wellness Hotel, Zalakaros	Hotel Piroska, Bük
Ensana Thermal Hévíz, Hévíz	Spirit Hotel Thermal Spa, Sárvár	Hunguest Hotel Freya, Zalakaros	Hunguest Hotel Forrás, Szeged	Hotel Imperial, Kiskőrös
NaturMed Hotel Carbona, Hévíz	Hunguest Hotel Flóra, Eger	Hotel Forrás, Zalakaros	Termálhotel Martfű	Hotel Palace, Hévíz
Hotel Barátság, Hajdúszoboszló	Ensana Thermal Margitsziget, Budapest	Hotel Spa, Hévíz	Hunguest Hotel Apolló, Hajdúszoboszló	Hotel Hőforrás, Hajdúszoboszló
Thermal Hotel Harkány, Harkány	Hajnal Hotel Gyógyszálloda, Mezőkövesd	Hőforrás Gyógyszálló, Gyula	Balneo Hotel Zsori Thermal & Wellness, Mezőkövesd	Hotel Nagyerdő, Debrecen
Hotel Kumánia, Kisújszállás	Hunguest Hotel Helios, Hévíz	Termál Hotel Pávai, Berekfürdő	Aquaticum Debrecen Termál & Wellness Hotel, Debrecen	Hotel Fit, Hévíz
Hotel Európa Fit, Hévíz	Ensana Thermal Sárvár, Sárvár	Erzsébet Park Hotel, Parádfürdő	Hotel Aquarell, Cegléd	Danubius Hotel Helia, Budapest
		Hunguest Hotel Panoráma, Hévíz		Aquincum Hotel, Budapest
		Mátyás Király Gyógy-és Wellness Hotel, Hajdúszoboszló		Cascade Resort & Spa, Demjén
				Danubius Hotel Bük, Bükfürdő

Source: author's compilation (n=40)

Among the hotels with a balanced profile within the established groups, three outstanding hotels can be identified based on the diagram. The destination is different, from Hévíz, among the nine certified medical spa hotels are Hotel Európa Fit and NaturMed Hotel Carbona, among the six hotels in Hajdúszoboszló is Hotel Barátság, from the capital Ensana Thermal Margitsziget. Two hotels belonging to the Hunguest Hotels chain from the group with a more typical medical profile, Hotel Panoráma in Hévíz and Hotel Freya in Zalakaros, occupy the best positions. The Aquaticum Debrecen Termál & Wellness Hotel and the Hunguest Hotel Forrás in Szeged have a strong wellness profile, thanks to the adventure spa complex in the immediate vicinity of both. However, it is interesting that in terms of the wellness potential of both, there are hotels in the balanced category that surpass it. From the point of view of the investigation, Cascade Resort & Spa Demjén does not have any striking features, which may be a consequence of the new type of online communication, which does not detail the services, but conveys promises of experience with its dynamic visual content.
It is worth examining separately the development of the profile of the hotels in Hévíz, Zalakaros and Hajdúszoboszló. Of the 9 hotels in Hévíz, five have chosen a balanced profile, diversification, two have a specialized profile, and two are probably still in the process of making a strategic decision.

However, none of the certified spa hotels has a significant wellness profile, the traditional Hévíz cures have a stable market, but at the same time they are expanding their services to rejuvenate the clientele. Of the six qualified spa hotels in Hajdúszoboszló, they are included in all categories, two each between the balanced and the marked medical profile, and one each between the wellness and the slightly marked profile. This result indicates the openness and willingness to expand the clientele. A separate group can be selected from hotels with average profile characteristics, for which more pronounced profiling can probably be solved through communication.

CONCLUSIONS

Based on the results of the research, strategies can be recommended for individual medical spa hotels according to their position in terms of product development, depending on the strategy for the target market segments. In communication, however, it is advisable to separate the three branches of health tourism, possibly emphasizing medical wellness as the fourth. The medical wellness approach entrusts the use of medical support to the guest, which presumably depends on the success of the treatments. Several medical spa hotels offer treatments that can be used by the local population, presumably in order to utilize the medical capacities. This can be increased by welcoming guests from other hotels. Taking economic aspects into account, the relative spending of the wellness guest is higher, so striving for a balanced service profile can be a realistic goal as long as the subsidy content of the subsidized treatments remains unchanged. The multi-profile also allows more room for adaptation, for example to replace guests from the East who are absent due to the war. Diversified product development as set out in the NTS 2030. Tourism 2.0 document (2022), i.e. the conscious specialization of the product range of spas and spa resorts, profile cleaning, as well as marketing and sales promotion, can also represent the further path of development for spa hotels. This contributes to the domestic revival of health tourism culture and its repositioning abroad, to a leap in service level and guest experience.
The investigation coincides with the findings of the strategy, according to which spa medicine is no longer a successful sector in Hungary due to the declining (and price-sensitive) clientele and stagnant health insurance support levels. In spas, a smaller share of the revenue is typically linked to medicine, as a result of which the development of the spa departments lags behind, and the level of service decreases. In general, it is easier to satisfy the needs of domestic experience bathers than to sell a spa treatment package to foreign insurers, which is well reflected in the product development decisions of the domestic service provider management.

REFERENCES

- BAKUCZ Márta – BOZÓTI András – HAJNAL Klára – KÖBLI Ádám (2016): *Elméleti háttér*. In.: Fürdőtelepülések versenyképességi vizsgálata néhány magyar és közép-európai régióban. PTE, Pécs, pp.18-22 ISBN 978 963 423 056 8. https://pea.lib.pte.hu/handle/pea/15515
- BOROS Szilvia – MONDOK Anita – VÁRHELYI Tamás (2012): *Az egészségturizmus szolgáltatásai és menedzsmentje* (ed.: KÓRÓDI Márta) Szolnoki Főiskola, Szolnok, pp. 9; 36-38 ; 74; 99-105 ISBN: 978-963-89339-4-2.
- BOROS Szilvia – PRINTZ-MARKÓ Erzsébet – PRISZINGER Krisztina (2011): *Egészségturizmus.* In.: Turisztikai terméktervezés és fejlesztés (Szerk: Michalkó Gábor) Pécsi Tudományegyetem, Pécs, ISBN 978-963-642-435-0 http://www.eturizmus.ttk.pte.hu/szakmai-anyagok/Turisztikai%20term%C3%A9ktervez%C3%A9s%20%C3%A9s%20fejleszt%C3%A9s/book.html
- DONKA Attila – SZTRUNGA Erzsébet (2008): *Turizmus alapismeretek*. Kereskedelmi és Idegenforgalmi Továbbképző Kft. Budapest, pp. 22. ISBN 978 963 637 286 6,

- FÁBIÁN Tamás (2021): *Az egészségturizmus kézikönyve*. SpringMed Kiadó, Budapest. pp. 19; 114. ISBN 978-615-6337-05-4
- GONDA Tibor (2016): *A turisztikai termékfejlesztés elméleti alapjai*. Pécsi Tudományegyetem, Pécs, pp. 186-203. ISBN 978-963-429-108-4 https://mek.oszk.hu/16600/16658/16658.pdf
- BALOGH László – GYŐRI Ferenc – HÉZSŐNÉ BÖRÖCZ Andrea – KISS Gábor – LEHMANN-DOBÓ Andrea – MESZLÉNYI-LENHART Emese (2013).: *Wellness, sport- és egészségturizmus*. SZTE-JGYPK. Szeged, ISBN 978-963-306-379-8 http://www.jgypk.hu/tamop13e/tananyag_html/wellness/index.html
- SMITH Melanie – PUCZKÓ László (2010): *Egészségturizmus:gyógyászat, wellness, holisztika*. Akadémiai kiadó, Budapest, pp.17-158 ISBN 978 963 05 8806 5
- VÁMOSINÉ Rovó Gyöngyvér (2013): Az egészségfejlesztés és rekreáció helye a turizmus rendszerében. *Tudásmenedzsment*. Vol.14. (1) pp. 62-72. http://epa.oszk.hu/02700/02750/00033/pdf/EPA02750_tudasmenedzsment_2013_02_062-072.pdf
- MT ZRT (2014): Magyar Turizmus Zrt.: *Wellness turizmus – Szakmai segédlet turisztikai partnereinknek*. https://mtu.gov.hu/documents/prod/wellness_turizmus_final_20140204.pdf
- Nemzeti Turizmusfejlesztési Stratégia 2030 – Turizmus 2.0. (2020) https://mtu.gov.hu/cikkek/strategia/
- Gyógyszállók (2023): *Gyógyszállók* https://www.antsz.hu/felso_menu/ugyintezes/hatosagi_nyilvantartas/termeszetes_gyogytenyezok_nyt/gyogyszallok.html, , https://www.kormanyhivatal.hu/download/7/7c/a6000/6_Gyogyszallok_003.pdf
- OEFS (2007): *Országos Egészségturizmus Fejlesztési Stratégia* https://2010-2014.kormany.hu/download/b/8e/20000/Egeszsegturizmusstrategia.pdf
- KÓRÓDI Márta (ed.) 2011. *Turizmus kutatások módszertana*. Pécsi Tudományegyetem, Pécs, ISBN 978 963 642 431 2 http://www.eturizmus.ttk.pte.hu/szakmai-anyagok/Turizmus%20kutat%C3%A1sok%20m%C3%B3dszertana/book.html
- LEHOTA József (2001): *Marketingkutatás az agrárgazdaságban*. Mezőgazda Kiadó, Budapest, 233 p. ISBN 963 935 825 8
- BONCZ Imre (2015) *Kutatásmódszertani alapismeretek*. Pécsi Tudományegyetem Egészségtudományi Kar, Pécs, 290 p. ISBN 978 963 642 826 6
- GYULAVÁRI Tamás – MITEV Ariel Zoltán – NEULINGER Ágnes – NEUMANN-BÓDI Edit – SIMON Judit – SZŰCS Krisztián (2017) *A marketingkutatás alapjai*. Budapest: Akadémiai Kiadó. https://doi.org/10.1556/9789630598880 https://mersz.hu/hivatkozas/dj240ama_217_p23/#dj240ama_217_p23)
- 74/1999. (XII. 25.) EüM rendelet a természetes gyógytényezőkről https://net.jogtar.hu/jogszabaly?docid=99900074.eum

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KATA FÖLDI, ÉVA PÓLYA, IBOLYA RÓZSA PÉNZES: FIGHT FOR CUSTOMERS CORRELATIONS OF TRADE ORGANIZATIONS AND SALES PROMOTION ON THE HUNGARIAN FMCG MARKET

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Abstract

Tract of time after the millennial brought well definable changes in retailers' trade organizations and marketing activity in the Hungarian three-pole FMCG market. Operation conditions of enterprises became more complicated which is also reflected in the variability of the number and intensity of relevant influencing factors as well as in the difficulties of forecasting them. Out of these the change of consumer/purchase behaviour, the growth of competition intensity, the swell of procurement marketing, changes in channel position, the innovation of informatics and info communication tools, the dominant change of economic environment, the stiffening legislation and the unexpected influence of ecological environment can be highlighted.
An important starting point for exploring the impact of the changes focusing on market competition is that the number and activity of chain stores operating in Hungary has stabilized, which has shifted the direction of research to explore the relationship between trade organization and marketing, improving competitive advantages and management efficiency.
Key words: operation conditions, trade organization, sales promotion, consumer opinion

1. Introduction

1.1 The role and forms of sales promotion activities

After the millennium, the commercial marketing tools of retail chains continued to evolve along with the service level. (Pólya-Pénzes, 2019) Together, ownership expectations, the pressure of urgent success, shortened brand life cycles and accelerating innovation are forcing corporate leaders to think about their brand management decisions in a shorter time period. Among many other things, this is the reason why sales promotion, which focuses primarily on increasing traffic, is gets more emphasis and role within the marketing communication tools, the long-term cognitive and emotional influence of consumers is only secondary. The impact on consumers can be financial, but in many cases even emotional, therefore we can talk about utilitarian and hedonistic effects. Savings, better quality at the same price and convenience of shopping can be considered an utilitarian advantage, while the possibility of discovery, entertainment, but even higher self-esteem can be a hedonistic advantage. (Horváth-Bauer, 2013)
The system of sales promotion tools is rich, it also includes the presentation and placement of goods through price and consumer information tools. Among the tools, the literatures we investigated highlight the role of point-of-sale advertising and merchandising, which are closely related to the research topic. Point of Sale (POS) and Point of Purchase (POP) tools affect customers in the stores and are part of on-line communications. (Pénzes, 2005) The tools of sales promotion are varied in the store chain practice, it largely depends on the degree to which the given tool fits the goals of the examined store chain, to what extent it provides a competitive advantage and how economical its application is. Customer loyalty systems and regularly organized rebates, which are primarily aimed at increasing revenue, generating needs and maintaining loyalty, are now standard tools in retail

chains. The database of loyal customer systems can provide the basis for direct customer access and online communication. (Pénzes, 2010, Pénzes-Pólya, 2019)
Sales promotion have many effects, but its mean different things to the retailers and different things to the consumers. It is most favorable for the retailers if, in addition to the increase in turnover, the number of customers also increases, while producers want to achieve a category change primarily in favor of their own products and at the expense of others. Sales promotion can bring a change in behavior, but we should not forget about mental reactions either. Among other things, a lower reference price may develop in consumers' mind, so they may insist on a lower price level in the future and wait for another promotion. (Horváth-Bauer, 2013)

1.2. Interrelation between procurement and sales promotion

Goods turnover of retailing companies especially procurement must be investigated for reaching the goals of our paper, first of all the point of view of discounts, reductions and subsidies of procurement. Procurement was mentioned as a retailing function (McGoldrick 1990, Tonndorf 1997), and micro-economic function (Pénzes-Gyenge 2010). The procurement of retailing company task is buying goods for satisfying the customer's needs (Dudás 2012), for reaching competitive and economic advantage (Pénzes-Gyenge 2010), value (Vörösmarty 2001). Economic conditions of procurement criteria contain discounts and advertisement subsidy (Nilsen-Host 1987, Koppelmann 1997), rabat (Schenk 2007). Buying syndicates/Purchasing groups often organize two-level rebates (country and regional) (Agárdi 2010). The types of supplier's discount: commercial, volume, promotional, seasonal and paying (Juhász et al. 2006). The types of commercial promotion discount from the total sum of invoice, returns invoice, free goods, discount of cooperation advertisement, discount of placement, turnover promotions, conditions of financing stock, shelf fee, street fee (Blattberg-Neslin 1993, Szakály 2017, Horváth-Bauer 2013, Agárdi 2010), promotion of invoice-return invoice (Horváth-Bauer 2013, Agárdi 2010). We are focusing such types of discounts which contribute to the organization of sales promotion. These discounts named commercial promotion (Szakály 2017, Horváth-Bauer 2013, Agárdi 2010), incentive discount (Kotler-Keller 2012) promotional discount (Rekettye 2011). Classic promotional discounts are granted by the producer to retailers for the purpose of carrying out local sales promotion tasks (Rekettye 2011). Willingness to buy of consumers and food supply chain may be supported by different discounts (Panyor et al 2019).
We concluded that different authors found interrelation between retailer's promotion activities and efficient procurement, which can be characterized by a complex system of actors and elements of activity.

2. Material and Methods

The investigation of the topic was based on secondary and primary information, which made it possible to compare the results of our regional primary research with national research results and to compare the value judgments of people living in settlements with different purchasing power and store chain network.

- During our secondary research, we relied on the CSO database, market research results and publications of the relationship between store chains and consumer behaviour.
- The primary research was taken in the form of in-depth interviews, observations and interviews, in the latter the students of the Wekerle Business School and the John von Neumann University participated as interviewers. During the analysis, 650 evaluable questionnaires were processed.
- The objectives of the structured interviews were: understanding the role of procurement discounts, rebates and support in organization of promotions in general and product-specific in Hungarian and multinational retail chains. The interviews were conducted face-to-face in February 2021, after preliminary telephone appointment, with the procurement director and marketing manager of a member company at a Hungarian store chain, and with a store manager at a multinational store chain.

2.1. Size and composition of the sample

36 percent of the respondents were men and 64 percent were women, which corresponds to the composition of domestic food buyers. Examining the composition by age, it can be stated that the questionnaire was filled in the largest proportion by those in the 41-51 age category, followed by those under 20 (18%) and then by the thirties (16.7%).
80.6 per cent of the respondents declared themselves to be in an average financial situation, 6.2 per cent to be below average, and 13.2 per cent to be in a higher income category. In our opinion, the place of residence and its size is an important grouping criterion due to the differences in purchasing power and the differences in the store network characteristic of the types of settlements.

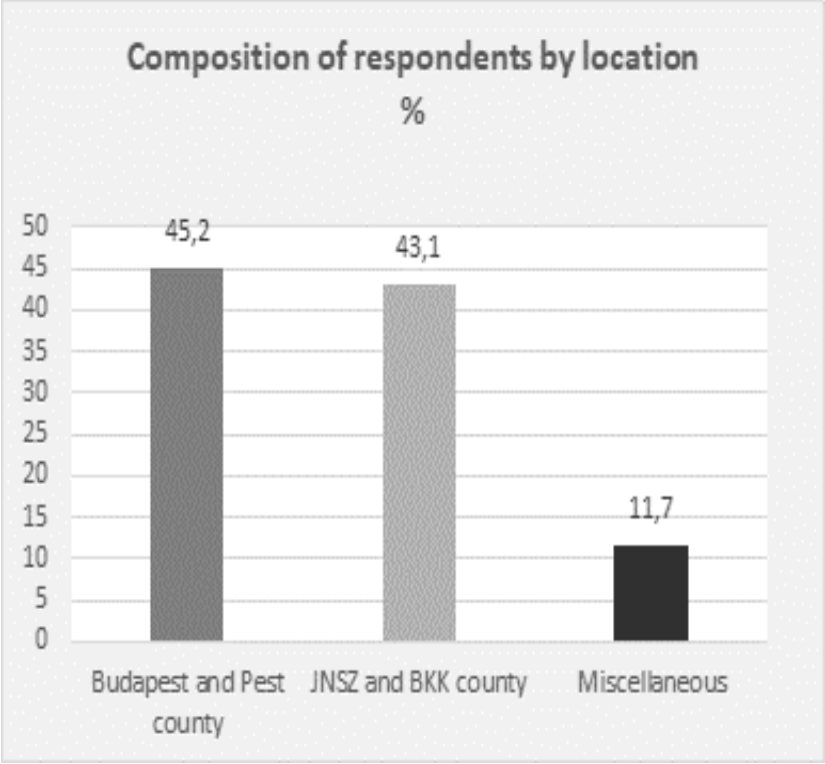

Fig. 1 Composition of respondents by place of residence%
Source: own edition, N=650
The residents of Budapest and Pest counties were grouped due to the close proximity of the capital and the regular commuting of the residents, while Jász-Nagykun-Szolnok county and Bács-Kiskun county were due to their geographical location (Eastern Hungary), the counties have approximately the same nature and purchasing power.
86 percent of respondents live in settlements with a resident population of more than 5000, a fact that provides a good basis for meeting and experiencing the promotional activities of retail chains. It should be noted that Hungarian-owned chains are present in settlements with a population of less than 5000, which make up 14% of the respondents, and their sales promotion activity has also a special feature.

3. Results and Discussion

*3.1. The results of in-depth interview*s
Due to scope limit, we only cover the role of purchasing discounts, rebates and subsidies. Summarized in Table 1.

Table 1 The role of purchasing rebates, discounts and subsidies

Interview question topic	Hungarian store chain	Multinational store chain
most typical	- quantitative rebate - appear in feature - tasting articles - delivery charge - bonus refund - contribution to the sweepstake - business promotion - POS materials - ancillary goods - free goods	no information
current number	10-15	no information
available (after 2009 restrictive legislation)	- number decreased, they remained the most important - no service content cannot be enforced - everything can be included in the price discount	- number decreased - remained for consideration
supplier identities and differences	- identity: fulfill expectation procurement's negotiation - differences: articles for tasting, consumer's gifts, POS materials, special discount in monthly differentiation	- differences: transport to logistics center (centralized) or store (decentralized)

Source: own edition

3.2. The results of the survey

3.2.1 The influencing power of sales promotional tools

The effectiveness of businesses 'activities towards consumers can be interpreted in a complex way, one component of which is the result of the influence on consumer behaviour. In this study, we investigated the effectiveness of sales promotion tools based on consumer value judgment. The research studied a scale of 1-5, how consumers consider the various instruments of the retail chains sales promotion and their impact on the purchase decision. The used range of sales promotion activities is various on FMCG market, and their impact on customers is different. Investigating the highlighted instruments, it can be seen that their influencing effect and the standard deviation of consumer value judgment are also different.

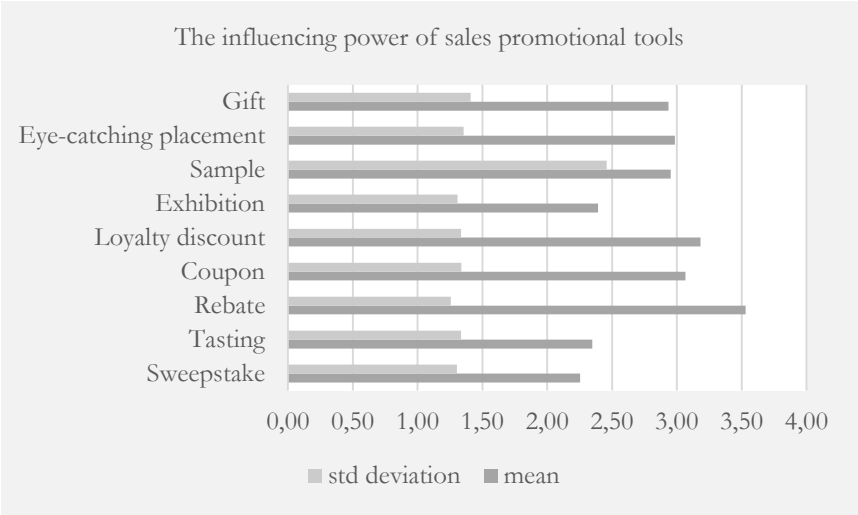

Fig. 2 The influencing power of sales promotional tools

Source: own edition, N=650

Among the tools used, weekly promotions are the most effective, with an average score of slightly above 3.5 and a relatively low standard deviation of responses (1,256). Customers rated the discounts to loyal customers to a similar extent (3.18), which in the current practice is visible in the post-purchase bonus points and the discount related to goods. Based on the responses, the least popular solution is the sweepstakes, which can be mainly explained by the low chance of winning and the relatively modest amount of winnings. Comparing the valuation of the tools, it can be seen that the immediately available, certain price advantage is more favorable than the longer-term tools.

3.2.2. Impact of rebates in different commodity groups

During the research, we examined the extent to which regular rebate promotions affect purchases in different food groups.

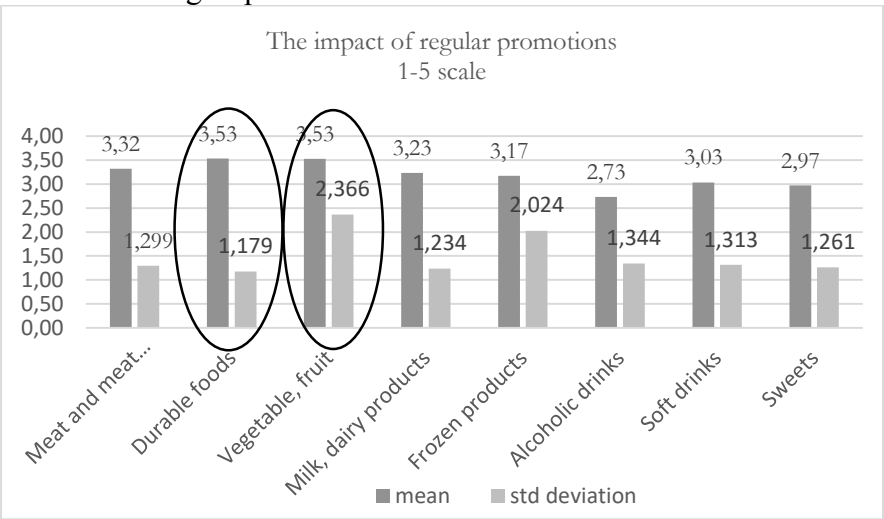

Fig. 3 The impact of regular promotions

Source: own edition, N=650

By the respondents, regular actions increase the demand for durable food and fruit and vegetable products the most, in both cases it was estimated at 3.53. However, if we also examine the homogeneity of the responses, it can be seen that the standard deviation is smaller for durable foods, so consumers 'value judgments are more solid for this commodity group. The rebates have the least effect on alcoholic beverages (2.73) and sweets (2.97). Favorable data for the fruit and vegetable group also highlights that chain stores can achieve increasing profits for fresh goods through effective promotional communication and selection, however the value of standard deviation highlights the importance of examining products in this commodity separately.

3.2.3. Differences in the influencing effect of actions, rebates

The socio-demographic characteristics of consumers influence the impact of actions, of which age, place of residence and income can be highlighted.

Examining the age categories, it can be stated that with the exception of one group (20-30 years), it is typical everywhere that more than 60 percent of the respondents are strongly or decisively influenced by the actions. The value of the correlation coefficient is low (+0.112), which shows that in this sample, age does not decisively influence the overall effect of sales promotions on buyers. However, if we examine the average evaluation of consumers belonging to each category, it can be seen that as the age increases, the influencing effect of the actions increases, which is an indicator for determining further directions of research. Based on the analysis of the impact of the actions on consumers, it can be stated that while in Budapest only 50.1 percent of the population feels that the actions influence them very much or at least decisively, in Pest County this proportion is already 61%. In Jász-Nagykun-Szolnok and Bács-Kiskun counties, 69 percent of the respondents opined the same. Regarding the average results of the influencing effect of the actions, it can be seen that while in Budapest and Pest counties the effect of the actions has a medium influence, in the other two counties it can be characterized by the term "very influencing". This originates in several factors, of which purchasing power and the income situation of consumers seems to be important, but other factors must of course be taken into account when developing a store chain strategy.

3.2.4. Evaluation of the organization and implementation of regular weekly actions

The research revealed that among the residents of Budapest and Pest counties, in addition to Tesco and Auchan, the popularity of discounts is typical, while in Jász-Nagykun-Szolnok county, in addition to discounts, the Coop chain is decisive in purchasing goods.

The evaluation of hypermarket promotions from different perspectives shows results above 4 with two exceptions. From the evaluation, a positive opinion can be highlighted regarding the quality of the discount goods, their display in the store and the formal implementation of the action catalogue (4.27-4.28). They are less satisfied with the amount of the discount (3.75) and the indication of the discount that facilitates the decision. Comparing the results achieved in each category, respondents are most satisfied with Interspar, followed by Auchan and Tesco. It is also important to take into account that Tesco Global Áruházak Zrt. and Spar Magyarország Kft. Also operate supermarkets in addition to hypermarkets. Consumer perceptions of supermarket promotions show a differentiated picture. While in the case of Tesco, supermarkets were rated better than hypermarkets with two exceptions, this shows a mixed assessment in the case of Spar.

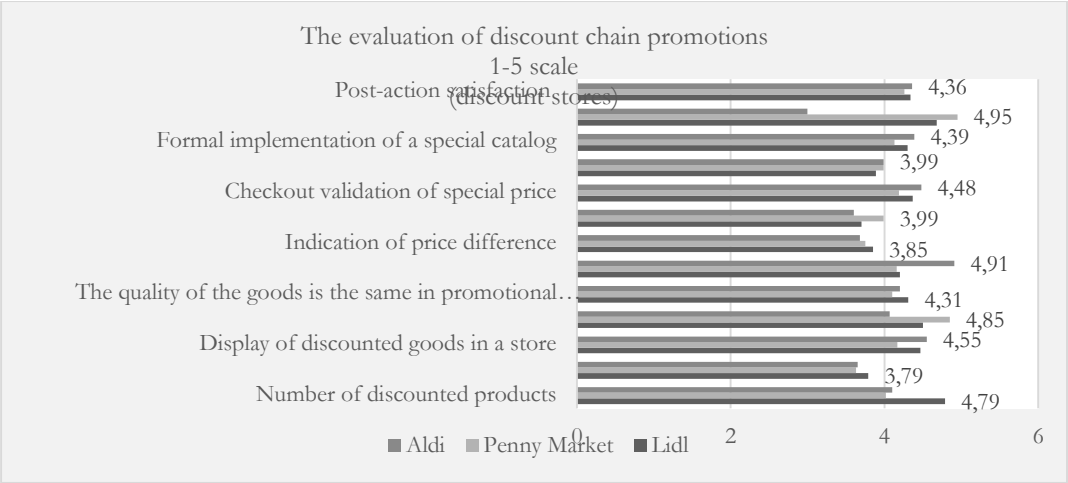

Fig. 4 The evaluation of discount chain promotions
Source: own edition, N=650

The study of the promotional activity of discounts, which play a prominent role in the attendance and popularity of business forms, was an important area of research. They are characterized by the fact that in addition to the cost-focused approach in the organization of sales within the chain, they also strive for significant standardization in the infrastructure of stores, in the conditions of sales and in the organization of promotions. Knowing these, we explored the consumer perception of the action organizing activities of discount chains operating in Hungary (Lidl, Penny Market, Aldi).

The promotional activity of the discounts was mostly rated as good by the respondents. In the case of Penny Market, the attention-grabbing effect of the information and the transparency of the selection of promotions were rated exceptionally high, as well as the number of goods involved in the promotion at Lidl. Comparing the store chains, the respondents ranked Aldi stores in the first place according to 6 criteria, Penny markets 3, and Lidl stores 4.

4. Conclusion

The aim of the paper was to explore the similarities and differences of the sales promotion of Hungarian and multinational retail chains, which also function as a means of competition, and to highlight the correlations between trade organization and regularly organized promotional activity, separately investigating it from the aspect of company and private brands. In our paper we revealed the several aspects of trade promotions and consumer reactions as well, there are still some viewpoints to be discovered. Hence the further directions are about to reveal other means of sales promotions and follow on our qualitative investigations with all store types in Hungary.

References

Agárdi Irma (2010), *Kereskedelmi marketing és menedzsment.* Budapest Akadémiai Kiadó.
Blattberg, Robert C. and Neslin Scott A. (1993), „Chapter 12 Sales promotion models Handbooks," *Operations Research and Management Science*, Volume 5, Pages 553-609
Dudás Katalin (2012), *A kereskedelmi gazdaságtan alapjai.* Pécs: PTE KTK
Horváth Dóra and Bauer András (szerk.) (2013), *Marketingkommunikáció*. Budapest: Akadémiai kiadó
Juhász Anna, Kenedics Krisztina and Sólyom Csaba (2006), *Kereskedelmi vállalkozások gazdálkodása és vezetése.* Budapest: **BGF Kereskedelmi, Vendéglátóipari és Idegenforgalmi Kar** 2006.
Koppelmann U. (1997), *Beschaffungsmarketing für die Praxis.* Tokio: Springer Verlag
Kotler, Philip – Keller, Kevin Laner (2012), *Marketingmenedzsment*. Budapest: Akadémiai kiadó
McGoldrick P. J. (1990), *Retail marketing*. London: Mcgraw-Hill Book Company
Nilson J. and Host V. (1987), „Reseller A sortment Decision Criteria," In: GRUNERT K.G. (et al) (1996) *Market Orientation in Food and Agriculture.* London: Kluwer Academic Publishers

Panyor Ágota, Balogh Sándor and Hampel György (2019), *Élelmiszer-gazdaság.* Szegedi Tudományegyetem
Pénzes Ibolya Rózsa (2010), „Üzletláncok vásárlásösztönzésének hatása a magyarországi FMCG piacon," *Marketing és Menedzsment*, 44: 3 pp. 29-39.
Pólya Éva and Pénzes Ibolya (2019), "The Interrelationship between the Factors Influencing Retail Selection Behavior and FMCG Market Network," *Economica* (SZOLNOK): 2 pp. 77-82.
Pénzes Ibolya and Gyenge Balázs (2010), *Kereskedelmi marketing.* Gödöllő: Szent István Egyetem Gödöllő Gazdaságtudományi Kar Marketing Intézet
Rekettye Gábor (2011), *Multidimenzionális árazás Insight trendek, vásárlók.* Budapest Akadémiai Kiadó
Schenk H, O. (2007), *Psychologie im Handel Entscheidungsgrundlagen für das Handelsmarketing*. 2. Auflage München Wien Oldenburg Verlag
Szakály Zoltán (2017), (szerk) *Élelmiszermarketing.* Budapest: Akadémiai kiadó
Tonndorf H. G. (1997), *Kiskereskedelem Európai Színvonalon.* Budapest: Novorg Kiadó
Vörösmarty Gyöngyi (2001), *A beszerzés információs kapcsolatai.* doktori disszertáció Budapesti Közgazdaságtudományi és Államigazgatási egyetem

KATA FÖLDI:
QUALITATIVE RESEARCH ON FOOD SHOPPING BEHAVIOR FROM THE POINT OF VIEW OF TODAY'S RETAILERS

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ABSTRACT

The spectacular growth effect of the Covid-19 epidemic is widely known. The epidemic caused a significant increase in e-commerce.
My research goal is to explore the opinions of food retail store managers regarding changes in customer behavior (shopping habits and store choice) during the Covid-19 period; what factors of the advantages of shopping in FMCG market webshops can be offset by buying food in traditional stores.
Among the qualitative research methods, I chose the expert interview because it is suitable for a deeper exploration of a specific problem area, in this case the topics of food purchasing habits and store selection. According to Steinar (2005, p. 63), the qualitative interview is a research method that allows a privileged glimpse into our fundamental experiences of the world.
The expert interviews made it possible to thoroughly question expert and competitor respondents, and were suitable for a deeper exploration of shopping habits, store selection, and the problem area of satisfied and regular customers.
According to Rubin-Rubin (1995, p. 43), the qualitative interview design is flexible, iterative and continuous, rather than pre-prepared and set in stone. Therefore, I adapted the order of the questions within and between topics to the answers of the in-depth interview subjects. Steinar's (2005) five main approaches to interview analysis are discussed, from which I used meaning condensation, which was used to convert the interviewees' main points into short forms. The categorization structures the extensive and complex interviews and provides an overview. Using this method, I structured the long texts into figures using the software of the word cloud method. Steinar (2005, p. 201) mentions Miles-Huberman's (1994) 13 tactics in the context of ad hoc meaning-making, of which he approaches counting as a well-known way of seeing "what's there". Therefore, I also used this method during my interview analyses.
keywords: food purchasing habits, coronavirus 1st wave, food retail store managers, qualitative research, Hungary

1. INTRODUCTION

While previous epidemics were localized, coronavirus has a global scale. (Donadelli et al, 2021)
The economic crisis that appeared in 2008 may be somewhat similar to the characteristics of the COVID-19 epidemic. However, the two crises cannot be compared. The coronavirus epidemic hit all economic sectors simultaneously, which was much more far-reaching than the 2008 crisis. The functioning of the market was not governed by the internal laws of the economy, but by the epidemiological regulations. (Posgay et al, 2020)
Research proves the effect of the coronavirus epidemic. It also exerted a strong influence on the behavior of customers.
The focus of the marketing approach is always on consumers and customers (Törőcsik, 2016). Fear appeared as an incentive: some customers began to consciously avoid crowded stores and the number of purchases decreased, although the basket value increased significantly as a result. Keeping in mind the observance of health rules and measures, customers changed their habits and routines, and the proximity of the store, as well as overcrowding, became an important factor. The proportion of online purchases began to increase intensively, displacing some of the physical purchases (Turcsán, Gfk.hu

2020). The epidemic caused a significant shopping panic worldwide, which was especially noticeable in the case of durable goods, as the accumulation of reserves gives people a sense of control over the crisis and reduces the feeling of vulnerability (Keane - Neal. 2021).
The choice of store is important for customers, the customer knows which stores satisfy his needs. Most of the time, the already tested business is not replaced by another one (Törőcsik, 2016). However, it is also worth mentioning that recent events (e.g. Covid-19) have had an impact on shopping habits with regards to the choice of store, as the proportion of online purchases has also increased. In this regard, research was carried out by Balogh-Kardos and Gál (2022), during which they found that there are a number of factors that are positively perceived by consumers in relation to online shopping, such as the fact that online shopping is generally perceived as easy and convenient as large crowds can be avoided, and they can also access products that are unique and cannot be found in the stores located in their neighbourhood. Online shopping is also greatly influenced by various social media sites, thanks to which they can access information and opinions from other consumers (Balogh-Kardos and Gál, 2021).
Before the virus, customers mainly acquired the necessary food to meet their household needs in a traditional way, but the pandemic forced many of them to change their priorities (Piros-Fehér, 2020: 73). Online options have become increasingly integrated into basic consumer decisions and most often supplement or replace the traditional shopping process (Bányai–Novák, 2011; Fehér et al., 2014). According to Ben et al. (2015), compared to the traditional store environment, online shopping environment offers many challenges and opportunities to find various goods.

2. MATERIAL AND METHODS

According to Babbie (2004), qualitative research can reveal explanatory value (causal relationships between variables) and patterns. Among the qualitative research methods, I chose the expert in-depth interview because it is suitable for a deeper exploration of a specific problem area, in this case the topics of food purchasing habits and store selection during the first wave of Covid. According to Steinar (2005, p. 63), the qualitative interview is a research method that allows a privileged glimpse into our fundamental experiences of the lived world. Nowadays, according to Steinar (2005), qualitative interviewing is widespread for predicting and controlling customer behavior.
The basic purpose of the in-depth interview is to explore, learn and understand. I was able to connect the answer to one respondent, and the respondent was not under social pressure to identify with the group's opinion, so the results were created during free exchange of information (Malhotra-Simon, 2008). The expert in-depth interviews made it possible to thoroughly question expert and competitor respondents, and were suitable for a deeper exploration of shopping habits, store selection, and the problem area of satisfied and regular customers. In the in-depth interviews, I used the semi-structured approach: I prepared questions on the main topics of the researched area, which I put up to the respondents, then I followed and deepened each research topic with several interwoven questions (Lehota, 2001). According to Rubin-Rubin (1995, p. 43), the qualitative interview design is flexible, iterative and continuous, rather than pre-prepared and set in stone. Therefore, I adapted the order of the questions within and between topics to the answers of the in-depth interview subjects.
Steinar (2005) discusses five main approaches to interview analysis: meaning categorization, meaning condensation, meaning structuring through narratives, meaning interpretation and adhoc methods of meaning generation. Among these approaches, I used meaning condensation, which was used to convert the interviewees' main points into short forms. The categorization structures the extensive and complex interviews and provides an overview. Using this method, I structured the long texts into figures using the software of the word cloud method. Steinar (2005, p. 201) mentions Miles-Huberman's (1994) 13 tactics in the context of ad hoc meaning-making, of which he approaches counting as a well-known way of seeing "what's there". Therefore, I also used this method during my interview analyses.
According to Steinar (2005, p. 279), interview studies can be used for hypothesis verification of differences between groups, and the categorization approach of interview analyzes allows testing

hypotheses (Steiner, 2005, p. 194) Babbie (2004, p. 421) when creating codes cited Glasser-Strauss (1967, p. 101), who highlighted hypothesis testing, generated by previous theory as the goal of coding.
The goal of the qualitative research were the following: to gain a deeper understanding of the opinions of those representing the supply side of food retail during the 1st wave of the covid epidemic in the area of food shopping habits and store choice, and to explore the opinions of satisfied, loyal and regular customer concepts and customer groups.
The subjects of in-depth interviews are food retail store managers (deputies) in 8 Hungarian retail chains (Coop Hungary Zrt and Reál Hungária Élélmiszer Kft.) and 6 multinational retail chains (Spar Magyarország Kft., Aldi Magyarország Élélmiszer Bt., Penny Market Kft.) and 7 independent retailers. owners, business managers. The professional experience of the interviewees fluctuates between very large extremes, from 1 year to almost 40 years.
The in-depth interviews were conducted between May and June 2020. Based on a telephone appointment, 23 in-depth interviews were conducted by students of the Qualitative and Quantitative Research subject at the Szolnok Campus of the University of Debrecen's Faculty of Economics with food retail store managers, deputies and owners.
To process the in-depth interviews, I used the word cloud method, which was assisted by the word cloud creation program of the website http://wordle.net.
The word cloud method helped the content analysis of the answers, and despite the fact that I applied it to all in-depth interview questions, I only displayed three related questions for seven questions, two of which I combined
Table 1 illustrates the breakdown of the interview questions by topic.

Table 1. The issues and the number of questions

issues	**number of questions**
Introduction	2
Buyers, buying habits	7
Store choice	8
Stores in the given settlement	4
Buyers of own store	5
Satisfied, loyal, regular customer characteristics	6
total	**32**

Source: Own editing

3. RESULTS AND DISCUSSION

3.1. Literature and secondary resarch

The topic has an extremely rich literature, and within the framework of this study we have made highlights due to the limitations of the scope. Accordingly, I examined the importance of the supply side of the food industry, food purchases and the phases of the 1st wave of the coronavirus.

3.1.1. The importance of the supply side of the food industry during a pandemic

The emergence of the pandemic played a major role in the reorganization of the supply and demand side of the market. The market was not controlled by the "invisible hand", but by the measures taken by the government and the stimulus responses to them. This was reflected in the short-term upward trend in the excess demand for durable foods and the decline in the hotels and restaurants sector, as well as in the lack of demand for service providers. (Posgay et al, 2020)
With the appearance of the epidemic, the role of food industry became more valuable, countries recognized their strategic role, began to open up to self-sufficiency and, at the same time, the food industry became more and more important. (Pious - Nagy, 2022)

COVID-19 has significantly rearranged the supply and demand side of the food industry. (Molnár et al, 2022:67) Halmai (2022) put the supply side at the center of the post-Covid recovery.

3.1.2. Food purchasing in an epidemic situation

The demand for certain goods has increased significantly as a result of the epidemic, such as food. (Hungarian, 2020, GKI DIGITAL, 2020).

Before the virus, customers mainly acquired the necessary food to meet their household needs in a traditional way, but the pandemic forced many of them to change their priorities (Piros-Fehér, 2020: 73)

The emergence and rapid spread of the COVID-19 pandemic caused an economic shock, which also brought changes in customer behavior. The new situation, the fear of the virus, the various restrictions noticeably change shopping habits, thus fundamentally influencing the decision-making process of consumers. (Molnár et al, 2022:56)

The unexpected emergence of the epidemic affected all areas of human well-being. Two out of three people reported serious financial problems despite government subsidies. (Pomázi, 2022)

With the outbreak of the epidemic, vegetable consumption remained unchanged. However, consumer habits have changed. (Tisza et al, 2021) Canned fruit and vegetable consumption has become popular among Americans, Del Monte Foods' sales increased by 200% year-on-year in March 2020. (Hiebert, 2021)

The social distancing introduced due to the coronavirus epidemic also resulted in a significant change in food shopping habits. Most people choose to shop in stores. (PWC, 2020). According to Soós (2020), residence, age and education have a significant relationship with the place of purchase.

As a result of the epidemic, customers have become more aware of their spending. Health awareness in the field of eating became a more important aspect, and steps taken to reduce waste became more widespread (Eger et.al, 2021).

3.1.3. 5 stages of the 1st wave of the coronavirus

GKI Digital divided the period from February to the end of May 2020 into 5 stages (GKI Digital, 2020).

The first phase from February was the „calm before the storm" phase (February-March 2020), which was all about waiting, with demand gradually starting to increase and some well-informed businesses (and customers) started to stock up. This was followed by the phase of panic buying (from March 10, 2020), when the operational directorate began its work. On March 13 and 14, 2020 (and the following week), customers rushed the stores (Huszka et al., 2020).

In the spring of 2020, customers started panic dumping buying, the background of which was the fear of closing of the store and stopping of production. As a result, the turnover of mixed retail stores increased by 10.7%. (Huszka et al, 2020)

The results of the quantitative research conducted during panic buying clearly show that ¾ of the customers stockpiled a significant amount of food. During the pandemic, 23.1% of customers stored enough food for more than two weeks, while 1.6% of respondents had a one-day supply of food. 8% of the respondents stated that they cannot consume the food stockpiled during the epidemic until the expiration date. (Kasza et al, 2020)

Buying, and thereby "owning" stocks, gives consumers a sense of control over unpredictability at a time when the number of conscious and planned purchases is decreasing due to uncertainty (Coibion et.al, 2020; Keane - Neal, 2021).

The third phase, the period of spring quarantine (March 28, 2020 - April 14, 2020), the period of curfew lasted until mid-April. Online orders soared, reaching Christmas order numbers in several places. The research also pointed out that the epidemic resulted in a wider spread of digitalization than ever before. The growing importance of digital devices in the workplace, in homes, but also in our purchasing decisions could be felt. (Keller-Huszka 2021: 163)

The fourth was the habituation phase (April 15, 2020 - May 3, 2020). Security of supply improved and discipline loosened. Stock shortages ended, more and more people went to stores again, but the

desire to shop online was still high. The last phase is the "normal" phase again (from May 4, 2020). In this period, customers were expected to wait, and many of them had financial problems due to food stocks accumulated in the previous period (GKI, 2020).
In the second wave, we can no longer discover the classic stages experienced in the first wave, but it can be clearly observed (also supported by the research of Keller-Huszka 2021) that online orders have stabilized at a high level, and many people have repeatedly accumulated reserve stocks. (Keller-Huszka 2021: 164)

3.4. Primary research

Due to space limitations, I will focus on evaluating the answers to 7 interview questions out of the 32 questions in the interview draft, which are as follows:
What changes (time of purchases, value, number of customers, frequency of purchases, composition, duration of purchases) did you experience in customer habits during the 1st wave of the coronavirus epidemic?
What groups were relegated into the background during the coronavirus epidemic? What groups have strengthened during the coronavirus epidemic? Are there completely new groups?
What changes do you expect in the next 1-2 years?
- in the field of store selection
- in the field of own store customers
- in the field satisfied, loyal, regular customers

According to the majority of the interviewees, before the virus, customers visited the store almost every day because they purchased only a few days in advance.
In the first wave of the coronavirus epidemic, the changes experienced by the interviewees also affected the time, value, number of customers, frequency and composition of purchases.
They started stocking up on panic buying, which resulted in an explosive increase in traffic (doubled daily traffic), and basic food items became scarce. The number of customers and traffic were compared to holiday gift shopping, and according to one store manager, even the opening hours turned out to be too short. One interviewee compared the week of March 16 to the period before Christmas in terms of the number of customers and volume of traffic. The time of purchases, the basket value and the customer number increased. Therefore, many restrictions were introduced, such as the maximum amount of goods allowed to be purchased. Being prepared for the possible curfew restrictions, many customers (young and old) went on a big shopping spree, pushing the members of the everyday customer circle into the background.
One of the interviewees described the causes and consequences of panic buying in a meaningful way below:
„You couldn't see a system in the purchases, rather panic was felt, everyone wanted to reserve, but everyone something else. There was a common thread: flour, cooking oil and yeast. The customers were not thinking clearly, it did not occur to anyone that the shops would not close. If consumers had not hoarded so many staple foods, there would not have been shortages of several items as it has been experienced with yeast to date. This run-up could be experienced for about 3 weeks and by Easter the desire to buy decreased." F. H.
The implemented shopping time restrictions (from 9.00 to 12.00 am) brought with the limitation of the duration of purchases, and so the different age groups shopped more consciously during the specified time frame. Even in the time window available for the older age group, it was reported that the older age group did not go shopping every day either. One of the store managers reported that if the younger age group could not complete their shopping before 9.00 am, many times they did not go back to the store in the afternoon. After the period of panic buying, they spent less time in the store, but bought a larger than average basket value.
One of the interviewees described the change in the composition of the purchase as follows:

"At the beginning of the virus, customers made a significant reserve of durable foods, so it can be said that after that what they came to the store for, was to buy fresh foods, cleaning agents, disinfectants, vitamins, and discount products." E. J.
According to another interviewee:
"The time spent shopping increased, and although everyone came in knowing what they wanted to buy, the time per person spent with shopping increased because they were buying in bulk,." R.M.
The frequency of purchases dropped significantly, so they bought less often and in larger quantities (items) and amounts even after the buying spree. One of the interviewees reported on purchases concentrating on Saturdays.
One of the store managers highlighted the increase in prices, which caused the basket values to increase, not only because of the increase in the quantity purchased. One of the interviewees explained the decrease in turnover at the end of April and May 2020 with the drop in discretionary income resulting from the reduction in the duration and number of days of work due to the dismissal of employees and the closing of schools.
The so-called "normal" phase of the fifth phase of wave 1 was evaluated by the interviewees as the compulsion to make excessive purchases subsided and the usual quantities of food were increasingly visible in the shopping baskets.
Picture 1 illustrates the change in FMCG market purchasing habits that changed during the first wave of the coronavirus epidemic.

Picture 1. Areas of change in shopping habits during the 1st wave of the coronavirus
Source: **https://wordart.com/create**

In the stores of most of the interviewees, the retired age group was relegated to the background during the coronavirus epidemic, which was explained by the time limit of their visits and the greater exposure and fear of infection. Also, their family members (middle-aged and young people) made purchases instead of their older relatives, thereby protecting their health and protecting pensioners from exposure to infection when buying food. One of the store managers also mentioned such motives in the case of parents of families with small children. One of the interviewees stated that there were 10-15 customers in the 9-12 hour time slot. Some mentioned students, the "low-income" (minimum wage earners, unemployed) as a marginalized customer group.
The following interviewee gave a thorough account of the strengthening customer group:
"The group of middle-aged people buingy for their families alone, and younger people buying for their older relatives, have become larger. „Buyers on assignment" have appeared." V. D. K.
Contrary to the opinion of the other interviewees, one of the interviewees mentioned pensioners and the unemployed as a customer group that is becoming stronger in his store.

Employees of family support institutes were mentioned as a new customer group, who made purchases on the basis of a list, so impulse purchases were excluded. Another interviewee mentioned the increase in the number of "order" buyers. One interviewee reported an increase in the number of male customers.
Several interviewees were of the opinion that during the period of the 1st wave of the coronavirus, he was unable to isolate a group of customers that was neither marginalized, nor strengthened, nor new. It is specific to the locality, store chain and store whether there were groups of customers that were pushed into the background, got stronger or emerged as new.
Picture 2 illustrates the marginalized customer groups with a word cloud.

Group
Pensioners
Shop
Go
People
Work
Income
Need
Children
Epidemic
Family
Buy
Come
Customer
Bit
Little
Generate
Virus
Traffic
Living
Loss
Over
During
Background
Good
Less
New
Older
Store
Home
Retired
Now
Foster
Relegated
Appeared
Arrived
Unemployed
Completely
Construction
Small
Age
According
Unfortunately
Announced
Additional
Minimum
Directly
Cold
Even
Seasonal
Wage
Made
Time
Pushed
Individuals
List
Visits
Many
Money
Corona
Experience
Clearly
Industry
Period
Meet
Until
Support
Students
Parents
Elderly
Jobs
Maybe
One
Limited
School
State
Institute
Seen
Noticed
Help
Age
Emergency
Slot
Interval
Actually
Afraid
Next
Workers
Home
Raising
Break
Called
Traffic
Reduced
Grown
Small
Stronger
Want
Regular
Occasional
Shop
Retired
Break
Down
Factories
Sandwich
Loss
Virus
Shop
Now
Foster
Arrived
Appeared
Relegated
Cook
New
Continued
Older
Less
Store
Home
Retired
Tourists
Construction
Income
Need
Under
Reason
Went
Pastries
Pensioners
Unemployed
Young
Store
Background
Good
During
Go
Work
Well
Children
Belonging
Knows
Weight
Typical
Proportion
Used
Unfortunately
Need
Called
Restrictions
Even
Thought
Pensioners
Belonging
Made
Well
Office
Next
Industry
Won
Largest
Go
Reason
Foster
Cook
Continued
Older
Less
Store
Home
Retired
Tourists
Construction
Income
Need
Under
Reason
Went
Pastries
Dangerous
Family
Seen
Benefited
Small
Completely
Age
According

A change is expected due to the increase in the competitive situation, in which online shopping, home delivery and online stores play a role. Several interviewees expect to introduce the digitalization of their business chain and create their own web store.
One store manager expects the following changes when choosing a store:
"Price, quality and origin, where of course domestic products will have a significant advantage in terms of product selection, but in the case of service, trust in the dealer, credibility, expertis and, empathy." E. J.
The head of one of the Hungarian chain stores expects the impersonal nature of discount chains to reach his store as well.
In detail, one store manager expects the following changes:
"If you think about the state of their economy today, trade, including food retail, will not be in a good position either. Tens of thousands have become and will become unemployed. This process is difficult to stop, and if these people do not find work again, they will have no income to spend. As unemployment increases, tourism will decrease, which will mean a drop in income for seasonal shops, which will not be an easy task to replace due to the above factors. You can prepare for a change in customer habits in the next period. It is difficult to predict in what form this will take place. I think people will consider even more on what and where they spend their income." F. H.
There were interviewees who did not expect any changes, while others optimistically expect an increase in turnover and the number of customers, especially the number of regular customers, in the next 1-2 years.
The following sentences from one of the interviewees best summarize the hope:
"He hopes that this corona virus misery will end as soon as possible, and then order will be restored, school will start, children will also buy more because of school life, parents will also buy more, life will also start at the workplace, so a lot of more people will be able to return to work." It will be business as usual, and thus their turnover will also be strengthened." K.K.
It is store chain or store manager (deputy) specific ons how they forecast the direction and factors of future changes (factors influencing store choice, shopping habits). The answers of the interviewees are summarized in the word cloud in Picture 3.

More
Hope
Customer
People
Change
Expect
Online
Store
Aldi
Product
Shops
Future
Now
Price
Know
Even
Good
Over
Up
Take
Trust
Think
End
Personal
Service
Waiting
Discount
Prepare
Become
Competitor
Next
Terms
Situation
Period
Everything
Digital
Domestic
Lot
Due
Range
Increase
Chain
Competitive
Coronavirus
Care
Believe
Traffic
Regular
Whether
Back
Experienced
World
Case
Income
Years
Group
Expand
Contact
Age
Younger
Well
Advertising
Life
Number
Economy
Work
School
Space
Widening
Enough
Bit
Place
Stop
Choose
Strengthened
Different
Way
Mean
Great
Leave
Etc
Form
Buy
Home
Important
Habits
Self
Rise
Loyalty
Much
Seat
Distant
Out
Easy
Toll
Aldi
Time
Food
Pass
Eyes
Expertise
Achieve
Selection
Viral
Retail
Demand
State
Crisis
Health
Position
Supermarkets
Tourism
Price
Find
See
Confident
Thought
Advanced
Store
Supported
Technology
Due
Last
Know
Pronounced
Down
Shops
Shaken
Unemployment
Money
Expect
Many
Continue
End
Everyone
Large
Above
Fine
Best
Cold
Here
Corona
Trust
Cuts
Process
Turnover
Writer
Introducing
Completion
Return
Seasonal
Work
Trade
Provided
Current
Arouse
Bit
Case
Cod
Thus
Decrease
Creating
Happen
Existed
Trust
Cuts
Here
Corona
Turnover
Process

5. CONCLUSION

The main objective of this research was to map the change in food purchasing habits during the 1st wave of the epidemic situation with the help of secondary and primary research. In the literature section, I evaluated the impact of the epidemic on food purchases. Secondary data show that the restrictions introduced due to the virus (temporary restrictions in trade, home office for employers, training from home in education) have changed food shopping habits (time, value of purchases, number of customers, frequency of purchases, composition, duration of purchases). Panic buying began in FMCG stores worldwide. In order to explore the changed customer habits, we conducted qualitative research with the participation of students studying at the Szolnok Campus of the Faculty of Economics of the University of Debrecen. In May and June 2020, we examined the change in food purchasing habits from the point of view of retail store managers and deputies in the FMCG market in person and in the framework of online expert interviews. During the qualitative research, we discovered that those who buy food less often during the pandemic period (scared of the virus) have different shopping habits than those who are less afraid of the virus. It is locality or store chain or store-specific, whether there were backward, strengthening or new customer groups. It is also store chain and store manager (deputy) specific, how the direction and factors of future changes (factors influencing store choice, shopping habits) were forecasted. The growing trend of online grocery shopping was clearly stated. The presented results clearly illustrate the characteristics that could characterize food purchasing habits in 2020 both in Hungary and globally. Our empirical research shed light on the effects of the coronavirus on food shopping habits.

REFERENCES

BABBIE, E. (2004), A társadalomtudományi kutatás gyakorlata. [The practice of social science research.] Balassi Kiadó, Hatodik átdolgozott kiadás Budapest

BALOGH-KARDOS, Valeintina - GÁL, Tímea (2021): A közösségi média hatása a médiafogyasztásra és a reklámpiacra. [The impact of social media on media consumption and the advertising market.] *Régiókutatás Szemle*, 6, 1. 121-132.

BALOGH-KARDOS, Valeintina - GÁL, Tímea (2022): Az online vásárlási szokások vizsgálata a generációk szempontjából. [Examining online shopping habits from the point of view of generations.] *Studia Mundi – Economica*. 9, 2. 1-11.

BÁNYAI Edit – NOVÁK Péter (szerk.) (2011): Online üzlet és marketing [Online business and marketing]. Akadémiai Kiadó, Budapest

BENN, Y. – WEBB, T. L. – CHANG, B. P. I. – REIDY, J. (2015): What information do consumers consider, and how do they look for it, when shopping for groceries online? *Appetite,* 89, 265–273.

Coibion O. & Gorodnichenko Y.& Weber M. (2020), The cost of the COVID-19 crisis: Lockdowns, macroeconomic expectations, and consumer spending. National Bureau of Economic Research, May (2020). letöltve: 2022.08.20.

DONADELLI, M. - FERRANNA, L. - GUFLER, I. - PARADISO, A. (2021), Using past epidemics to estimate the macroeconomic implications of COVID-19: A bad idea! *Structural Change and Economic Dynamics*, 57 (C), 214–224. DOI: 10.1016/j.strueco.2

EGER L. - KOMÁRKOVA L. - EGEROVÁ D. - MICÍK M. (2021), The effect of COVID-19 on consumer shopping behaviour: Generational cohort perspective. *Journal of Retailing and consumer services*, 61, 102542. letöltve: 2021.12.09.

FEHÉR András – SOÓS Mihály – SZAKÁLY Zoltán (2014): Az élelmiszer-fogyasztói magatartás vizsgálata online környezetben: Létezik-e hazánkban digitális élelmiszer-fogyasztó? [Examining food consumer behavior in an online environment: Are there digital food consumers in Hungary?] *Táplálkozásmarketing*, 1 (1–2), 29–38.

Gki Digital (2020): A koronavírus nyertese?! – lendületben az e-kereskedelem. 2020. [The winner of the coronavirus?! - e-commerce is booming. 2020.] https://gkidigital.hu/2020/05/07/ koronavirus/ (Letöltés dátuma: 2022.04.21.)

GLASER, B. - STRAUSS, A. (1967), The Discovery of Grounded Theory: Strategies for Qualéitative Research. Chicago: Aldine
HALMAI P.(2022), Poszt-COVID kilábalás: középpontban a kínálati oldal. [Post-COVID recovery: focus on the supply side] *Külgazdaság*, 66 (1-2) 58-71.
HIEBERT, Péter (2021), Canned Fruits and Veggies Have a Bad Rap, but the Pandemic Might Be Revamping Their Image. https://www.adweek.com/commerce/canned-fruits-and-veggies-have-a-bad-rap-but-the-pandemic-might-be-revamping-their-image/, letöltés dátuma: 2022.04.25.
HUSZKA, Péter - HUSZKA, Péter Barnabás - LŐRE, Vendel (2020), A koronavírus-járvány és felvásárlási láz néhány összefüggésének vizsgálata Győrben. [Examining some of the connections between the coronavirus epidemic and takeover fever in Győr.] *Táplálkozásmarketing*, 7 (1), 89–101. https://doi.org/10.20494/TM/7/1/7.
JÁMBOR Zsófia - NAGY Judit (2022), Hogyan hatott a COVID-helyzet az élelmiszeripari ellátási láncokra Magyarországon? [How did the COVID situation affect the supply chains of the food industry in Hungary?] *Magyar Tudomány* 183 (4) 442-454 https://mersz.hu/hivatkozas/matud202204_f73788#matud202204_f73788
KASZA Gyula - DORKÓ Annamária - KUNSZABÓ András SZAKOS Dóra (2020), Minden válság egy lehetőség. – élelmiszer-biztonság, élelmiszer-tartalékolás és élelmiszer-pazarlás a háztartásokban a koronavírus tükrében. [Every crisis is an opportunity – food security, food storage and food- waste in households in light of the coronavirus.] In: ANTAL Emese, PILLING Róbert (szerk.): A magyar lakosság életmódja járványhelyzet idején: táplálkozás, testmozgás és lélek Tanulmánykötet a koronavírus-járvány életmódot érintő hatásairól, az ezzel kapcsolatos kutatások eredményeiről és a lakosságnak szóló szakmai javaslatokról a TÉT Platform szerkesztésében, [The lifestyle of the Hungarian population during an epidemic situation: nutrition, physical activity and spirit Study volume on the effects of the coronavirus epidemic on the lifestyle, the results of related research and professional recommendations for the population edited by the TÉT Platform] Budapest, 61-63. (ISBN 978-615-01-0124-8)
KEANE M. - NEAL T. (2021), Consumer panic in the COVID-19 pandemic. *Journal of Econometrics*, 220 86-105. letöltve: 2022.12.15.
LEHOTA, J. (2001), Élelmiszer-gazdasági marketing. [Food economy marketing.] Műszaki Könyvkiadó, Budapest
MAGYAR Ádám (2020): Virágzik az online kereskedelem Magyarországon a koronavírus-járvány miatt [Online trade is booming in Hungary due to the coronavirus epidemic] https://hu.euronews.com/2020/04/01/viragzik-az-online-kereskedelem-magyarorszagon-a-koronavirus-jarvany-miatt (Letöltés dátuma: 2022.06.26.)
MALHOTRA, N. K. & SIMON, J. (2008), Marketingkutatás. [Marketing research] Akadémiai Kiadó, Budapest
MILES, M. B. - HUBERMAN, A. M. (1994), Qualitative Data Analysis: An Expanded Sourcebook. Sage Publications Ltd.
MOLNÁR Anna – JÓZSA László – DERNÓCZY-POLYÁK Adrienn (2022) Az élelmiszer-vásárlási szokások változása a covid járvány alatt Szlovákiában és Magyarországon, helyzetkép Dél-Szlovákiában és Nyugat-Magyarországon. [Changes in food shopping habits during the covid epidemic in Slovakia and Hungary, situation in southern Slovakia and western Hungary] *Táplálkozásmarketing* 9, 1. 55-70..
PIROS Edina – FEHÉR András (2020a): Az élelmiszer-vásárlói magatartás vizsgálata online környezetben – szakirodalmi áttekintés [Examining food purchasing behavior in an online environment - literature review] *Táplálkozásmarketing* 7, 1. 67-78.
POSGAY István - REGŐS Gábor - HORVÁTH Diána - MOLNÁR Dániel (2020) A koronavírus-járvány gazdasági hatásairól. *Polgári Szemle*. 16 (4-6) 31-32. http://real.mtak.hu/121528/1/PSZ%202020.%204-6.szam_4.pdf letöltési dátum: 2022. 10. 22.
PWC (2020), 2020 a gyorsan változó fogyasztói szokások éve. [2020 is the year of rapidly changing consumer habits.]

https://www.pwc.com/hu/hu/sajtoszoba/2020/2020_a_gyorsan_valtozo_fogyasztoi_szokasok_eve.html letöltési dátum: 2022. 05. 08.
RUBIN, H. I. - RUBIN, R. (1995), Qualitative Interviewing: The Art of Hearing Data. Thousand Oaks, CA, Sage
SOÓS Gabriella (2020). Az élelmiszer-fogyasztói szokások változása a COVID-19 vírus megjelenéséhez kapcsolódóan Magyarországon. [Changes in food consumer habits related to the appearance of the COVID-19 virus in Hungary.] ELTE, EKE, Oeconomia, 54 (3), 15–27. https://doi.org/10.15170/MM.2020.54.03.02
STEINAR, K. (2005), Az interjú Bevezetés a kvalitatív kutatás interjútechnikáiba. [The interview Introduction to the interview techniques of qualitative research] Jószöveg Műhely Kiadó, Budapest
TISZA Boglárka Bernadett - IVÁN Gyöngyi - KÓRÓ Melinda - SZÁNTÓRI Patrícia - PRIBÉLI Olivia - GALAMBOS Rebeka - MÜLLER Henriett - GYÓCSINÉ VARGA Zsófia - VERZÁR Zsófia - GUBICSKÓNÉ KISBENEDEK Andrea (2021), Zöldség- és gyümölcsfogyasztás a COVID-19 pandémia 2020-as időszak alatt. [Vegetable and fruit consumption during the 2020 COVID-19 pandemic.] *Táplálkozástudományi és Dietikai Szemle*. 1 (2), 41-43. http://etk.pte.hu/public/upload/files/TaplalkozastudomanyiDietetikaiSzemle_1evf2szam-J2.pdf letöltési dátum: 2023. 10. 25.
TÖRŐCSIK Mária (2016): Fogyasztói magatartás: Insight, trendek, vásárlók. [Consumer behavior: Insight, trends, customers.] Akadémiai Kiadó, Budapest. ISBN: 9789630597371 Digitális kiadás. https://mersz.hu/hivatkozas/dj72fm_2/#dj72fm_2
TÖRŐCSIK Mária (2016), A fogyasztói magatartás új tendenciái. [New trends in consumer behavior.] *Vezetéstudomány*, 47. 4, 19–25.
TURCSÁN T. (2020), Fogyasztói változások - a víruson innen és túl. [Consumer changes - from here and beyond the virus.] Gfk.hu https://www.gfk.com/press/fogyasztoi-valtozasok-a-viruson-innen-es-tul letöltési dátum: 2023. 02. 14.

BORÓKA-JÚLIA BÍRÓ, BÍBORKA-ESZTER BÍRÓ: POST-COVID EVOLUTION OF AN ONLINE FOOD DELIVERY SYSTEM IN ROMANIA

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Abstract

Food delivery market is continuously emerging locally, regionally and globally. The market has been permanently growing during and after the COVID pandemic. Present Study proposes to analyse the post-pandemic evolution of a local online food marketplace system present in Romania, located in the middle of the country**.** We present the system of a locally functioning food marketplace: ospatarul.ro, including its actors as well as the relations between them. Meal delivery experience of customers has been enhanced in multiple ways recently, while services offered for partner restaurants had also been diversified during the same time period. We intend to capture the challenges and opportunities lying behind the switching of the system from classic delivery to new delivery. Finally, we try to give economical explanation on how a small local actor can survive international competition that entered the local market.

Keywords: online food delivery, new delivery, marketplace, online marketing, consumer experience.

Introduction

Material and Methods

Within the framework of present study we analyze the evolution of a local online food delivery (OFD) system: Ospătarul. Contrary to the vast majority of such types of services, Ospătarul is a locally constructed and locally operated marketplace system, which does not belong to any multinational players present on the Romanian market. It is present in four towns of the Romanian Central Region: Sfântu Gheorghe, Miercurea Ciuc, Târgu Secuisesc and Covasna, with a market leading position in Sfântu Gheorghe.

We built up our research on three pillars. We present, model and analyze the evolving services system of Ospatărul on the one hand by focusing on its development timeline (first pillar) and the business model (second pillar) it uses. On the other hand we analyze the Ospătarul database (third pillar) in order to depict local consumer behavior, customer preferences, that we then compare to country level patterns.

Finally, we try to give economical explanation on how this small local OFD player managed to survive international competition that entered the local market in April 2021, and is still present in April 2023.

Results and Discussion

Development timeline

Ospatarul.ro started operating on the Romanian market with location Sfântu Gheorghe town in February 2019. Since then, several frontend developments, backend developments and new service introduction has been made by the company (Figure 1.). We here briefly present the major frontend developments, that are crucial for the customers' perception of the quality of service when using the Ospătarul marketplace system. The initial webpage was reachable by customers in Romanian language. Next year, in February 2020, ospatarul.ro was launched in Hungarian language as well. As three quarter of the population of Sfântu Gheorghe town has Hungarian nationality, the introduction of the Hungarian language was an important step. Once with COVID pandemic arising in the country in mid-March 2020, the platform operator introduced online payment opportunity (in April 2020) offered contactless delivery possibility (since April 2020), and also speeded up the joining process of new restaurant partners. Ospătarul application was launched in December 2020.

Considering frontend development aspects: the webpage ospatarul.ro is available in two languages: Hungarian (since February 2020) and Romanian (since the beginning: February 2019). Application is available in three languages: English, Hungarian and Romanian. Apple Pay, Google Pay payment possibilities as well as card saving options are available since September 2022 (both at ospatarul.ro webpage and in Ospătarul Application). What is coming in the near future regarding frontend development: the company is currently working on the introducing of meal ticket payment possibility; integration of a rating system for consumers.

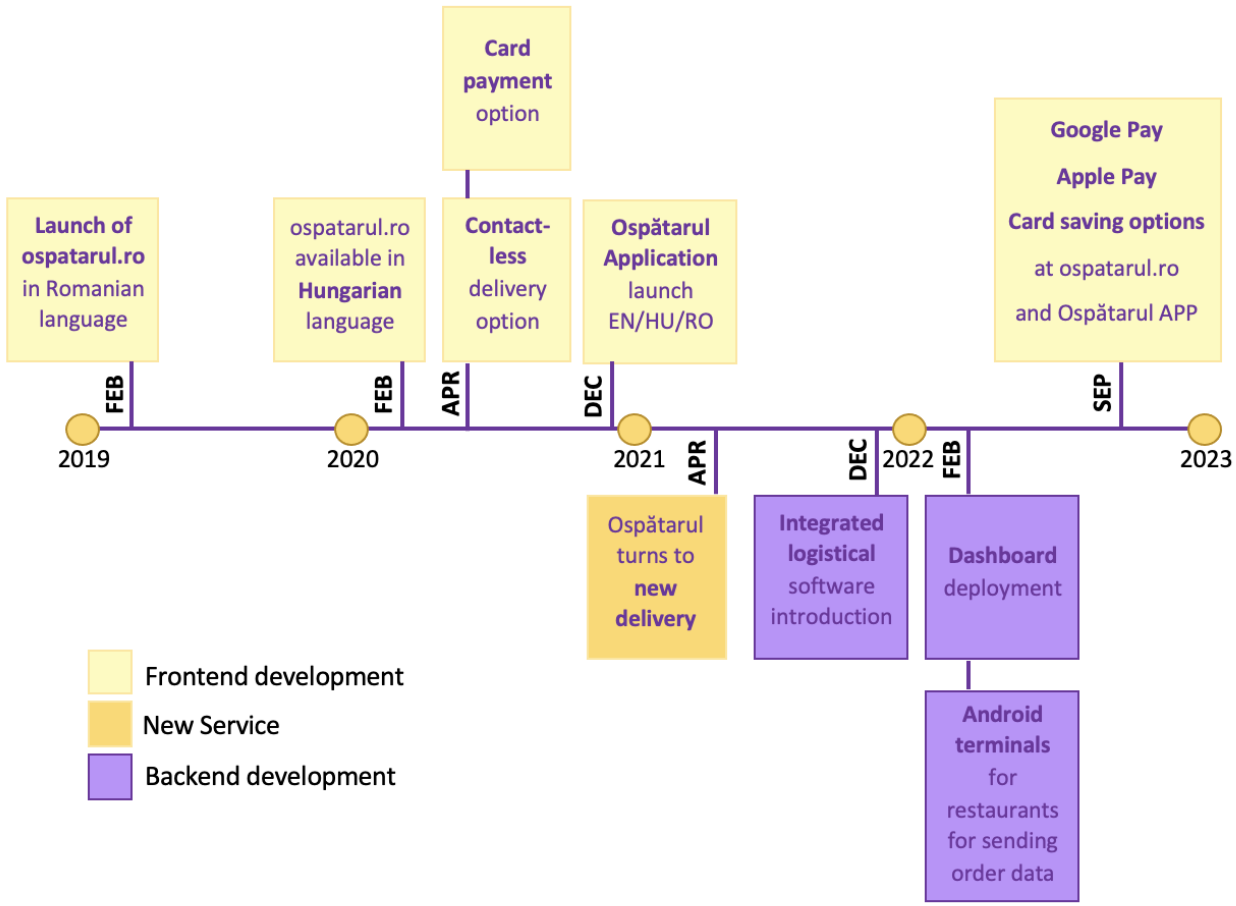


Figure 1: Major developments' timeline at Ospătarul
Source: authors' own edition

In April 2021, Ospătarul turnes from classic delivery aggregator to new delivery aggregator by introducing its own delivery system. According to McKinsey and Company, 2016, there are two basic models in food delivery ecommerce: classic delivery and new delivery. Classic delivery model emerged more than two decades ago, and applies for the so called aggregators, who make possible for consumers to choose from a wide variety of menus belonging to different restaurants, compare menus, place orders with just a few clicks, have different payment options, get informed by other consumers' reviews, have the possibility of writing reviews, giving feedback regarding the food and the service. Classic delivery aggregators take orders from consumers and send these orders to restaurants, and restaurants handle the delivery process for themselves. The other basic model appeared ten years ago on the OFD market, it is called new delivery. New deliverers differ from classic ones by having their own logistics network. Ospătarul built up its own delivery system that is assisted by an integrated logistical software. There is a logistical challenge lying behind the introduction of delivery service for an ecommerce food aggregator as it has to face multiple pick-up points (several restaurants to deliver from) and multiple delivery points (several consumer addresses to deliver at). Food is perishable and preferably has to arrive quick and warm to the hungry costumer, thus the delivery system has to have a focus on: last minute and last mile. Last mile delivery logistics refers to the final step of the delivery process (bringing the products to the customers door), while last minute refers to the fact that the goods has to be delivered as quickly, as accurately and as affordably to the customers door as possible. Right now, Ospătarul has 15 deliverers in Sfântu Gheorghe, who deliver food by bikes or by car, and has a delivery software that helps optimising the whole delivery process.

Major backend developments have also been made mainly during the post-COVID period at Ospătarul. The introduction of an integrated logistical software was one of the major backend activities, once with the introduction of the delivery service by the aggregator. Regarding the performance of the delivery system we can state that right now, Ospătarul delivers 25% of total orders placed on its platform, and order numbers of those restaurants Ospătarul delivers from: increased. This gives us a hint on the quality of the delivery service as compared to the restaurants' own delivery services in the town. The aggregator targets to deliver every second, i.e. 50% of the food orders placed at its platform. Average delivery time is under 30 minutes from pick-up. This timeframe is actually the best in town. Complaints are under 0.5%, and response time on complaints is extremely fast: under 20 minutes. What the delivery, the integrated logistical software ensures is: effective route planning, detailed logging of every aspect of the delivery and last but not least: maintaining high quality standards. Other major backend developments last year at Ospătarul have been: dashboard deployment and placing Android terminals in Restaurants for sending order data, both aiming to reach cost effectiveness - on mid- and long term - of several business processes. Dashboard deployment led to better administration and reporting, while the introduction of the use of Android terminals led to quicker and simplified communication between the aggregator and the partner restaurants.
The development timeline of ospatarul.ro shows a continuous sequence of actions that converge to meet and satisfy customers' needs on a higher level. Meal delivery experience of customers had thus been enhanced in multiple ways recently. During four years' time, tens of deployments have been made, and hundreds of bugfixes by Ospătarul team. Dospinescu et al. (2020) concludes that there are six factors lying behind the reputation of Romanian food delivery companies: the quality of the food delivered, the price, the variety of the menu, the taste of food, the perception of companions and the quality of the electronic application. Out of this six factors, the sixths one, i.e. the quality of the application is the one that directly depends on the aggregator company, in our case: Ospătarul. Accessibility of menus in differrent languages as well as various payment methods are facilities that were being introduced by Ospătarul in order to gain reputation by costumers who use it. Literature also shows that (Chai & Yat, 2019) behavioral intention (i.e. the individual likelihood to act) is related to a customer's experience. The more positive previous experience was, the more probable is that the customer is going to adopt online food delivery services. Positive experiences lead to the adoptive behaviour of new products and new technologies, in this case to the use of online aggregator platforms

for satisying nutrition related needs of customers. This is what Ospătarul follows with its development actions. Literature also points out that the time saving aspect of online food delivery services is an important factor for consumers when they opt for digital sources to order food. They prefer food to arrive to their location as fast as possible (Yeo et al., 2017). Ospătarul aims, since it turned to a new delivery platform, i.e. since it has its own delivery fleet: to deliver food from partner restaurants to the customers' door as quickly as possible. Being a last mile type of delivery process, the literature describes it as: the most expensive, most inefficient and polluting part of the supply chain (Mohammad et al., 2023). There is room for Ospătarul to make the delivery process a more sustainable one. First steps had already been made in this respect as 15% of deliveries are made by bicycles, and 85% by car. We here mention that Sfântu Gheorghe is geographically located at a mountainous area, with cold and snowy winters, two aspects that restrict the possibility of fully changing the delivery process from cars to bikes. Once with local adaptation of technological development however in the medium term it is possible to substitute vehicles by delivery robots, and thus offering an economically and environmentally sustainable OFD process.

The business model

B2B2C (business-to-business-to-customer) models are blended models of the classic forms of B2B (business-to-business) and B2C (business-to-customer) models (Zhao & Guo, 2012). The term "B2B2C" is already being used in the e-commerce scene. (Heinemann, 2023) Once with the emergence of technology-meditated selling, B2B2C models have risen as a fusion of the two of the basic sales models, i.e. B2B and B2C (Rejikumar & Asokan-Ajitha, 2023). However, B2B2C models are different from traditional reselling models composed by B2B plus B2C. In ecommerce environment, a B2B2C model is a model within the framework of which a supplier of goods and services (let's call first B) provides its products to another business (second B) with the purpose of selling them to consumers via second B's ecommerce channels. In this model the final price of the products are usually set by first B, and second B gets a commission on each sale. In B2B2C models small and/or emerging businesses as first Bs can take advantage of the popularity and reputation of the second B that sells their products to final consumers through ecommerce channels. First Bs are partnering with second B in order to sell products or services directly to the clients within the consumer base of the partner business (i.e. second B). (Virto, 2022)

The most common forms of B2B2C business models in e-commerce are online food delivery systems (services). Ospătarul operates as a B2B2C company. The services model has two basic components: a B2B and a B2C one. Ospătarul aggregates the offer of all of the partner restaurants that are listed on its webpage and application. This is the B2B component. The other part of the model is: B2C, that means that Ospătarul offers, delivers the food to (in some cases), and collects the money from (in some cases) the final customer.

The business model through which Ospătarul offers its' services to partner restaurants and selling the food prepared by them to consumers in a delivery system: is a B2B2C ecommerce one. (Figure 2.)

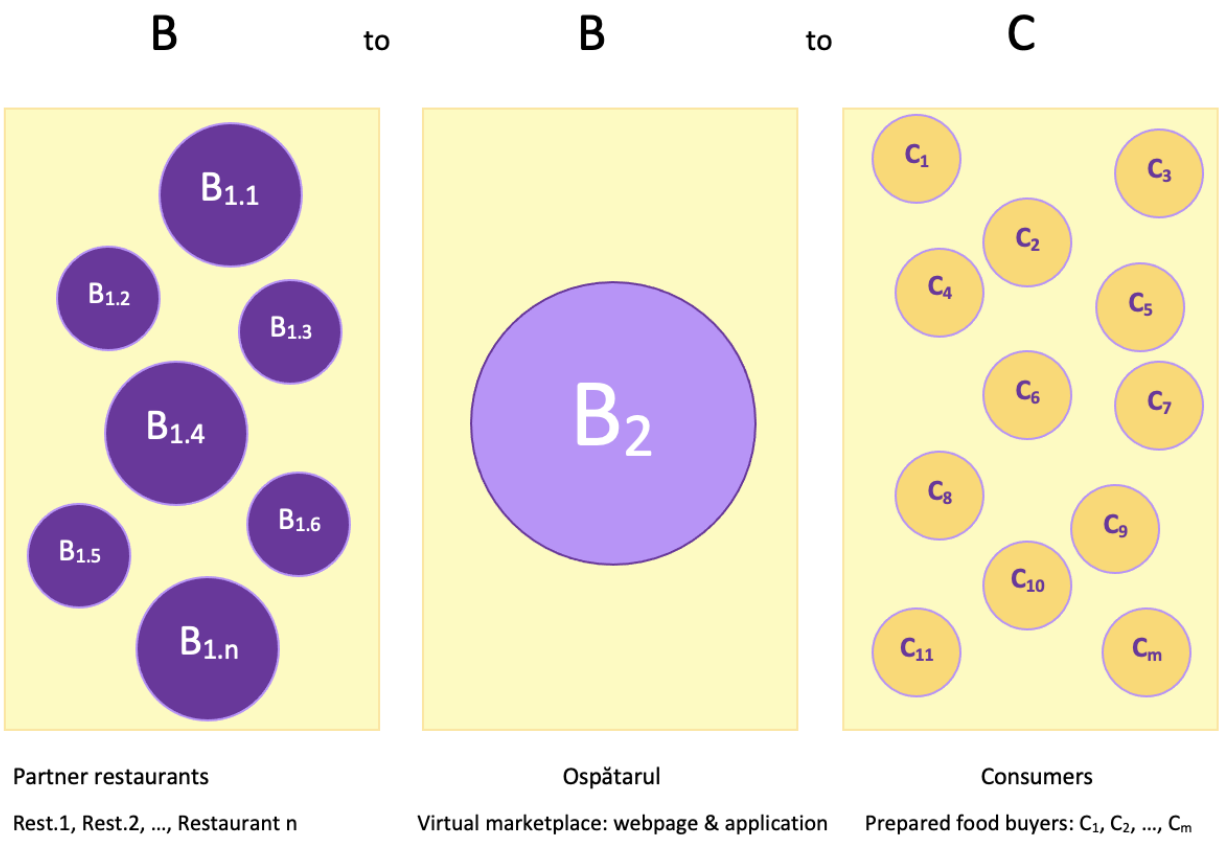


Figure 2.: Business model of Ospătarul
Source: authors' own edition

Ospătarul partners with local restaurants in Sfântu Gheorghe, Romania, to sell their food in a delivery regime while offering its virtual marketplace where partner restaurants can list their menus. Customers are buying food from the virtual marketplace, being aware of what restaurant cooks their meal. Customer relationship is owned and operated/handled by Ospătarul in such a model, including the set of customers that use either ospatarul.ro webpage or Ospătarul Application to order food home from various restaurants that are listed on the platform.

Database analysis

As the third pillar of our research, we analyzed the Ospătarul database in order to get ta closer look on, to know better the Ospătarul consumer. The following aspects have been analyzed: gender distribution of consumers, the age group distribution of consumers, the evolution of the average cart value, the evolution of daily and hourly transactions, as well as the most commonly ordered meals.

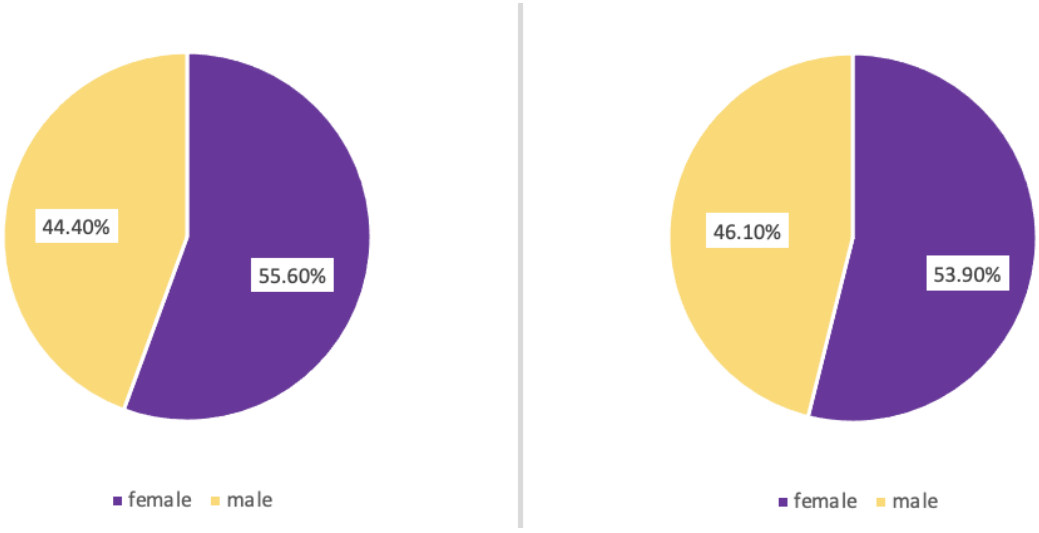


Figure 3.: Gender distribution of users of Ospătarul, Sfântu Gheorghe in 2021 and in 2022
Source: authors' own calculations, Ospătarul database

Gender distribution of consumers (Figure 3.) show the predominance of female users of the Ospătarul OFD service as compared to males in post pandemic years: 2021 and 2022. In 2019 Ospătarul was used by 51.57% female and 48.43% male customers. On Romanian country level in 2019 OFD services had been used by 52.50% female customers and 47.50% male customers (Statista, 2020). As compared to pre-covid local data, we see a slightly higher share of female users of Ospătarul OFD.

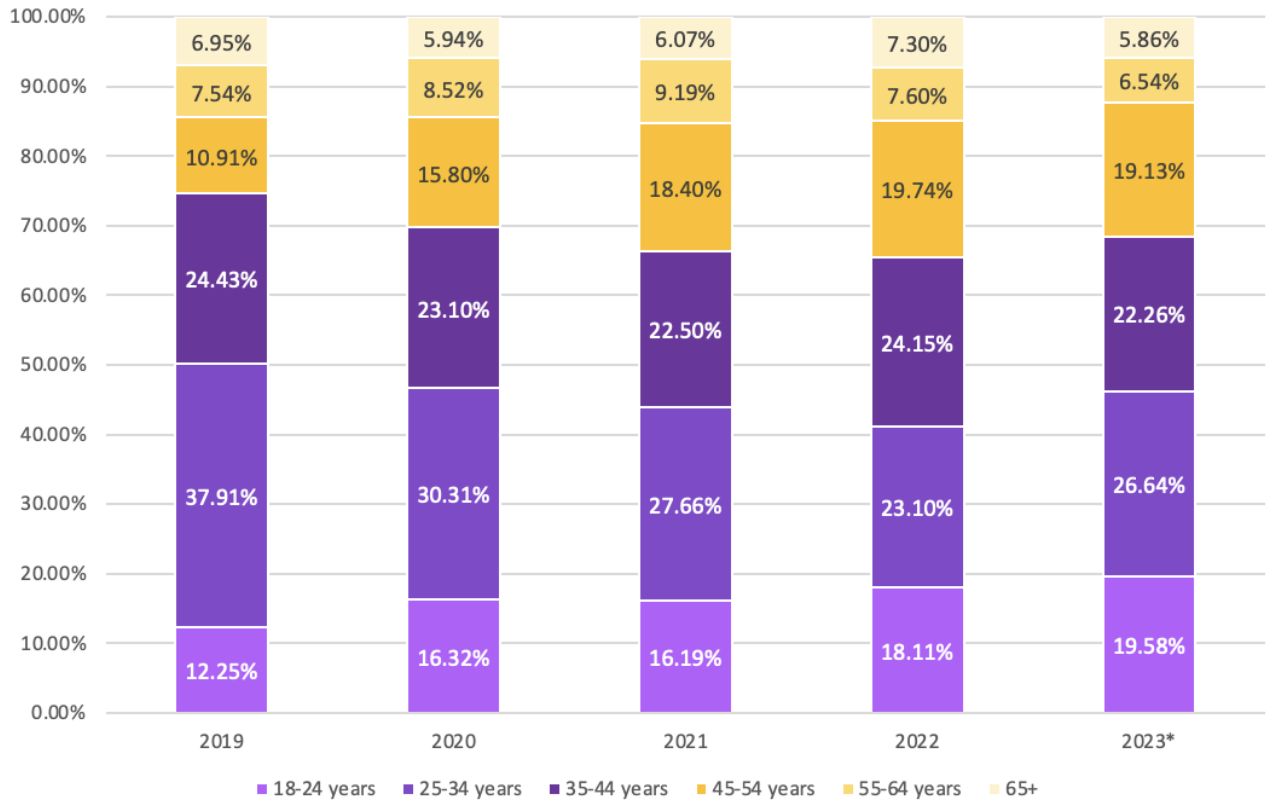


Figure 4.: Evolution of users of Ospătarul, by age groups, Sfântu Gheorghe
*First three months of 2023 included: January, February, March
Source: authors' own calculations, Ospătarul database

Age distribution of users of OFDs show that the 25-34 years age group is most active one both on country (according to Statista, 2020) and on local level. Having the largest share on the one hand, we see a decreasing share of this age group on the other hand between 2019 and 2022. There is a growing potential in the total number of users as time passes by, because there is a relative large share of users aged 18-24 years potentially followed by even a larger one as those under 18 now are entering the market during next years. The growing share of the youngest users' age group is already noticeable at Figure 3: from 12.25% in 2019 to 19.58% in 2023 (most recent data available: first three months of 2023 included: January, February, March). Less active OFD customer age group is the over 55 years cathegory. (*Figure 4.*)

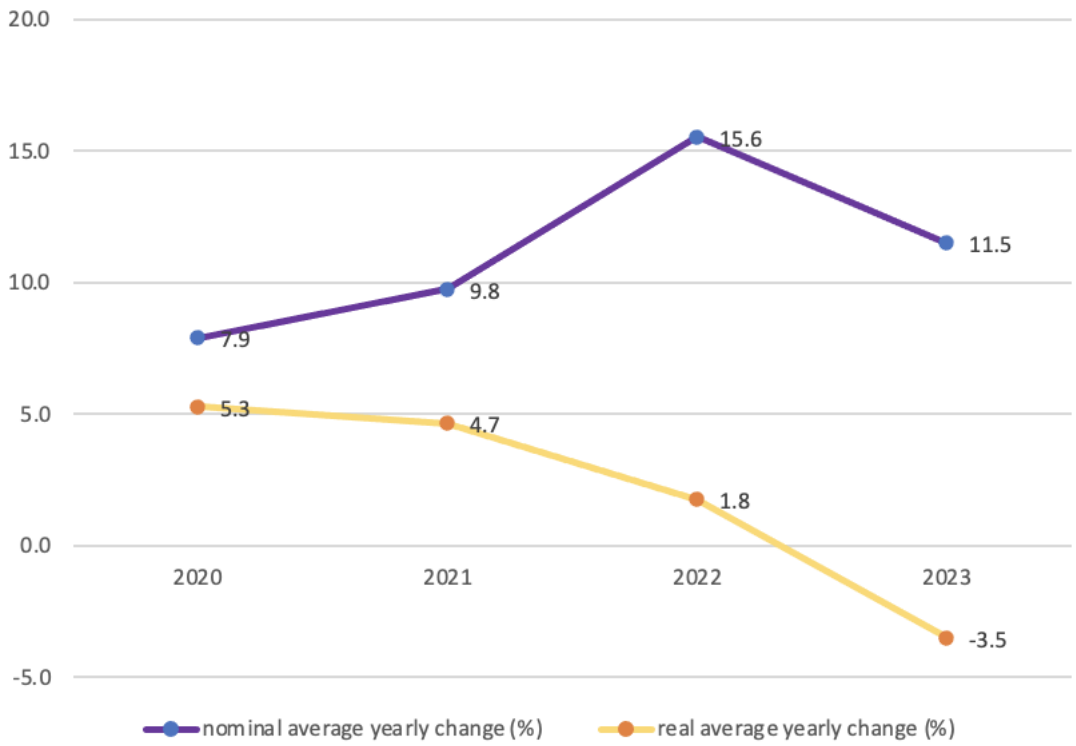


Figure 5.: Evolution of the average cart value at Ospătarul, Sfântu Gheorghe (%, reference: previous year)
Source: authors' own calculations, Ospătarul database

We analysed the evolution of average cart value at Ospătarul. Nominal average yearly change shows an increase from one year to the other with steps between 7.9% and 15.6%. We then calculated real average yearly changes of the average cart value by correcting nominal values with the yearly inflation rate. In real terms, regarding the post pandemic period (2020-2022), we see an average yearly increase with a decreasing evolution in time. As for the first three months' data available for the year 2023 we can notice a decrease of the average cart value in real terms, taking into consideration the inflation rate. This is the first time when a decrease of average cart value is detectable at Ospătarul, however the whole 2023 year data is not yet available. High inflation rates, post pandemic crisis and current world economic conditions that have an impact to the Romanian economy, all lead to a possible money saving intentions of Ospătarul customers.

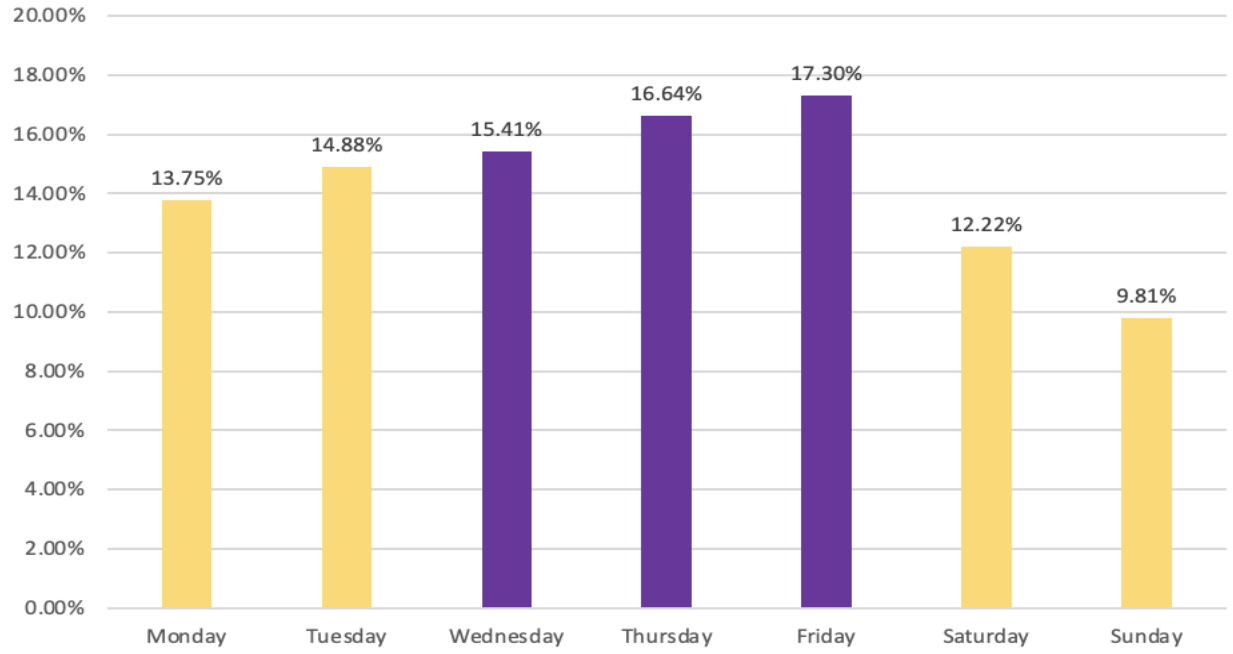
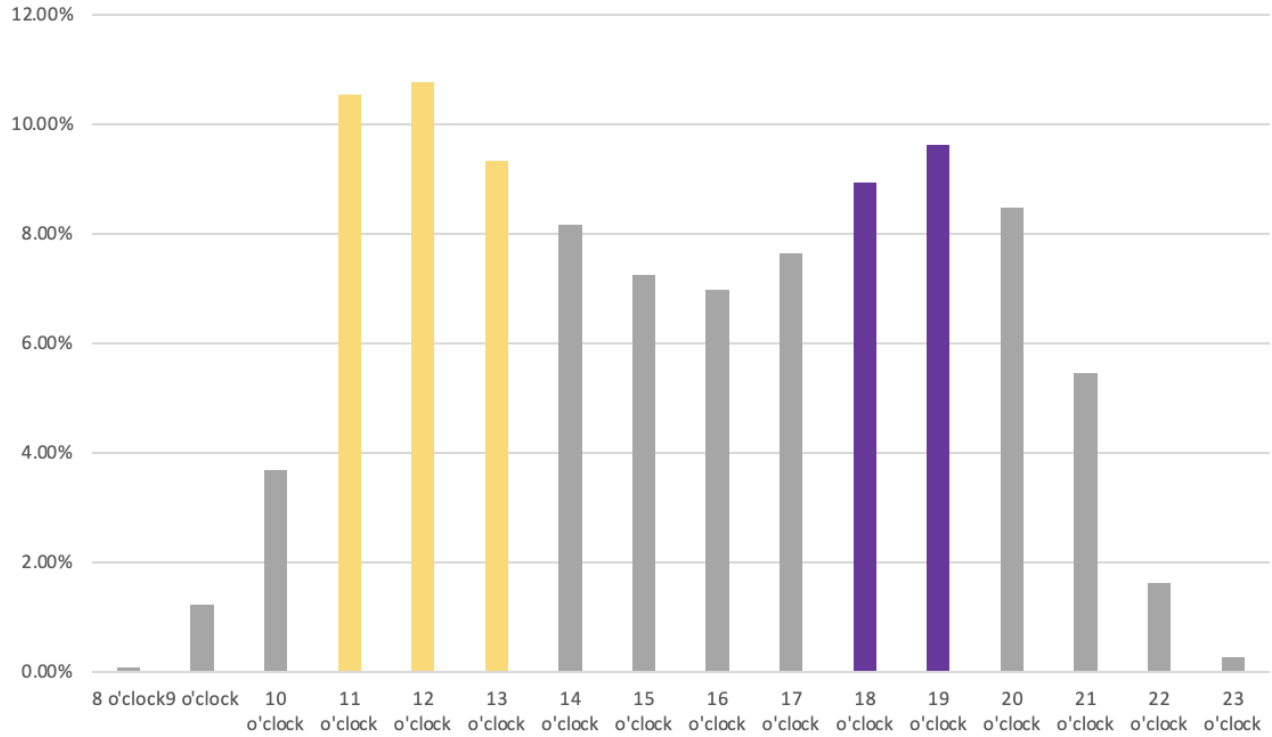


Figure 6.: Evolution of daily transactions at Ospătarul between 2019 and 2022, in Sfântu Gheorghe
Source: authors' own calculations, Ospătarul database

According to Statista (2020), Thursday, Friday and Saturday were the most popular days of OFD in Romania, in the year 2019. Analysing the most popular days of the week at Ospătarul OFD, taking into consideration data referring to years: 2019, 2020, 2021 and 2022, we can conlude that Wednesday, Thursday and Friday were the most popular ones. Within this timeframe, in Sfântu Gheorghe 49.34% of orders were placed during the three most popular days, while 50.66% on the other four days of the week (*Figure 6.*)



Analysing customer behaviour at Ospătarul OFD (Figure 7.), referring to the most popular hours of the day we can define two major timespans. These are as follows: lunchtime (between 11.00 and

14.00 o'clock) and dinnertime (between 18.00 and 20.00 o'clock). These exact timespans are observable in 2019, on Romanian country level, according to Statista (2020). If we take a closer look we can conclude that in Sfântu Gheorghe every second order happens during lunchtime or dinnertime, while every other orders in a day happen during the other eleven open hours of restaurants. (Figure 7.) The uneven distribution of online food orders in within a day means a challenge for the management of the delivery system.

Figure 7.: Evolution of hourly transactions at Ospătarul between 2019 and 2022, in Sfântu Gheorghe
Source: authors' own calculations, Ospătarul database

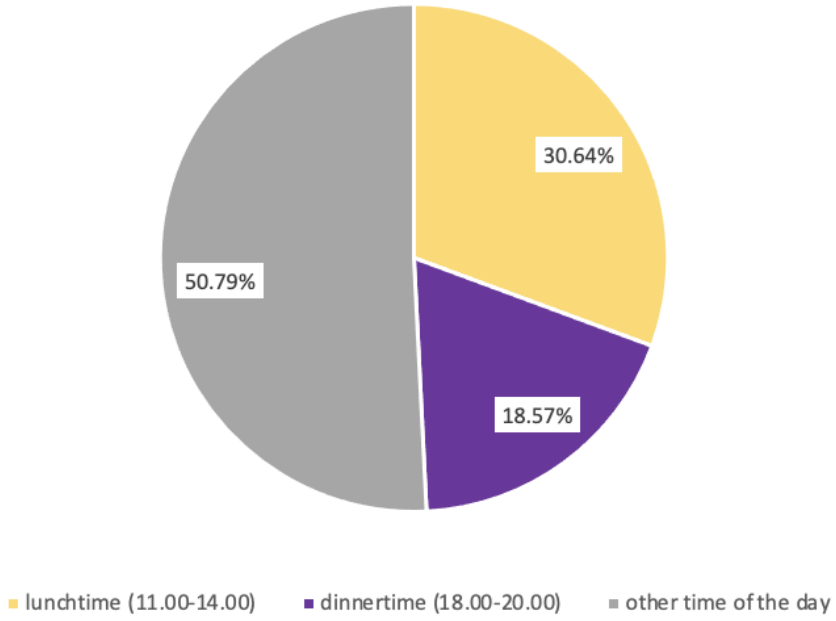


Figure 8.: Evolution of mealtime transactions (derived from hourly transactions) at Ospătarul between 2019 and 2022, in Sfântu Gheorghe
Source: authors' own calculations, Ospătarul database

Regarding the favorite dishes ordered, pizza ranks first among Romanians, with more than 3 million searches in 2022, according to the analysis of the Bookingham platform (economedia.ro, 2023). The pizza keeps its place at the top of the ranking since 4 years ago, in the post-pandemic era as well, having been also the favorite of Romanians during the pandemic. In 2020, Romania passed 2,600 pizzerias. Similar trends are noticeable locally, in Sfântu Gheorghe, as Ospătarul database shows that the most searched product is pizza, but with a slightly decreasing share among orders as time goes by: 30% of total orders in 2019, 22% of total orders in 2020, 22% of total orders in 2021, 22% of total orders in 2022, 19% of total orders in the first three months of 2023 were pizza products. It is also an important indicator that 28% of partners listed at ospatarul.ro and on Ospătarul application are pizzerias. Decreasing shares of pizza consumes can caused by the fact that the aggregated offer of the platform is now, in 2023 more diversified as it was at the beginning, in 2019. Pizza still remains the most consumed product via online food delivery in Sfântu Gheorghe both during pandemic times ad the post pandemic era as well.

Conclusion

Three major areas had been considered within present research by analysing a small local ecommerce OFD actor from Romania. Firstly we studied the development timeline of services system of Ospatărul OFD. Secondly we modelled the business type Ospătarul uses. Thirdly we analyzed the Ospătarul database in order to depict local consumer behavior, customer preferences, that we then compared to country level patterns.

We found that Ospătarul had and still has a continuously evolving set of services both regarding pre-pandemic period, the pandemic era, and post-pandemic times. Backend, frontend development and new service introduction activities target to ensure high quality service package both for partner restaurants and for OFD food consumers.

We modelled the B2B2C business type used by Ospătarul. A B2B2C ecommerce business model in food delivery can be a win-win-win model in which all the three parties benefit in the following way: firstly restaurants get access to all customers of the aggregator, this way having the possibility to increase the volume of sales, secondly: the marketplace gets commissions from partner restaurants for the sells that occurred at their virtual aggregated market, thirdly: consumers enjoy a wider range of food and meal products on a marketplace than on a single restaurants webpage or application.

Several similar patterns were detected on local and on country level. Similarity was detected in terms of: gender distribution, age group distribution, peak ordering hours in within a day. Pizza still remains the most consumed product via online food delivery in Sfântu Gheorghe both during pandemic times ad the post pandemic era, as well as it is Romanian inhabitants' favourite online food delivered dish currently.

Ospătarul started operating in Sfântu Gheorghe in February 2019. International competitors entered the local market as follows: Glovo in March 2021, Foodpanda in April 2021 and Tazz in May 2023. An online food delivery took place on international level: Glovo acquired Foodpanda in Romania and Bulgaria. Consequently, Foodpanda Sfântu Gheorghe was taken by Glovo Sfântu Gheorghe. Daily number of orders remained constant at ospatarul.ro. Growing potential was blocked due to the presence of Glovo and Foodpanda during the year 2021, with a growth of order numbers during 2022 and in the first months of 2023. We can conclude that the small local actor still survived international competition with three multinationals entering the local market during the last two years. Possible reasons of survival are the following. Currently highest number of restaurants are still reachable at ospatarul.ro, and in Ospătartul application. Ospătarul is reachable in 3 languages: English, Hungarian, Romanian. Glovo and Tazz only uses Romanian language. 76% of the inhabitants of Sfântu Gheorghe are Hungarian. Multinationals completely ignore local cultural patterns. Ospătarul has its own quick delivery service introduced since April 2021, which offers the highest quality of this type of service currently reachable in the town. Customer care and support offered by Ospătarul both regarding partner restaurants and considering end users is also unique locally. Multinationals are working with negative margins in order to gain market share. They can afford it and they practice it for a long period of time. This aspect makes extremely difficult to compete with them for the small local company.

References:

Chai, L. T., & Yat, D. N. C. (2019). Online food delivery services: Making food delivery the new normal. Journal of Marketing advances and Practices, 1(1), 62-77.

Divya Kaushal (2023): Top 10 successful food delivery apps in the world, https://www.netsolutions.com/insights/top-10-successful-food-delivery-apps-in-the-world/ , accessed: 05.04.2023.

Dospinescu, N., Dospinescu, O., & Tatarusanu, M. (2020). Analysis of the influence factors on the reputation of food-delivery companies: Evidence from Romania. Sustainability, 12(10), 4142.
Economedia.ro (2023): De pe ce platforme își comandă românii mâncare? Topul aplicațiilor preferate și a brandurilor de fast-food, 21. February 2023 https://economedia.ro/de-pe-ce-platforme-isi-comanda-romanii-mancare-topul-aplicatiilor-preferate-si-a-brandurilor-de-fast-food.html#.ZFFOp-xBy3I , accessed: 05.04.2023.

Heinemann, G. (2023). The new online trade: Business models, business systems and benchmarks in e-commerce. Springer Nature.

McKinsey&Company (2021): Kabir Ahuja, Vishwa Chandra, Victoria Lord and Curtis Peens, Ordering in: The rapid evolution of food delivery https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/ordering-in-the-rapid-evolution-of-food-delivery#/ , 22. September 2021, accessed: 22.03.2023.

McKinsey&Company (2016): Carsten Hirschberg, Alexander Rajko, Thomas Schumacher and Martin Wrulich, The changing market for food delivery, Telecommunications, November 2016, https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/the-changing-market-for-food-delivery# , accessed: 08.04.2023.

Mohammad, W. A., Nazih Diab, Y., Elomri, A., & Triki, C. (2023). Innovative solutions in last mile delivery: concepts, practices, challenges, and future directions. In Supply Chain Forum: An International Journal (pp. 1-19). Taylor & Francis.

Rejikumar, G & Asokan-Ajitha, A. (2023). Business customer experience in B2B2C service settings: a scale development. Journal of Business & Industrial Marketing, 38(4), 886-904.

Statista (2020): Digital Market Insights. Online food delivery in Romania in 2019. https://www.statista.com/outlook/dmo/online-food-delivery/romania , accessed 04.04.2021.

Virto Commerce (2022): What is B2B2C in eCommerce: examples, business model and definition, 25th August 2022, https://virtocommerce.com/blog/b2c-ecommerce-b2b2c#textinparagraphsorincolumnsUlhA , accessed: 22.04.2023.

Yeo, V. C. S., Goh, S. K., & Rezaei, S. (2017). Consumer experiences, attitude and behavioral intention toward online food delivery (OFD) services. Journal of Retailing and Consumer services, 35, 150-162.

Zhao, L., & Guo, S. (2012). The value creation of B2B2C e-business mode based on SaaS. Journal of Electronic Commerce in Organizations (JECO), 10(3), 1-12.

www.insse.ro, TEMPO online database, National Statistical Institute, Romania

Ospătarul datasets: www.ospatarul.ro
ospatarul.ro, Google Analytics Datasets
ospatarul.ro, Google Ads Datasets
Ospătarul Application

PIROSKA BIRÓ, TAMÁS KÁDEK:
TASK ANNOTATION CAPABILITIES OF THE PROGCONT SYSTEM IN PRACTICE

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Abstract
The ProgCont system has been developed since 2011 by the lecturers of the Faculty of Informatics of the University of Debrecen, and since 2014 the software, originally intended for competitions, has been intensively used for the assessment of various programming courses. The ProgCont system helps to evaluate practical programming tasks by automatically compiling and running the source code and checking the output of the program. The system can be used not only by the citizens of the University of Debrecen, but the current collection of 354 exercises and the possibility of automatic evaluation of the source code submitted for these exercises is publicly available to anyone. It was also used for the evaluation of homework assignments in the subject Data Structures and Algorithms in C# programming language at the Faculty of Economics, Socio-Human Sciences and Engeneering, Sapientia Hungarian University of Transylvania in 2021.
The ProgCont system bases the evaluation of the assignments on the results of running the submitted solutions in several different entries. Although the public interface only shows students an aggregated result (how many inputs gave the correct answer and how many did not), the system's database allows us to explore deeper correlations. In recent years, the possibility of annotating test cases uploaded to ProgCont has been introduced, allowing the sub-tasks covered by each test case to be marked. In the case of annotated test sets, some of the solutions are already good. Of course, test cases can also be modified and annotated afterwards, giving the teacher a better insight into previously submitted but not quite-perfect solutions.
In this article, we will look at the source code submitted in the context of the Data Structures and Algorithms object in the C# programming language. In order to get a complete picture of some problems, we will complete and annotate the test cases and then re-evaluate the submitted solutions. The results of our study provide important feedback to instructors on what students have difficulty solving tasks and can be incorporated into future teaching of the subject, which can increase student achievement.

Keywords: ProgCont system, automatic task evaluation, programming education, annotations

Introduction
Sapientia Hungarian University of Transylvania, Faculty of Economics, Socio-Human Sciences and Engeneering, introduces the course Data Structures and Algorithms in the education of first-year students of Business Informatics. In 2021, the solution of the programming tasks was integrated into the introductory programming course and was taught using C# programming language. As part of the requirements of the course, students were required to complete 3 assignments independently as homework on a weekly basis.
For the automatic and objective evaluation of the submitted homework assignments, we used the ProgCont system, which has been developed at the Faculty of Informatics of the University of Debrecen for decades (Biró 2020, 2021, 2022; Kádek 2019a, 2019b, 2020). The pandemic also

required a redesign of the ProgCont system (Hargitai 2020; Horvath 2017; Gonzales 2020; Kádek 2020; Zhu 2020). Distance learning requires the use of tools to assist in stand-alone preparation. Thanks to automatic assessment, the student receives immediate feedback on the success of the assignment submitted. The automatic assessment evaluation is done by compiling the submitted solution and checking, for several different inputs, whether the program gives the correct output. Based on these, the student sees a percentage of the number of test cases in which he or she has performed well. Those can be considered as a correct solution (when the program produces the correct result for all inputs), a partially correct solution (when the result is not correct for all inputs), and a bad solution (when the program does not produce a good solution for any input). Given that the description of the tasks contains at least one test case (expected output for its input data) as an example, producing a partially correct solution is not difficult. The design of test cases is good if they cover different extreme cases, in which case a higher percentage result means that more subproblems have been fully solved.

The Sample

For the Data Structures and Algorithms course of the year 2021, 10 sets of problems and a total of 30 problems have been set. The problem sets were created using the tasks available in the ProgCont system. Students were allowed to try more than once to submit a task, so the number of tasks submitted could be several times the number of students (25) for the more difficult tasks. In 7 of the set tasks, the number of submissions reached 50. For these tasks, it is worth investigating in order to identify the sub-tasks that are challenging for the students.

Table 1: Selected tasks

TASK	TASK TITLE	COUNT	PASS	ERES	ERUN	ETME	EPRE
Task 1	Tornado	66	11	29	25	0	0
Task 2	Here he is, here's Bagaméri, who measures his own ice cream	50	16	7	21	0	0
Task 3	Reverse number series	58	21	2	8	0	26
Task 4	Piggy bank	56	15	33	7	0	0
Task 5	Lottery draw	52	10	23	6	0	6
Task 6	Combing blocks	67	11	23	5	0	21
Task 7	The greats of the turn of the century	62	5	39	9	0	0

Results

Results by Tasks

First, it is worth looking at which task was the most challenging for the students. There is an opportunity to decide this by looking at the proportion of successful and unsuccessful submissions. For the 7 tasks selected, this ratio is shown in *Fig. 1*, based on *Table 1*. For those submissions whose compilation was successful, ProgCont runs and evaluates the submitted solution on a test case-by-test case basis. If the correct output is obtained for each test case, the solution is evaluated as PASS (Accepted), whereas for the wrong answer, the system gives one of the following evaluations:

- ERUN-Runtime error,
- ETME-Timeout,
- ERES-Wrong answer,
- EPRE-Presentation error.

The ratio of all to correct submissions can be misleading; if the student submits the same wrong program more than once with minor modifications during debugging, it may make the task appear more difficult than it actually was. It is, therefore, worth looking at the time taken to get the first correct solution. It can be assumed that if there is a longer time lag between the first submission and the first correct solution, the task is more difficult.

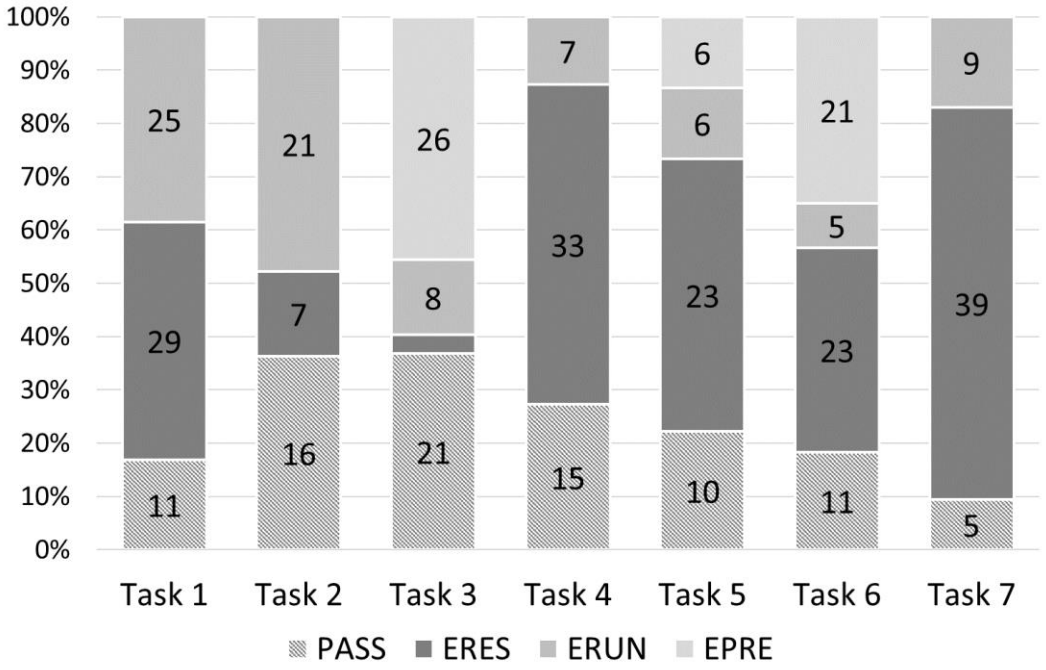

Figure 1. Results by tasks

Fig. 2 shows the difference in minutes between the first and the first place in the list. For the selected 7 tasks, we observe a larger difference in three of them(Task 1[51], 4[52], 7[53]), so we restrict our further analysis to these three tasks where the difference was at least 5 hours.

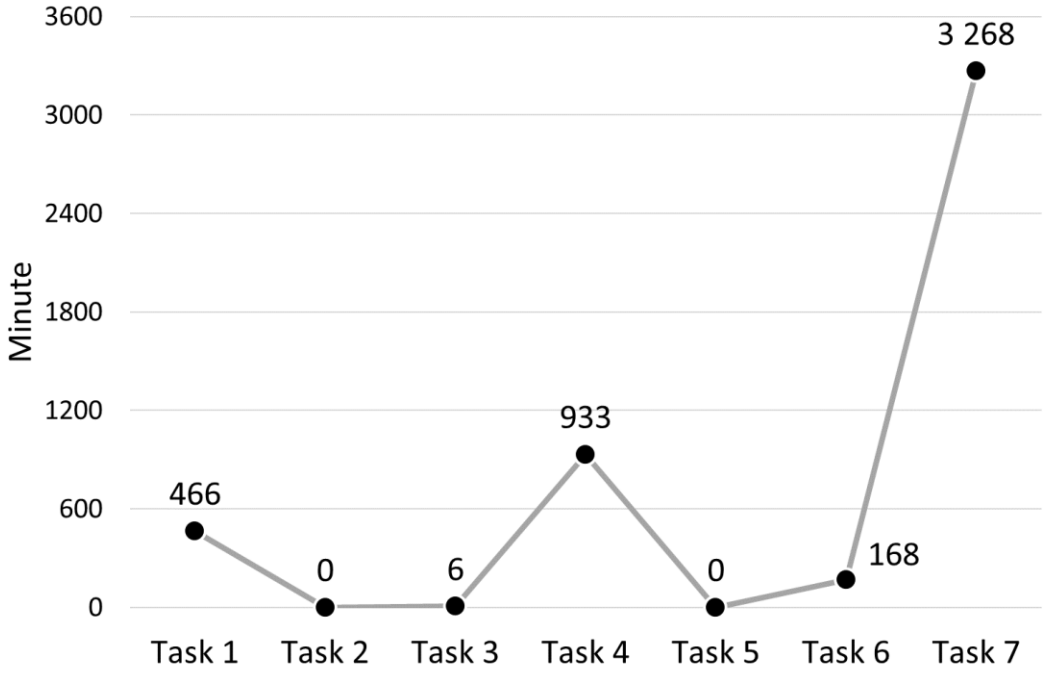

Figure 2. Time between first and first passed submission

[51] https://progcont.hu/progcont/100349/?pid=201511

[52] https://progcont.hu/progcont/100353/?pid=201527

[53] https://progcont.hu/progcont/100325/?pid=201450

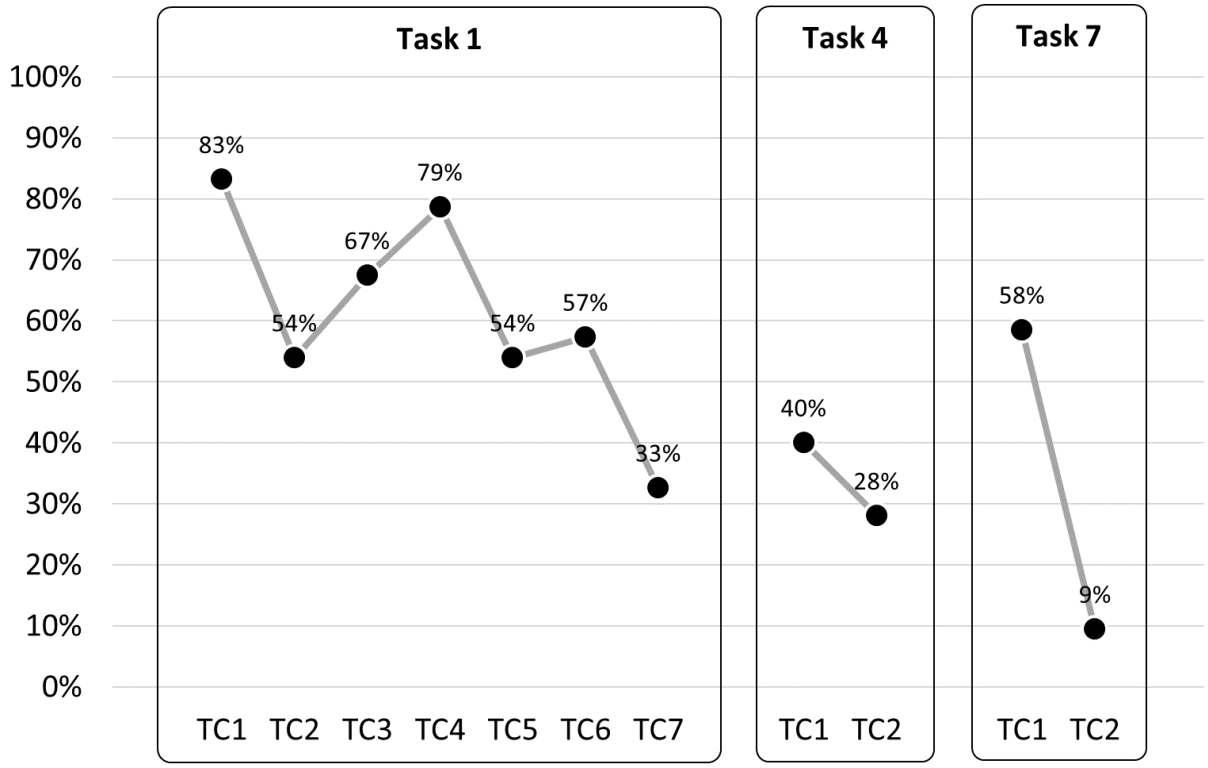

Figure 3. Results by test cases

The three tasks selected were created in ProgCont at different times and for different subjects, which is shown in *Fig. 3*. Each task has at least two test cases, the first of which (TC1) is shown as an example in the task description. The majority of students only submit solutions that produce a good result on this example test, which explains the high success rate of TC1. For some tasks (Task 4 and 7), a single second test case contains all possible extreme inputs, while in other cases (Task 1) several different test cases are used to check the correctness of the submitted program. The use of two test cases is advantageous in terms of the evaluation time of the solutions, while multiple test cases provide more information on how many extremes the student has prepared his program for.

Table 2: Results of Task1 with test cases

TC NAME	PASS	ERES	ERUN	EPRE
TC1	108	28	42	1
TC2	76	59	44	0
TC3	83	46	49	1
TC4	99	35	44	1
TC5	75	60	44	0
TC6	95	29	54	1
TC7	56	76	47	0

TASK 1 - Tornado

In the case of Task 1, there are considerably more test cases (7) available, which allow us to distinguish between partially good solutions, but the test cases do not indicate which part of the task the submitted solution failed (*Table 2*).

Table 2: Results of Task1 with pass rates

COUNT	TC1	TC2	TC3	TC4	TC5	TC6	TC7	PASS RATE
55	0	0	0	0	0	0	0	0%
3	0	0	0	0	0	0	1	14%
1	0	1	0	0	0	0	0	14%
8	0	0	0	0	0	1	0	14%
4	1	0	0	1	0	0	0	29%
11	1	0	0	0	0	1	0	29%
2	0	0	0	1	0	1	0	29%
2	1	0	0	1	0	1	0	43%
8	1	0	1	1	0	0	0	43%
1	0	1	0	0	1	0	1	43%
1	1	1	0	1	1	0	0	57%
1	0	1	0	0	1	1	1	57%
10	1	0	1	1	0	1	0	57%
7	1	1	0	1	1	1	0	71%
4	1	1	1	1	1	0	0	71%
10	1	1	1	1	1	1	0	86%
7	1	1	1	1	1	0	1	86%
44	1	1	1	1	1	1	1	100%
	108	**76**	**83**	**99**	**75**	**95**	**56**	

In *Table 3* we have collected which test cases were passed and which were not passed for each submission. There are 55 submissions that failed all the test cases and 44 submissions that passed all the tests. In between these two extremes are the partially good solutions (80), which show 16 different patterns of test case completion. In conclusion, this resolution does not provide any further help in the debugging process, and the individual subtasks covered by the test cases cannot be identified.

Results by Annotations

The development of the ProgCont system has been affected by the situation created by the Pandemic in recent years. The role of independent preparation has become more critical, whereby students who come up with a faulty solution must be guided to the cause of the problem. It is not enough to give feedback in percentages showing the rates of correct and incorrect results; it is also necessary to identify the characteristics of the tests that failed. This will give the student information about which sub-problems have already been solved and in which direction to look for the cause of the failure. In response to this challenge, we have started to rethink the way in which test cases are constructed, on the one hand trying to ensure that each extreme case appears in a different test case, and on the other hand to indicate which subproblems each test case focuses on.

In the case of Task4 and Task7, it is not possible to draw conclusions about sub-tasks from the two test cases available, so new test cases have been created for these tasks. These test cases were composed in such a way that they are well separated in content, and the differences between them were highlighted by their annotations (Biró 2021, 2022; Balázs 2021).

TASK 4 - Piggy Bank

In the Piggy Bank problem, two separate subproblems must be solved to be successful. You have to sum up the integer values at the input and check the fulfilment of a condition in each row separately. In the hope that the solution of the sub-tasks will be reflected in the partially good solutions, we have created new test cases according to the different characteristics of each sub-task:

- For the aggregation task, we distinguish between cases where the input data set consists of a single row (students = ONE) and cases where there are several (students = MORE), and

between cases where there is a single input per row (savings = ONE) and cases where there are several (savings = MORE).

- For condition testing, we split the test cases to contain only rows where the condition is met (range = GT), only rows where it is not met (range = LT), and cases where the inputs are right on the border (range = EQ).

Table 3: Results of Task4 with new test cases

TEST CASES	ANNOTATIONS			RESULTS			
NAME	**RANGE**	**STUDENTS**	**SAVINGS**	**PASS**	**ERES**	**ERUN**	**EPRE**
TC1				59	47	13	3
TC2				46	61	12	3
TC3	LT	ONE	ONE	81	24	13	4
TC4	EQ	ONE	ONE	74	31	13	4
TC5	GT	ONE	ONE	73	32	13	4
TC6	LT	ONE	MORE	83	21	14	4
TC7	EQ	ONE	MORE	73	32	13	4
TC8	GT	ONE	MORE	72	33	13	4
TC9	LT	MORE	ONE	76	28	14	4
TC10	EQ	MORE	ONE	52	53	13	4
TC11	GT	MORE	ONE	51	54	13	4
TC12	LT	MORE	MORE	79	25	14	4
TC13	EQ	MORE	MORE	51	55	12	4
TC14	GT	MORE	MORE	50	56	12	4

According to the annotations introduced, 12 new test cases were created. As usual, the original test data have been kept for comparison. The TC1 test case in this case also contains the sample published in the task description, so one would expect the number of successful submissions to be the highest. *Table 3* shows, however, that there are some programs that do not work on the officially published input but successfully solve some sub-task.

The most difficult sub-task was found to be the one where all the rows of the multi-row input (students = more) fulfilled the condition to be tested. The test cases with the annotation range = EQ and range = GT satisfy the condition to be tested in all rows, except in the case of range = LT.

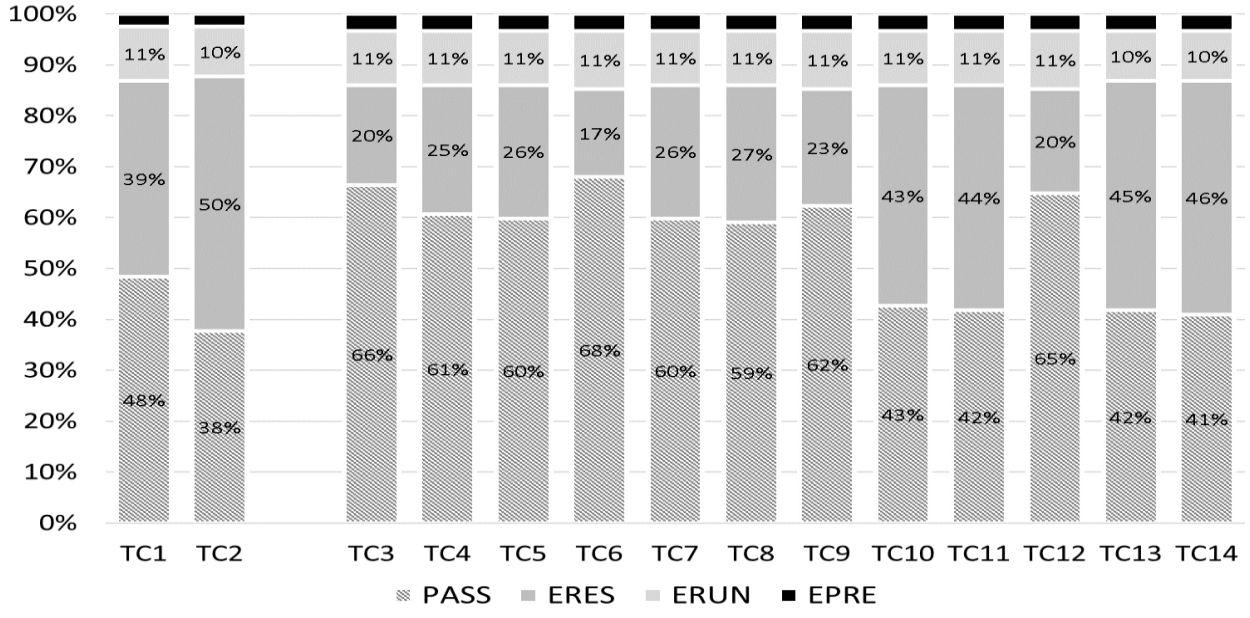

Figure 4. Results of Task4 with new test cases

The results obtained with test cases with different annotations are summarised in *Fig. 4*. The result is unaffected by whether the test case contains one or more savings: both test cases with savings = more and savings = one annotations have a success rate of 56%. The students = more annotated test cases with multiple lines of input had fewer applications than the single-line test cases, which suggests that students find it challenging to deal with multiple lines of input. A similar difference can be observed for range, i.e. the difference in the success rate of test cases with different values of the annotation indicates that some programs only worked correctly when the condition to be tested was not fulfilled, while when it was fulfilled, they could not detect it. In summary, more emphasis should be placed on the handling of multiple inputs and how to evaluate the test condition in exercises.

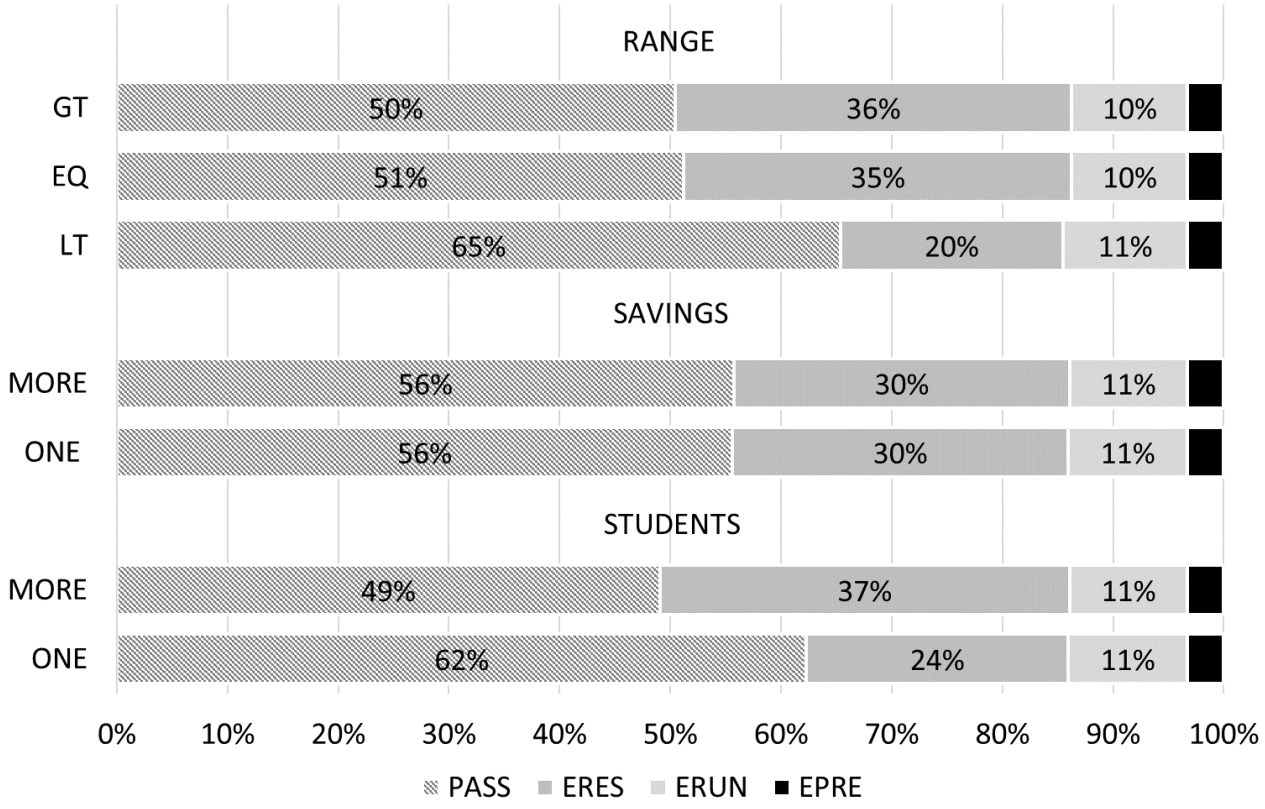

Figure 5. Results of Task4 by annotations

TASK 7 - The greats of the turn of the century

Of the three exercises, the Task 7 TC2 test case had the lowest number of solutions accepted (9%), despite a success rate of over 50% on TC1. Therefore, Task 7 was chosen as an example for the remaining examinations.

The task of the program to be created is to write, in order of scanning, to the standard output the names and the number of years lived by persons who, according to their birth and death years given in the input rows, "lived at the turn of the century", i.e. were not born in the century in which they died.

A critical aspect of solving this exercise is to get the century correct. In order to break this down into sub-tasks, new test cases (11 of them) were created from the data in the second test case. The annotations of the test cases are arranged according to the last two digits of the year of birth and death.

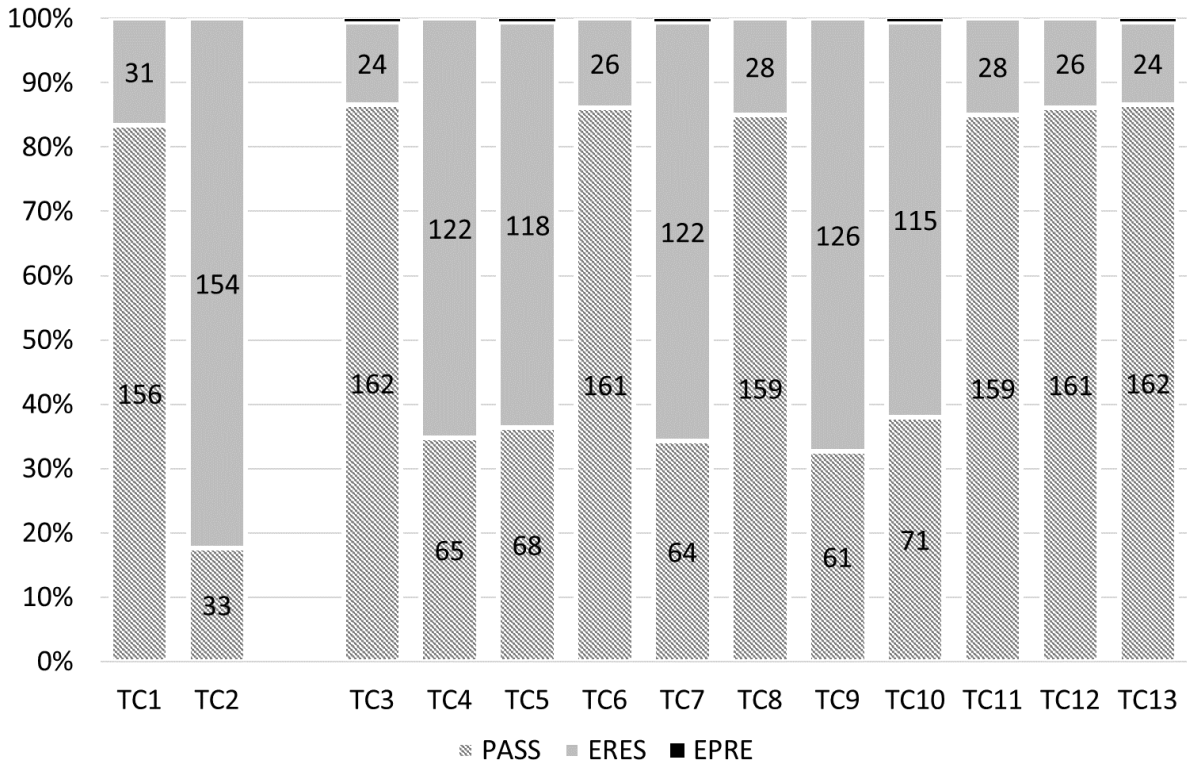

Figure 6. Results of Task7 with new test cases

Fig. 5 and *Table 2* show the number of successful and unsuccessful solutions per test case. In order to determine the percentage of completion of each subtask, the test cases must be grouped by annotation (*Fig. 6*).

Table 4: Results of Task7 with new test cases

TC NAME	FROM	TO	PASS	ERES	EPRE
TC1			**156**	**31**	**0**
TC2			**33**	**154**	**0**
TC3	**01**	**99**	**162**	**24**	**1**
TC4	**00**	**01**	**65**	**122**	**0**
TC5	**99**	**00**	**68**	**118**	**1**
TC6	**99**	**01**	**161**	**26**	**0**
TC7	**50**	**00**	**64**	**122**	**1**
TC8	**98**	**01**	**159**	**28**	**0**
TC9	**00**	**99**	**61**	**126**	**0**
TC10	**99**	**00**	**71**	**115**	**1**
TC11	**99**	**01**	**159**	**28**	**0**
TC12	**99**	**02**	**161**	**26**	**0**
TC13	**01**	**99**	**162**	**24**	**1**

Table 4 and *Fig. 7* show that the most difficult sub-task was the successful completion of TC4,5,7,9,10, where one of their annotations was the last year of the century (ending in 00).

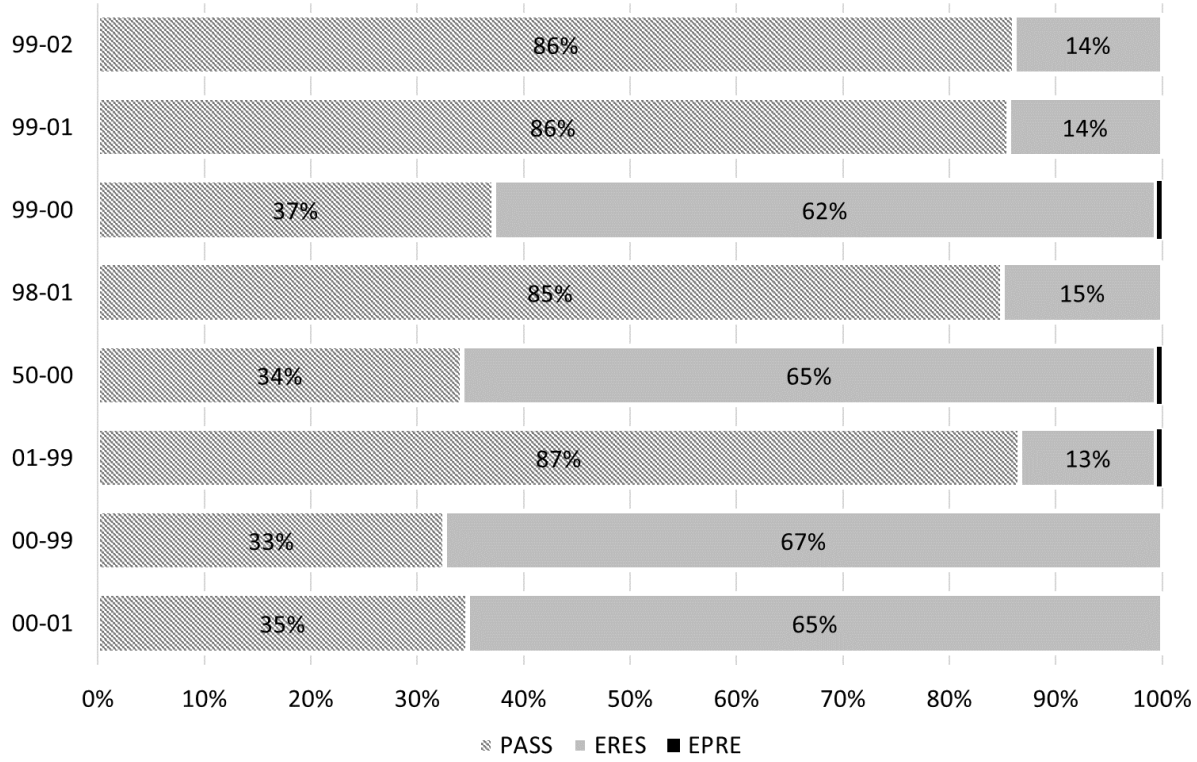

Figure 7. Results of Task7 by annotations

Conclusions

In this article, we examined students' performance on three selected tasks. The main objective of the study was to determine whether the annotation tools introduced in the ProgCont system in recent years are able to provide the instructor with additional information on these tasks. For the first task, several test cases were available and were analysed without using the annotation technique, while for the other two selected tasks, new test cases were created from the existing ones, grouped by subproblems and annotated accordingly.

Unsurprisingly, for the tasks where annotation was performed on the newly created test cases, the results were more impressive. In these cases, the test cases were structured according to the annotations, which clearly facilitated the identification of the subproblems. Without creating new test cases, it is possible to see that some of the solutions are good, but it is not possible to identify which subproblems they fulfil.

The work invested in creating new and annotated test cases pays off. On the one hand, it provides the instructor with new information, i.e. it highlights the features of the task that deserve special attention (which one does not necessarily realise after the first reading), and it also shows which sub-tasks are challenging for the students to solve. On the other hand, it also helps the students to debug the application, as they can produce test data that will help them to debug the application.

References

Balázs, Patrícia, Biró Piroska, Kádek Tamás, Kósa Márk and Pánovics János (2021), "Mathability and exploring mathematical skills of programmers with exercises' annotations". In: Nikodem, Jan; Klempous, Ryszard (eds.) *12th IEEE International Conference on Cognitive Infocommunications (CogInfoCom 2021)*: Proceedings IEEE 2021, pp. 347-350.

Biró, Piroska and Kádek Tamás (2020), "Automatic evaluation of programming tasks at the University of Debrecen", in *INTED2020 Proceedings*, 2–4 March, 2020, pp. 3522–3527, DOI:10.21125/inted.2020.0994.

Biró, Piroska and Kádek Tamás (2021), “How can the ProgCont system help with programming education during a pandemic?” In *15th International Conference on Economics and Business: Challenges in the Carpathian Basin: Global Challenges - Local Answers. Interdependencies or Slobalisation?* Cluj-Napoca, Editura Risoprint (2021), pp. 179-191.
Biró, Piroska and Kádek Tamás (2022), “The Mathability of Computer Problem Solving with ProgCont”. *Acta Polytechnica Hungarica 2022*, 19(1) pp. 77-91. https://doi.org/10.12700/APH.19.1.2022.19.6
Biró, Piroska, Kádek Tamás, Kósa Márk and Pánovics János (2022), “A New Method to Increase Feedback for Programming Tasks During Automatic Evaluation”. *Acta Polytechnica Hungarica 2022*, 19(9) pp. 103-116. https://doi.org/ 10.12700/APH.19.9.2022.9.6
Biró, Piroska, Kósa Márk, Pánovics János and Kádek Tamás (2021), “Test case annotation of programming tasks in the ProgCont system for differential education and strengthening stand-alone preparation opportunities”. In *EDULEARN21 Proceedings 2021*, (pp. 5433-5441). http://doi.org/10.21125/edulearn.2021.1109
Hargitai, Dávid Máté, Sasné Grósz Annamária and, Veres Zoltán (2020), “Hagyományos és online tanulási preferenciák a felsőoktatásban – A COVID-járvány kihívásai”. *STATISZTIKAI SZEMLE*, 2020, 98 (7). pp. 839-857.
Horváth, Győző, Horváth Gyula and Zsakó László (2017), “A bíró és a mester – az online értékelés szerepe a programozás oktatásában”, Mérési és értékelési módszerek az oktatásban és a pedagógusképzésben Szerk. Károly Krisztina és Homonnay Zoltán, *Diszciplínák tanítása – a tanítás diszciplínái 5*, ELTE Eötvös Kiadó, Budapest, 2017, pp. 89–103.
Kádek, Tamás and Biró Piroska (2019a), “A ProgCont API: programozási feladatok megoldásainak újszerű kiértékelése” in *SZÁMOKT 2019*, Romania: Erdélyi Magyar Műszaki Tudományos Társaság (EMT), pp. 191-195, 2019.
Kádek, Tamás and Biró Piroska (2019b), “Úton a szakköralkalmazás felé a ProgCont API-val”. *INFODIDAKT 2019 konferencia*, Zamárdi, Webdidaktika Alapítvány, https://people.inf.elte.hu/szlavi/InfoDidact19/Manuscripts/KTBP.pdf.
Kádek, Tamás and Biró Piroska (2021), “A távolléti oktatás hatásai a ProgCont rendszerre”, in *ENELKO SzámOkt 2020*, 2020, pp. 104–109. Accessed 14 September, 2021. Retrieved from https://ojs.emt.ro/index.php/enelko-szamokt/article/view/325/264.
Gonzalez, Thomas, M.A. de la Rubia, K. P. Hincz, M. Comas-Lopez, L. Subirats, S. Fort, G. M. Sacha (2020), “Influence of COVID-19 confinement in Students performance in higher education”, 2020. https://doi.org/10.35542/osf.io/9zuac
Zhu, Xudong and Jing Liu (2020), “Education in and After Covid-19: Immediate Responses and Long-Term Visions”. *Postdigital Science and Education, 2020*. https://doi.org/10.1007/s42438-020-00126-3

SZILÁRD MADARAS, NORBERT ÁGOSTON: A RULE-BASED EXPERT SYSTEM FOR FINANCIAL INVESTMENT DECISIONS IN ROMANIA

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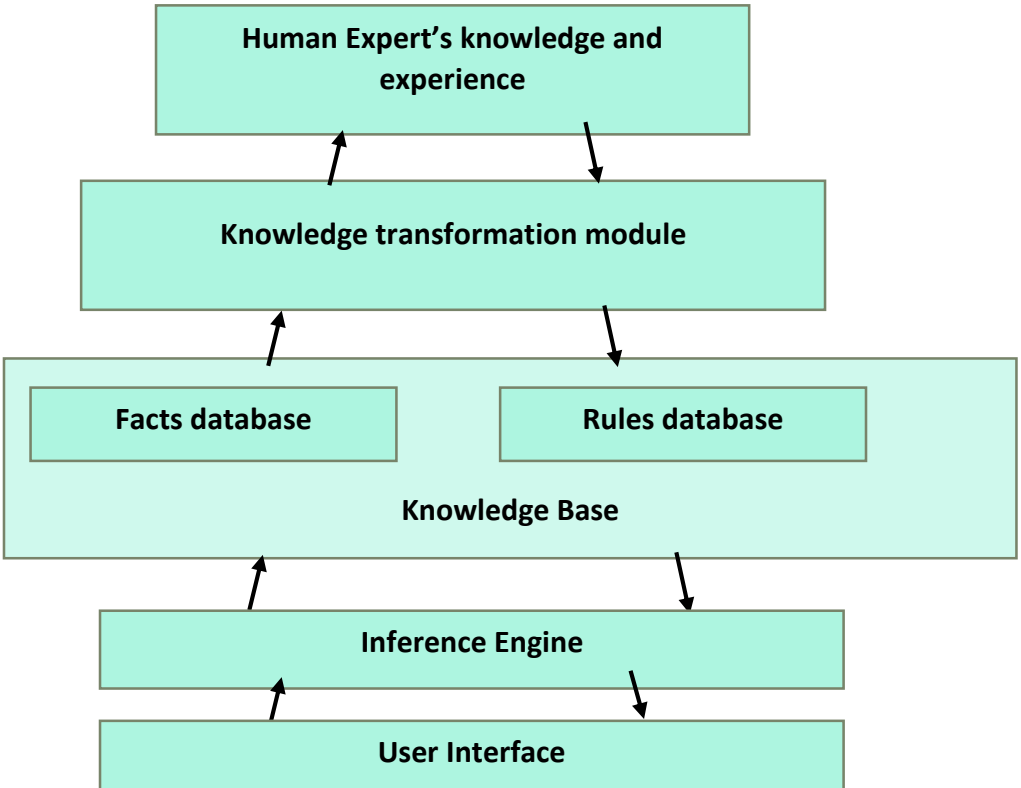
Theoretical background: expert systems used in finance

There are numerous examples of the financial purposes use of expert systems in the literature, from the very beginning: investor risk rating in Rozenholc (1988) or personal financial adviser Mersnissi (1988). Zaharia et al. (2003) used a VP-Expert type, rule-based expert system to model, among other things, the decisions based on a loan portfolio analysis. Similarly, expert system was used in the financial evaluation of companies (Shue et al., 2009).

The basic principles of each expert system are the same: a *Knowledge Base (KB)* part incorporate the knowledge, data and information gathered from human experts, the *Rule Base (RB)* contains the rules which are applied into Facts database (FD) part of the KB, *the inference engine (IE)*, the processing element of the expert system, which activates the KB's facts-based knowledge, generating new facts, and finally the User Interface (UI), which resolve the dialogue between the user and the expert system and displays the results. (Năstase and Zaharie, 1999; Orzan, 2007) (Figure 1.)

Figure 1. The architecture of an expert system



(Own edition, Năstase és Zaharie, 1999; Orzan, 2007:48, Madaras 2022:25)

The structure rules in expert systems corresponds to the 'IF… THEN' structure, which also known as the 'implication logical operator', symbolized by the a double-lined arrow: '=>'. The development of an expert system designed for an economic or financial situation provides the opportunity to systematize the professional knowledge and to formulate rules derived from economic theory.

The CLIPS (C Language Integrated Production System) programming language was developed explicitly for the scope of Expert Systems's creation. Initially starting in 1984 one of the NASA's research centers, the first release was dated in 1986. The other conqueror expert systems prototypes from the NASA have used the LISP programming language. The C language based development eliminated those prototype's hardware costs and low integration, in this was the CLIPS became the wildly accepted by government, industry and academic organizations. Most important advantages: it is available for free and it is the most popular expert system production language; easy to edit and visualizes efficiently the logical relationships that are otherwise easy to edit (*Madaras 2022:66, 145)*

Facts and rules in the CLIPS programming language. The facts are created using the deffacts (deffinition of facts) comand:

```
(deftemplate investment_fund(slot id))
        (deffacts investment_fund_facts(investment_fund (id 1)))
```

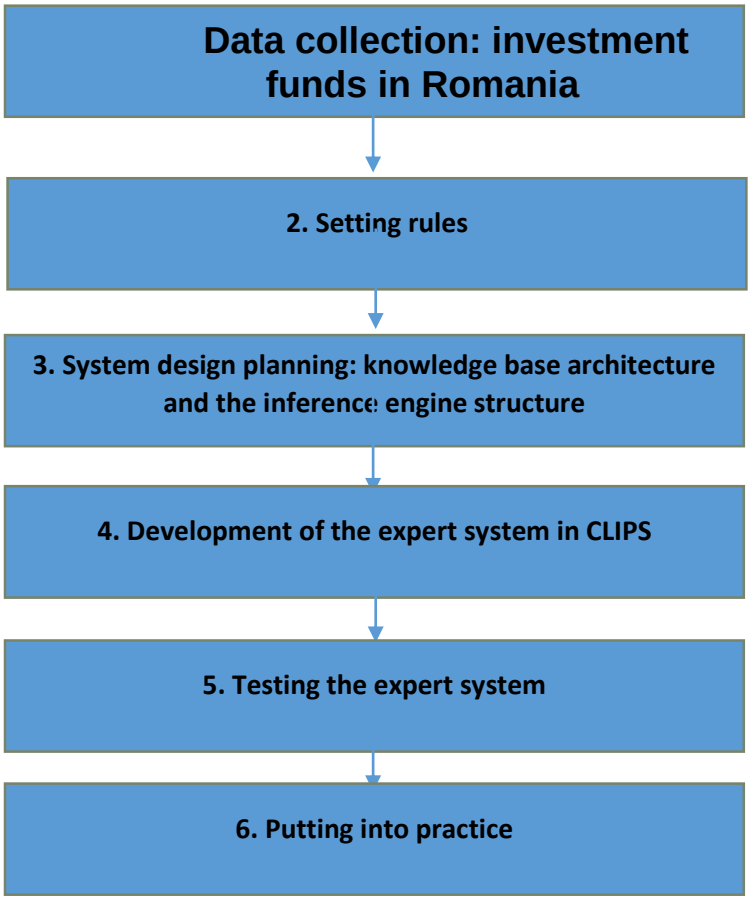
The rules LEFT side contains the logical conditions, while the RIGHT side the operations and instructions:

```
(defrule list_the_investment
        (investment yes) (investment_fund (name ?name))
        =>
        (printout t ?name " where the investment was made." crlf) )
```

A rule-based expert system for financial investment decisions in Romania

We set up the following six-step workflow for the financial investment decisions' expert system development, which starts with the data collection and ends with the practical usage of the new system. (Figure 2.)

Figure 2. The workflow of a financial expert system development



(Own edition)

In the following according to this workflow, we build step-by-step our expert system, starting with the data collection, and finally we test one specific case for an investment decision.

Investment funds in Romania

One of the great advantages of investment funds is that are managed by professionals who monitor the market and can react quickly to changes. They have access to a wealth of information that a small investor could only obtain at great cost. Mutual funds are therefore an ideal solution for people with little financial knowledge and small investors for whom other forms of investment would otherwise be too risky, too expensive or unavailable (Tatay, 2011). In addition to pooling the savings of small investors and the public, the importance of these institutions is underlined by the fact that pension funds and insurance companies are major participants in this market. Compared to fixed deposits, they offer a higher return, do not require a fixed investment period and can be purchased in several tranches. Shares in an open-ended fund can be redeemed at any time and the holder can get money quickly. Shares in closed-end funds can only be traded on the secondary market.

In the global outlook for mutual funds, the United States has the largest market share, with an estimated 49% in the fourth quarter of 2022. Luxembourg is second with 8.3% market share, followed by Ireland with 6.0%. China (5.1%) and Japan (3.2%) are relatively lagging in the international field (*EFAMA).* The net asset value and number of investment funds in some European countries are shown in Table 1.

Table 1: Asset value of European countries' investment funds (Q4 2022)

Country	**Net asset value (Billion EUR)**	**Number of investment funds**
Luxembourg	5028	14322
Ireland	3656	8689
Germany	2591	7438
France	2096	10997
United Kingdom	1758	3331
Netherlands	773	1611
Italy	340	2108
Austria	199	1981
Belgium	183	652
Poland	57	1049
Turkey	48	1489
Portugal	29	390
Hungary	23	568
Greece	13	244
Slovakia	9	97
Romania	8	153
Croatia	3	135
Bulgaria	1	137

(Source: European Fund and Asset Management Association, Romanian Association of Investment Fund Managers)

According to the Romanian Association of Investment Fund Managers (AAF), there were 153 investment funds at the beginning of 2023. Of these, 117 were open-ended funds managed by 16 fund managers. Six fund managers fall under the jurisdiction of commercial banks: Banca Transilvania, Banca Comerciala Romana, BRD, OTP Bank, Raiffeisen Bank and Patria Bank. The number of closed-end funds is 30. In addition, there is an alternative investment fund manager category, which operates as a public limited company and offers only closed-end funds. A proportion of their shares can be traded publicly on the stock exchange. The performance of these investment funds is tracked by the BET-FI index on the Bucharest Stock Exchange. Initially, they were called Societăți de Investiții Financiare (SIF for short), but in recent years some have been renamed. There are only 6 such financial services providers in Romania, as shown in Table 2.

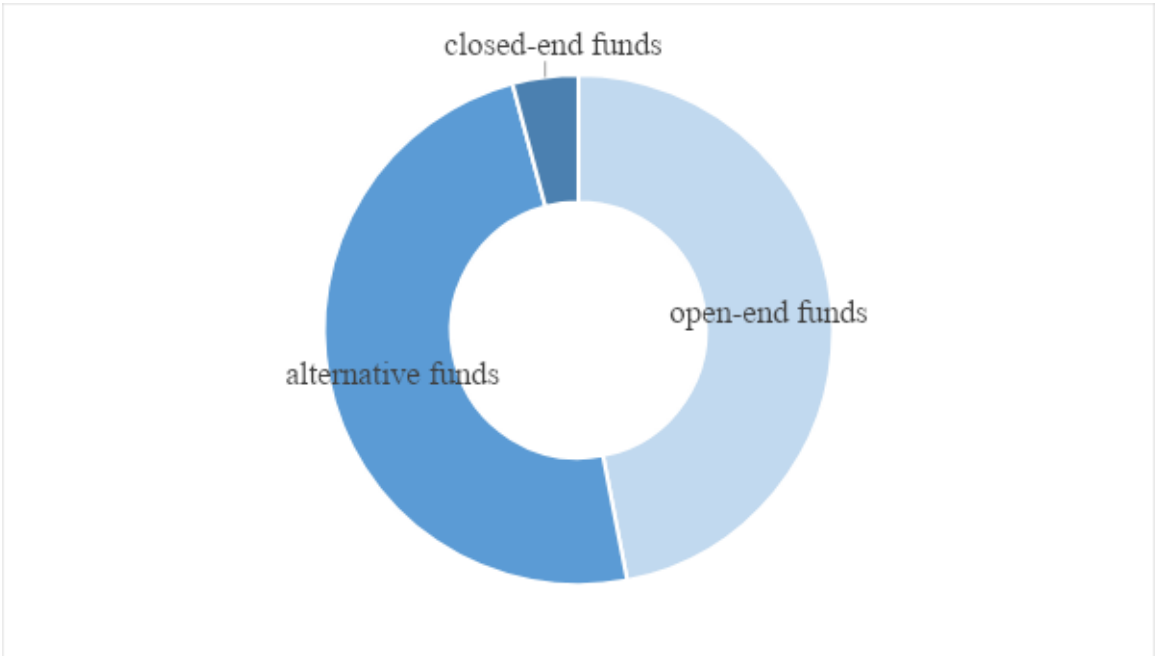
Table 2: Alternative investment funds

Title	Balance sheet 2021 (million RON)
Fondul Proprietatea	13 758
Lion Capital (former name: SIF Banat-Crisana)	3 597
Evergent Investment (former name: SIF Moldova)	2 515
SIF Oltenia	2 357
SIF Muntenia	1 977
Transilvania Investments Alliance (former name: SIF Transilvania)	1 436

(Source: AAF, Bucharest Stock Exchange)

The total net asset value of investment funds was 37,618 million RON in February 2023, representing almost 9% of the Romanian GDP in 2022. The distribution of the different types of funds is shown in Figure 1. The asset value of alternative funds proved to be the highest with 18 390 million RON, open-ended funds had an asset value of 17 655 million RON and closed-ended funds had an asset value of 1 572 million RON.

Figure 1: Net asset value of investment funds



Source: *Asociatia Administrator de Fonduri*

Expert system for investment fund analysis

The functioning and applicability of expert systems in the field of investment will be illustrated through a practical example that processes real economic data. This example will show how to make investment advice for investment funds efficient and shorter. Based on the representation of knowledge, the expert system built is rule-based and has been developed using the Clips programming language (version 6.4). In terms of problem types, the expert system is selective in that it offers the

best answers from the given set of options according to the user's criteria. In terms of size, it is a small system with 53 rules.

The investment funds traded in Romania and the related information form the basis of the expert system database. The information base is provided by the website of the Romanian Association of Investment Fund Managers (AAF), which provides consolidated statistics on most of the fund managers and investment funds currently operating. Further details are available from the reports published on the websites of the individual fund managers. The selection criterion was to select only open-ended investment funds, as there was a sufficient amount of data available. At the same time, these funds are available for redemption or purchase at any time and are therefore popular and more numerous on the market than closed-end funds. Data was last updated on 4th April 2023.

The data on investment funds, as summarised in Table 2, is entered into the expert system's knowledge base, which is stored in a data file separate from the program code, which is loaded by the application on start-up.

Table 3:

Information stored on investment funds

Name of fund manager
Name of the investment fund
Currency unit (RON/EUR/USD)
Type (money market, bond, equity, diversified)
Last 12 months' return (%)
Synthetic risk-reward indicator
Unit price (RON, 04.04.2023)
Net asset value (RON, 04.04.2023)
Minimum recommended investment period (months)
Purchase fee (%)
Redemption fee (%)
Annual fee (%)
Performance fee (%)
Insurance dummy (0-no, 1-yes)

Source: own editing

We have classified investment funds into the following types according to investment policy:

Money market funds: These funds invest at least 70% in money market instruments, such as bank deposits and government bonds maturing within a year. These funds are characterised by low risk and low growth and can therefore be an alternative to bank deposits. *Bond funds*: funds in this category are those that hold a large proportion (more than 70%) of their portfolio in bond assets, usually government bonds, corporate bonds and municipal bonds. These funds have some risk but

generally offer higher returns than money market funds. *Equity funds*: this category is used if the proportion of equity-type assets (stocks) in the fund's portfolio exceeds 70%. They are characterised by high risk, which also implies a higher level of return. *Diversified funds*: these funds have different proportions of the above-mentioned assets in their portfolios, so their risk depends on the weighting of the assets in the portfolio.

The most stable price evolution is observed in money market funds, where both the return and the risk are low and the shortest recommended investment period is a few months. The volatility of equity funds is one of the highest, with remarkable risk and high expected return. These funds are recommended for long-term investors who can lock their capital for several years and are not worried about temporary price falls. Bond and diversified funds are the "middle way": the risk/return trade-off is moderate and the recommended investment time is between the money market and equity funds.

We used the synthetic risk and reward indicator (SRRI) to define the risks associated with each investment fund. This is a mandatory published measure for open-ended mutual funds that informs investors about the fund's risk profile. It is calculated using the annualised volatility of the fund's total return over five years and, where possible, weekly return data are used instead of monthly data (Financial Supervisory Authority). In the rating system, a value of one indicates a low risk/return level, which does not represent a risk-free investment, while an SRRI of seven indicates a high risk/return level. The limits of our declared risk ratings are determined by volatility, as shown in Table 4.

Table 4: Synthetic risk-return ratio (SRRI) and declared risk

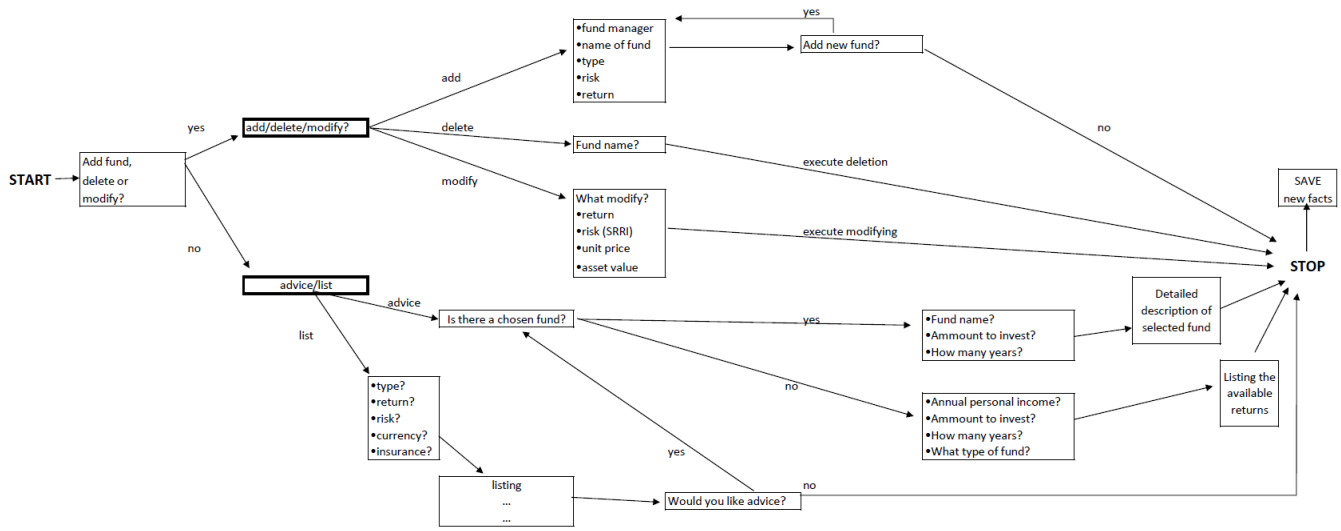
SRRI	**Volatility**		**Declared risk**
	greater than or equal to	smaller	
1	0%	0.5%	low
2	0.5%	2%	low
3	2%	5%	medium
4	5%	10%	medium
5	10%	15%	medium
6	15%	25%	high
7	25%		high

(Source: Financial Supervisory Authority)

The expert system uses 53 rules to guide through a process, in the end, it offers an ideal investment fund that fits user needs. The schematic structure is shown in Figure 2. At start-up, the user has the option to expand the database or delete existing funds or modify them as necessary. This module provides a means for knowledge engineers or experts to come between and update data. The user can proceed to the other branch of the rules system where can request advice and/or listings. The listing module gives a catalogue of investment funds that meets the user screening needs according to the selected criteria. One of the listing criteria may be the type of investment fund. The description of how to standardise these types has been discussed above, so the user can filter for money market, bond, equity and diversified funds. The other filtering criterion is the return, where investment funds with an equal to or higher return specified by the user are listed. A further listing criterion is risk,

which can be used to filter for low, medium or high-risk funds. These three risk categories are calculated from the synthetic risk reward indicator as shown in Table 4. It is also possible to filter by currency between the Romanian lei, Euro and Dollar denominated funds. The last listing option is the insurance, i.e. fund managers and funds that are insured by the Investors' Compensation Fund will be listed. After the listings, the user can switch to the advice rule set, but the application will end.

Figure 2: Structure of investment fund advisory expert system in CLIPS



Source: own editing

In the advice module, the user can start by requesting advice for a specific investment fund, either from the previously listed funds. Then the system will provide a future value calculation using the fund's past year's return, taking into account whether the investment period is within one year or more than one year, and a detailed statement based on the investment time horizon and the amount to be invested. We also receive detailed information on the currency, risk, exchange rate, net asset value, minimum recommended investment horizon, insurance coverage and all applicable fees and charges. In the other branch of the advice, some preliminary data input and filtering mechanisms can be used to obtain return calculations for investment funds that match the user's preference. Based on the user's annual income and the amount to invest, the system proposes an optimal savings structure, in proportion to income. It recommends 1-10% of monthly income for beginners and 10-20% for advanced investors. Only very careful financial planning recommended saving more than 20% of income, as it can lead to insolvency problems. Once the user's investment horizon and the type of investment fund have been established, the ideal mutual fund returns are presented. It also informs the risk group of the fund selected and the minimum recommended investment horizon. In the end, the system saves the new facts, so that the new data inputs are preserved and can be used for the next run.

Let's look at how it works the rules construct by picking one of 53 applied rules:

(defrule advice8 ;the rule name is advice8

(notselected) ;the rule starts if the notselected fact is valid

=>

(printout t "How much is your annual net income? (RON):");the first action is a question to the user

(bind ?*income* (read))

(if (lexemep ?*income*) then (printout t "Enter a number!")

(refresh advice8) ;not number input error handling

else (if (>= ?*income* 22776) then (assert (advice8b_cont))

else (if (< ?*income* 22776) then (printout t " Your income is below the minimum wage! Do you want to continue or add new value (continue/reload): ") ;nested if..then function to deal with the too low annual income

(bind ?answer (read))

(if (eq ?answer continue) then (assert (advice8b_cont)) ;add advice8b_cont that continues with another rule

else (refresh advice8))))))

Now let's look at a concrete example of listing and subsequent advice. Bolded sections indicate user interventions.

ADVICE ON INVESTMENT FUNDS

Basic information:

- the answer options are shown in brackets

- the program is case-sensitive

- the program accepts only perfect matches

Would you like to add, modify or delete an investment fund? (yes/no): **no**

Are you interested in advice or listing? (advice/listing): **listing**

What characteristics are you interested in? (type/return/risk/currency/insurance): **type**

What type of fund are you interested in? (money market/bond /equity/diversified): **money market**

Money market fund: Raiffeisen_Euro_Plus fund manager: Raiffeisen_Asset_Management

Money market fund: BT_FIX fund manager: BT_Asset_Management

Money market fund: BT_Euro_FIX fund manager: BT_Asset_Management

Money market fund: BT_Dolar_Fix fund manager: BT_Asset_Management

Money market fund: BRD_Euro_Simplu fund manager: BRD_Asset_Management

Would you like to receive some advice? (yes/no): **yes**

Do you have a selected fund to invest in?? (yes/no): **yes**

Which is this fund?: **BT_FIX**

How much do you want to invest? (minimum:50 RON):**1000**

How long do you want to invest? (month: minimum 1):**12**

BT_FIX investment fund characteristics:

Fund manager: BT_Asset_Management

Currency: ron

Type: money market

Synthetic risk and reward indicator: 1

Current price: 11.757 RON

Net asset value: 498350000 RON

Minimum recommended investment period: 6 months

Buying fee: 0%

Selling fee: 0%

Annual cost: 0.6%

Performance fee: 0%

Insured: no

BT_FIX fund would receive 1048 RON at the end of month 12

Attention! The calculation is based on last year's returns and does not guarantee future returns!

Goodbye!

Summary

From a small investor's perspective, the most important aspect of investing in funds is the return, but also the risks, the various fees and charges, and even the security of the funds. The freedom of choice of investment funds creates competition between fund managers, which has positively impacts this segment of financial services. One of the main objectives of the study's is to make the differences between investment funds clearer, more transparent and comparable, thereby supporting the choices of retail investors, reducing the confusion caused by information overload and overcoming under-information.

The expert system development for a special a financial problem solution, provide the possibility to systematize, incorporate and access a knowledge into one System

As a result, the developed expert system model simulating the decision situation of small investors and retail savers, allowing them to choose the most appropriate investment fund from the available funds. The expert system can be used to greatly reduce decision time and unlock the capacity of the experts. However, to obtain a well-performing expert system, the problem needs to be narrowed down as much as possible so that it can be well-defined by rules.

References

1. Madaras Sz. (2022) *Szakértői Rendszerek (Expert Systems -in hungarian)*, Editura Risoprint, Cluj-Napoca, ISBN: 987-973-53-2896-2
2. Mersnissi V. El. (1988) *A financial management assistant systems*, in: Ernst C. J. (editor) (1988) Management Expert Systems, Addison-Wesley Publishers Ltd.
3. Năstase P., Zaharie D., (1999), *Sisteme expert: teorie și aplicații*, Dual Tech, București
4. Orzan G. (2007) *Sisteme expert de marketing*, Editura Uranus, 2007
5. Rozenholc M., (1988) *EvEnt asseses risk taking*, in: Ernst C. J. (editor) (1988) Management Expert Systems, Addison-Wesley Publishers Ltd
6. Shue L.-Y., Chen C.-W., Shiue W. (2009) *The development of an ontology-based expert system for corporate financial rating*, Expert Systems with Applications 36, 2130–2142
7. Tatay T. (2011): Befektetési alapok. In *A pénzügyi intézményrendszer Magyarországon*, Tatay T., Vágyi F., Varga J. (eds.), Soproni Felsőoktatási Alapítvány, Sopron.
8. Zaharia M., Cârstea C., és Sălăgean L. (2003) *Inteligența artificială și sistemele expert în asistarea deciziilor economice*, Editura Economică, București
9. *** CLIPS Programming Language Homepage: https://www.clipsrules.net/ (Avaible 23.04.2023)
10. *** Romanian Association of Investment Fund Managers (AAF): www.aaf.ro (downloaded on 04/04/2023)
11. *** Financial Supervisory Authority (ASF): www.asfromania.ro (downloaded 05.04.2023)
12. *** Bucharest Stock Exchange (BVB): www.bvb.ro (downloaded 05.04.2023)
13. *** European Fund and Asset Management Association (EFMA): Quarterly Statistical Release. February 2023. International Quarterly Statistics. March 2023. www.efama.org (downloaded 07.04.2023).
14. *** Investors Compensation Fund: www.fond-fci.ro (downloaded on 04.04.2023)

REGIONAL DISPARITIES AND TERRITORIAL PROBLEMS SECTION

GYULAI TAMÁS, BALOGH ÉVA:
TERRITORIAL INNOVATION DEVELOPMENT BY SMART URBAN ACTIONS

ABSTRACT

The paper summarises the different versions of the smart city concept based on literature review and examines the programmes of European cities participating in the Intelligent Cities Challenge programme as practical examples. The research analysed the development documents of 70 cities and consortia of cooperating cities, and confirmed the research hypothesis that digital innovation hubs are an optimal solution for the urban application of Artificial Intelligence. A more detailed comparison was made for Szombathely, comparing the development process of the Hungarian border city with the smart city strategy of Timisoara. The concrete examples of the analysis represent developments that could serve as a model for other cities in the planning process.

Key words: digitalisation, smart cities, social innovation, territorial governance

1. Introduction

The use of artificial intelligence can make an important contribution to helping cities reduce their environmental impact. Virtual simulations can help planners understand how to reduce congestion, emissions, pollution and other challenges by analysing data from different sources and testing different variables in a virtual model. Smart cities can pave the way for so-called "big data", i.e. databases or sensor networks (the Internet of Things, IoT) that can be created simply, cheaply and efficiently, gathering information from different sources to test urban processes and citizen behaviour by creating sophisticated simulations. Smart cities therefore use modern technology to model future energy needs, emissions, parking, transport and emergency management. For example, IoT sensors collect data from cars, charging networks and urban infrastructure for modelling and landscape planning and city officials use the insights they gain to inform policies and priorities for sustainability.

The creation of smart buildings is another area of smart city implementation where green building design regulation is increasingly requiring the construction industry to undertake detailed design in advance to reduce environmental impact and energy consumption. The digital model will therefore enable infrastructure owners to better use resources, meet human needs and make decisions that support a more sustainable built environment. Better resource planning is now possible by harnessing data from different sources, and the role of artificial intelligence is becoming increasingly important. As smart technologies become more widespread, it will be possible to make better decisions that support a more circular, less carbon-intensive economy and ultimately lead to a more sustainable planet.

2. Literature review of smart cities

Smart Cities are urban environments that use IoT and networking, sensor technologies, data analytics and computing to connect and communicate across urban spaces. The objectives are to make better use of infrastructure in transport, energy, environmental monitoring and spatial orientation, and governance structures, with the ultimate goal of promoting sustainable development and happy citizens. Looking at the development of smart cities as a transformational process, Szarek-Iwaniuk and Senetra (2020) theorised in their study that not only the transformation of cities into smart cities can be considered as a transformational process, but also the concept of the smart city itself is evolving, with the quality of civic participation changing. On this basis, smart cities can be divided

into three generations, as the initial focus was on exploiting technological opportunities and improving the efficiency of city management (Smart City 1.0). In the next generation of smart cities, the local involvement of stakeholders gave equal importance to improving quality of life and local governance, alongside modern technologies (Smart City 2. 0). In the third generation of smart cities (Smart City 3.0), not only is stakeholder involvement increasing, but also community control, community initiative and leadership, and community creation (Gyimesi, Somlyódyné Pfeil 2021).

A smart city is closely linked to sustainability, which takes into account social, ecological and economic conditions. Consequently, sustainable smart design is concerned with developing strategies to reduce and recycle resources, increase economic efficiency and improve the integration of social aspects. Examples include a pedestrian-friendly environment, efficient road networks and mobility systems, sustainable land use, a circular economy or access for all to jobs, retail, services, health, culture and leisure. Some authors (Nam, Pardo 2011) combine a sustainable and smart city approach, others see the concept as a response to global climate change or as a step towards more efficient urban governance, in an attempt to attract more Generation Y and Z, often seen as drivers of new economic efficiency (Harrison, Donelly 2011). The development of these digital technologies has social and ethical implications, and the growing influence of technology giants on the economy, freedom and privacy of residents is an issue that is often not sufficiently taken into account (Viitanen, Kingston 2015).

The intuitive interaction with the environment in the smart city is enabled by intelligent interface with the user and the processing of big data for different purposes, such as smart governance by participating in public life, ensuring transparent governance and facilitating access to public and social services. Intelligent mobility can be achieved by facilitating local, national and international accessibility, ensuring the sustainability of the transport system and providing high-availability IT infrastructure. The city can contribute to smart living by improving the quality of housing, providing a high level of personal safety, educational, cultural and tourist facilities, and providing smart infrastructure by integrating smart technologies into the core systems serving the city. A smart environment can be achieved by promoting ecological awareness and renewable resources.

There is therefore currently no single definition or agreement in the literature on the concepts of the smart city, which have emerged in the development and deployment of smart cities worldwide due to the different stages of development of countries, the availability of resources, technological advances and evaluation criteria.

3. Digitalisation in urban context

Currently 56% of the world's population lives in cities and by 2050 the urban population will more than double its current size (European Commission 2022a). In the European Union, this proportion is even higher, with 75% of EU citizens currently living in cities (UNECE 2022). Cities therefore also play a crucial role in the EU's green and digital transition, as they are responsible for more than 60% of greenhouse gas emissions and 78% of global energy consumption (European Commission 2022b). To succeed, Europe also needs solutions that can address the challenges posed by the growing urban population, in particular mobility, housing and climate change. In response to the digital challenge, the European Commission has set an ambitious target of 100 climate-neutral and smart cities by 2030.

The OECD defines the relationship between digitalisation and smart cities as "initiatives that effectively use digitalisation to enhance the well-being of citizens and provide more efficient and sustainable urban services and environments with the participation of collaborating stakeholders" (OECD 2018). Digital innovation and stakeholder engagement can thus become central to the concept of the smart city, which can aim - from a policy-maker's perspective - to make the most of costly investments in smart cities to improve citizens' well-being. This approach emphasises that

smart cities contribute to improving people's lives while providing solutions to common urban challenges in a cross-sectoral way. Citizen engagement and collaborative partnerships to enhance civic engagement, which can include citizen participation, citizen-centric services and digital platforms for engagement, play therefore an important role.

In previous approaches to smart cities, large companies have very often played a major role in identifying challenges and implementing solutions, alongside local authorities. Digital innovation, on the other hand, brings new economic opportunities for cities, helping to improve service delivery and facilitate citizen engagement. A number of technologies can contribute to this, such as additive manufacturing (e.g. 3D printing), advanced energy storage technologies or unmanned aerial vehicles (drones). Harnessing the benefits of digitalisation is thus a collaborative and participatory process, aiming at economic growth and wealth creation, while taking into account both economic and social aspects (OECD 2019). Digital innovation can thus also enable new forms of broader citizen involvement, making planning and implementation a community process.

The current digital age is transforming the city into a complex and dynamic data repository, with an unprecedented amount of information. Future urban transformation and the availability and management of new data will go hand in hand. Sustainable urban governance takes place in a data-rich environment. The heterogeneity of data (volume, scale, provenance, reliability, frequency, access) requires not only advanced data science ('urban data analytics') but also a robust social, environmental and human-centred framework for the governance challenges associated with the sustainable development goals (SDGs) as challenges of our world's cities.

Digital technology and the ICT-centric society offer many opportunities to significantly improve performance and well-being in both the private and public sectors, as digital information is gradually becoming a pervasive and systemic feature of all advanced societies. The current wave of 'big data' is enabling researchers and policy makers to gain insights into urban information for their new analyses, particularly in the following areas:
(i) basic statistical data on sustainable urban life and urban public spaces,
(ii) the spatial choices and use of space by urban actors and relevant stakeholders,
(iii) the dynamics of urban land use,
(iv) the supply and accessibility of social and environmental services in urban agglomerations,
(v) architectural, planning and governance challenges of modern smart cities,
(vi) new data metrics (including advanced earth science and data mining research tools and methods) in contemporary urban studies ("the city as data warehouse").

The new data stream can serve both the scientific community and society as a whole to achieve sustainable, liveable and inclusive cities. This revolutionary big data development can be linked to the operation and management of modern self-organising urban agglomerations. This interconnectedness is characterised by a rich architectural design and multi-layered historical heritage, a multidimensional pattern of many individual and collective interests and behaviours, dynamic interactions between economic, technological, environmental, knowledge and business stakeholders, and a wide variety of internal and external network connectivity patterns (Lai 2020).

In its 2022 Work Programme (European Commission 2021a), the European Commission outlined steps towards a digital economy that will digitally transform the EU by 2030. For the period 2021-2027, the European Commission's new innovation framework programme Horizon Europe (European Commission 2021b) and its complementary DIGITAL programme (European Commission 2021c) will not only provide new opportunities for AI initiatives, research and industry, but also direct support for DIH centres. DIGITAL supports the creation of a network of European Digital Innovation Hubs (EDIH).

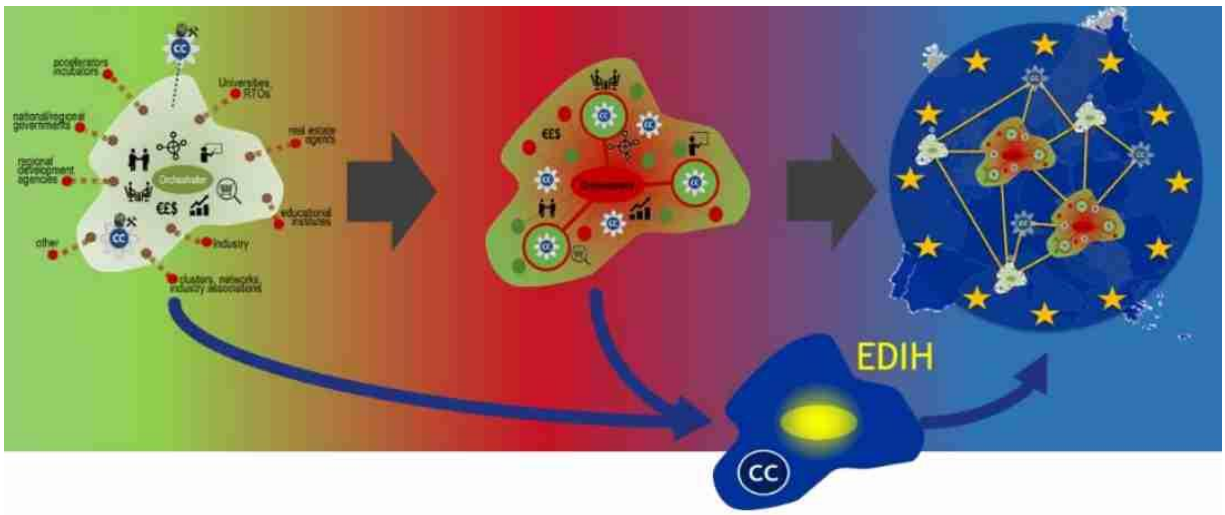


Figure 1. Planned evolution of DIH network on European level
Source:https://www.ip4fvg.it/wp-content/uploads/2020/06/DIHNET-Defining-the-DIH-in-its-context-FINAL.pdf

Higher education have the possibility to continue the activities started under H2020 by financing the services of DIH centres and new opportunities for clients working with DIH centres will be to experiment and test new digital solutions to develop their businesses (JRC 2021).

The EDIH network should become an interface for the European Commission to support the implementation of sectoral policies, SME policies and eGovernment policies. This means that EDIH centres specialised in a particular sector can be consulted on policies related to their area of expertise and can be involved in concrete actions. Good example is the New European Bauhaus initiative where EDIH centres can be invited to help accelerate the take-up of results and the development of lead markets. Another example of the potential involvement of EDIH centres is the "Adopt AI" programme, which is still being developed as a result of the White Paper on Artificial Intelligence (European Commission 2022c).

4. Digital innovation in practice

The Smart Specialisation Strategy (S3) of each Member State must be in line with the general policies of the European Union, as this is crucial to achieve the development objectives. S3 is a place-based innovation policy that supports the definition of regional priorities in innovative sectors, areas or technologies through an "entrepreneurial discovery process" that identifies, in a bottom-up manner, where a region can best exploit its scientific and technological potential (Foray, David 2011).

In the European Commission's cohesion policy for the 2014-2020 period, the S3 concept was an "ex-ante conditionality" for European regions to access funding from the Cohesion Fund and the European Regional Development Fund (European Commission 2012). In the 2021-27 programming period, by contrast, the EU devote a large part of its cohesion policy budget to promoting a Smarter Europe by strengthening smart specialisation strategies. European Member States and regions therefore had to update their smart specialisation strategies and meet the seven "enabling conditions" (Morisson, Pattinson 2020).

Most European regions have digital growth as an objective or horizontal priority in their S3 strategies. Digital innovation hubs are therefore a policy tool that can contribute to this goal by boosting the digitalisation of industry in every European country or region (European Commission 2017). Digital innovation hubs can thus be established by regional technology centres, universities, technology companies and government institutions providing services for the digitalisation of local industry.

These partners together can facilitate the technological upgrading and business growth of local companies, thereby also promoting the development of the regional innovation ecosystem. In terms of S3, European practice shows that some centres focus more on horizontal digitalisation support, while others lead an S3 priority area or implement a mixed portfolio of activities developed in collaboration with stakeholders.

Policy makers have recognised in Hungary, as well that strengthening the links between actors - policy makers, higher education and research institutions, businesses and professional organisations - at local level is key to the future performance and competitiveness of the innovation ecosystem. To facilitate this, the network of Territorial Innovation Platforms (TIP) was established with policy support from the Ministry of Innovation and Technology in 2019. The Platforms also play an important role in the implementation of S3, so one of their key tasks is to involve the widest possible range of business, academic and research institutions and social actors in the planning process, as set out in Hungary's National Smart Specialisation Strategy (National S3 2020).

The TIP is therefore a regional organisation which, in space and time, provides an opportunity to develop and strengthen cooperation with local and international innovation ecosystem actors and to create new professional foundations, in addition to learning about direct innovation policy directions, thus contributing to the transformation of the Hungarian economy into a competitive and sustainable knowledge economy (NKFIH 2021). In most cases, the Territorial Innovation Platforms that have been established and built on the local knowledge base of a university as a way of becoming a key player in the regional innovation environment. The TIP can therefore play a central coordinating and organising role for the city and its region: it can also contribute to the development of a smart city linked to smart specialisation.

In this context, universities can also take on a kind of animator role, which means that academics can be active/embedded partners in local/county/regional networks and thus central actors in local development coalitions. A development coalition is a purposeful cooperation of local actors: a locally based alliance for economic development in a given place and time, independent of social and political actors and classes. A prerequisite for a well-functioning development coalition is a shared interest, local identity, the existence of own resources and a lasting cooperation based on reciprocity (Pálné Kovács 2009).

5. Case studies

Digital Innovation Hubs can be important partners for cities and universities in the application of digitalisation because a relationship of trust with actual and potential customers is essential for their activities, which can only be developed by understanding real market needs. For DIH to be successful, it will need to reach out to SMEs that may be outside the scope of the companies with which it normally works, because it will also need to reach companies that are not used to working with this type of innovation support organisation and will need to use new means to engage with them. Although most DIHs have a well-defined portfolio of services, DIHs need to be flexible because they need to work through experimentation and co-creation to meet the needs of companies and to adapt to new business needs.

European experience (European Commission 2012b) shows that skills development can help companies to enter new markets in order to internationalise, and new ways to integrate digitalisation in less developed areas can be found. Several DIH have therefore been involved in supporting smart specialisation areas by enhancing the digitalisation of companies, including support for innovation across clusters and industrial sectors. This chapter therefore presents examples from Hungary and neighbouring Romania.

5.1. Example for strong regional influence: Timisoara in Romania

Romania has 8 regions at NUTS2 level, so territorial planning is also carried out at NUTS2 level. The Regional Smart Specialisation Strategies (ADR 2021a) for each region are prepared by the Regional Development Agencies, which, in addition to planning, also play a central role in the implementation of programmes at regional level.

The Operational Programme for the Western Region for the period 2021-2027, linked to S3, is the result of a more than one-year process. The first working version was completed by September 2020 following a regional survey through a questionnaire, on the basis of which direct consultation with the European Commission representatives started. The process was concluded with an open conference in November 2021 (ADR 2021b), which was one of the key events for stakeholder involvement.

In the context of the Regional Operational Programme, the Regional Development Agency has prepared a guide for smart city development (ADR 2021c) for the period 2021-2027, which includes detailed recommendations on the development actions proposed to cover the 6 main dimensions of smart cities. Based on the guide, a Smart City Strategy for Timisoara (Primaria Timisoara 2022) has been prepared to contribute to the city's digital transformation process by providing wide publicity. The results of the consultations of the open forums organised to involve stakeholders were also openly presented and incorporated into the strategic proposals. In addition to local stakeholder input, an international peer review was also carried out during the planning process.

The leading coordinator of the strategy planning process was the Regional Innovation and Technology Transfer Centre "Tehimpuls", which has been operating as an association since 2007 with the mission to increase the competitiveness of the region's economy and to promote cooperation between businesses and universities and R&D&I organisations. The founding members of the Tehimpuls Association therefore include, in addition to the development agency, several local universities from Arad and Timisoara, as well as some professional organisations and local businesses.

One of the cross-border initiatives of the association is the Regional Innovation Fair (Tehimpuls 2013), which started as a joint project with Hungarian partners in 2013 and has since become an annual event. As a further development, Tehimpuls has been providing the regional representation of the Enterprise Europe Network since 2015, which helps local businesses to enter the international market.

Timisoara is one of the cities participating in the Intelligent Cities Challenge (ICC) programme, which offers cities the opportunity for regional cooperation. This was of particular importance for the city of Arad, as the ICC follows the Digital Cities Challenge (DCC) programme, which aimed to strategically prepare European cities for the "strategic challenges of the 21st century". The DCC therefore provided technical support for the city-wide digital transformation, in which Arad participated, so that Arad can now work with Timisoara as an experienced partner in the ICC.

The establishment of a DIH with a regional scope was implemented by the Tehimpuls association in 2019, building on the technical support received under the DIHELP project, in cooperation with the regional development agency and regional automotive and IT clusters. Tehimpuls is able to operate the DIH function in a European network, as it has successfully participated in the pre-qualification procedure for DIH centres and has been given the opportunity to apply - as the only organisation in the region - to be a candidate organisation for participation at national level in the European DIH network in February 2022.

5.2. Example for cross-border actions: Szombathely in Hungary

The vision "Szombathely 2030", formulated in 2021, presents Szombathely as a city that is able to be a regional organizing force, providing a quality environment for its residents and businesses, thus realizing a competitive and modern city, with partnership and open communication as core values. In addition to the suggestions of the Chamber of Commerce, large urban companies, NGOs and the university, the opinions of many Szombathely residents were also sought online through the szombathely2030.hu website. In addition, direct discussions were held with the most important companies, but also with NGOs and the Chamber of Commerce and Industry of Vas County. Round table discussions were also held with more than a hundred participants (Szombathely 2022).

The programme, which has also been shaped significantly through public consultation, is thus based on two pillars, which will provide the framework for the next 10 years of development programmes. One pillar focuses on structural change and digitalisation in economic development, while the other pillar covers sustainability objectives ("green city") together with a focus on smart city developments ("smart city").

Pannon Gazdasági Hálózat Egyesület (Pannon Economic Network Association), which was established in 2006 with its headquarters in Győr and its operational centre in Szombathely, played an important role in the planning process as a regional economic development organisation in the West-Hungary region to strengthen the economic empowerment of micro, small and medium-sized enterprises.

A good example of this function is the Forum Digital cooperation which is a joint initiative of the City of Szombathely, Vas County and PBN to implement the DIH function. Within this framework, the parties undertook to do their utmost to ensure that the DIH centre established by PBN in Vas County and Szombathely can operate and provide services to businesses and social actors in a quality, accessible and directly valuable way. The DIH centre is also of European and national importance for the cooperating partners because it can act as a catalyst for digitalisation and transformation processes using the EU funds available in the 2021-2027 budget period. The DIH centre in Szombathely provides its services under the name "am-LAB", covering a wide range of advanced manufacturing technologies: additive prototyping and mass production, custom computer animation (CGI), augmented reality (AR) applications, data analysis based on artificial intelligence algorithms, and practice-oriented experimental development.

6. Conclusions and further research

There are a number of EU recommendations on the relationship between digitalisation, business development and territorial innovation systems, which can be relevant for all EU Member States. One such document is the practical guide (European Commission 2021d) on how the European DIH network, the Europe Enterprise Network and industry clusters can work together. The recommendations given in this document could easily be implemented in Romania, where, as in most other Romanian regions, the regional DIH function, the regional representation of the Europe Enterprise Network and the coordination of the region's major industry clusters (automotive and IT) are currently carried out by the same organisation in Timisoara.

In this context, it is good practice for the regional innovation coordinating body to play a meaningful role in the urban development strategy, as this also ensures stakeholder involvement. In spatial planning, synergies are thus possible between the regional and urban levels, and the regional institutional system (the regional development council and agency) can provide the opportunity for genuine stakeholder involvement.

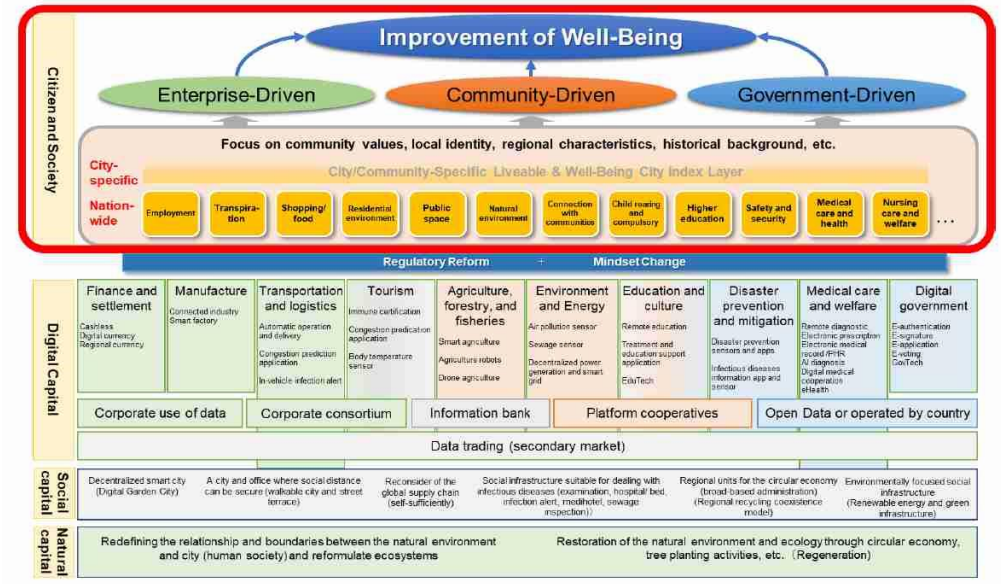
It is also possible to follow the recommendation in Hungary, but this can only be achieved with the effective cooperation of several organisations. For example, in Szombathely, the local DIH works in cross-border cooperation with Austrian partners, plays an active coordinating role in the elaboration and implementation of the city's economic development programme, and provides practical support to industry clusters (in the fields of wood and circular economy) through international cooperation projects.

The effectiveness of the DIH function is also demonstrated by the fact that after four years of operation, DIH Szombathely was chosen as the best DIH centre in Europe in 2021 (Portfolio 2021). This honourable award proves that it is possible to achieve a result recognised at European level from the countryside, from Central and Eastern Europe. To achieve success at European level, it was necessary to implement, despite the epidemic, nearly 60 national and international training courses on the use of digitisation tools for thousands of professionals and interested parties, and to launch several new R&D projects in 2020, in cooperation with nearly 500 international partners, universities and research institutes.

In response to the challenges of digitalisation, a European network of Digital Innovation Hubs will be set up in all EU Member States, co-funded by the European Union and the Member States. The fact that several Horizon 2020 programmes have supported the creation and operation of digital innovation hubs at local and regional level over the past years is a preparatory step in this direction. As a result, DIHs have been set up in each region of Romania with a view to applying to become a member of the European DIH network at regional level. In Hungary, on the other hand, this function will also be developed at national level with a new institutional background, so an already existing DIH in Hungary (e.g. in Szombathely) can play a role mainly in programmes and cross-border cooperation with direct EU funding.

Useful examples of people-centred smart city development can also be found in Japan, where a national concept called Society 5.0 has been defined. In this context, the Smart Cities Institute Japan has developed the Liveability and Well-being City Index (LWCI) model with measurable parameters, which is already being used in Europe, e.g. in the city of Tampere. It has therefore been identified as a further research direction to include the city of Kitakyushu in the comparison, together with testing the applicability of the LWCI model in Szombathely during 2023.

Figure 2. LWCI model by Smart City Institute Japan



Source: https://oascities.org/wp-content/uploads/2022/02/Tak-Nagumo-_CxC22_Monitoring-and-measuring-the-impact-of-digital-transformation-on-societal-priorities.pdf

References

Agentia Dezvoltare Regionala (ADR)
2021a Regiunea Vest - Strategia Regională de Specializare Inteligentă 2021-2027 https://adrvest.ro/wp-content/uploads/2021/01/Strategia-Regionala-de-Specializare-Inteligenta-a-Regiunii-Vest-2021-2027-RIS3-.pdf
2021b Prezentare POR Vest 2021-2027_Conferinta_Viitorul Regiunii Vest https://adrvest.ro/wp-content/uploads/2021/11/PPT-pt-consultare-POR-Vest-2021-2027_04.11.pdf
2021c Document Suport - POR VEST 2021-2027 ORAȘUL INTELIGENT, *versiunea 1, aprilie 2021* https://adrvest.ro/wp-content/uploads/2021/05/Orasul-Inteligent.pdf
EUROPEAN COMMISSION
2012a *Guide to Research and Innovation Strategies for Smart Specialisations (RIS 3*) doi:10.2776/65746
2012b *The role of clusters in smart specialisation strategies*, Publications Office of the European Union, Luxembourg, 2012, doi: 10.2777/43211
2017 *Digital Innovation Hubs: Mainstreaming Digital Innovation across All Sectors*, Roundtable on Digitising European Industry, Working Group 1. https://ec.europa.eu/futurium/en/system/files/ged/dei_working_group1_report_june2017_0.pdf
2021a Commission Work Programme (COM(2021) 645 final), https://ec.europa.eu/info/strategy-documents/commissionwork-programme/commission-work-programme-2022_en
2021b https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-opencalls/horizon-europe_en
2021c https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/digital-europe-programme_en
2021d *GUIDANCE FOR THE COOPERATION BETWEEN THE EUROPEAN DIGITAL INNOVATION HUBS, ENTERPRISE EUROPE NETWORK PARTNERS AND CLUSTER ORGANISATIONS* https://ec.europa.eu/newsroom/repository/document/2021-23/Guidance_note_EENEDIHclusters_12032021_FINAL_DGeWljbwe2VJd1pWb3UagT3oy8g_76992.pdf
2022a Cities of the Mission for 100 Climateneutral and Smart Cities by 2030 Announcement
2022b Smart Cities and Communities, Shaping Europe's digital future2021a Commission Work Programme (COM(2021) 645 final), https://ec.europa.eu/info/strategy-documents/commissionwork-programme/commission-work-programme-2022_en
2022c https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust_en

FORAY, D. – DAVID, P. A. – HALL, B. H.
2011 Smart specialisation - From academic idea to political instrument, the surprising career of a concept and the difficulties involved in its implementation, *MTEI Working Paper*, EFPL https://infoscience.epfl.ch/record/170252 (Letöltés: 2021. november 18.)

GYIMESI Á. – SOMLYÓDINÉ PFEIL E.
2021 Az adat és a kormányzás jelentősége az okos város stratégiai alapú értékteremtési folyamatában – Magyar nagyvárosok összehasonlítása egy szintetizáló ökoszisztéma modell keretében, *Tér és Társadalom* 35. évf., 3. szám, *https://doi.org/10.17649/TET.35.3.3339*
HARRISON, C. – DONELLY, I.A.
2011 A theory of smart cities. In Proceedings of the 55th Annual Meeting of the International Society for the System Sciences, Hull, UK, 17–22 July 2011; p. 15.
Joint Research Centre
2021 Digital Innovation Hubs as policy instruments to boost digitalisation of SMEs, JRC 121604, https://publications.jrc.ec.europa.eu/repository/handle/JRC121604

LAI, S.K.
2020 *Planning within complex urban systems*. Routledge.

NAM, T. – PARDO, T.A.
2011 Conceptualizing Smart City with dimensions of technology, people and institutions. In Proceedings of the 12th Annual International Conference on Digital Government Research, College Park, MD, USA, 12–15 June 2011; pp. 282–291.
National S3
2020 Nemzeti Intelligens Szakosodási Stratégia 2021-2027
https://nkfih.gov.hu/hivatalrol/strategia-alkotas/intelligens-szakosodasi-strategia-s3-2021-2027

Nemzeti Kutatási, Fejlesztési és Innovációs Hivatal (NKFIH)
2021 Területi Innovációs Platformok https://nkfih.gov.hu/hivatalrol/hivatal-hirei/teruleti-innovacios-platformok
MORISSON, A. – PATTINSON, M.
2020 Smart Specialisation Strategy (S3). Lille: Interreg Europe Policy Learning Platform.
https://www.interregeurope.eu/fileadmin/user_upload/plp_uploads/policy_briefs/Smart_Specialisation_Strategy__S3__-_Policy_Brief.pdf

OECD
2018 *The policy implications of digital innovation and megatrends in (smart) cities of the future: A project proposal,* Paris
2019 *Enhancing the contribution of digitalisation to the smart cities of the future*, Paris
PÁLNÉ KOVÁCS I.
2009 Régiók és fejlesztési koalíciók. *Politikatudományi Szemle,* vol. XVIII. No. 4. pp. 37–60.

Portfolio
2021 *Európa legjobb digitális innovációs központjának választották a szombathelyi központot,* 2021. január 27. https://www.portfolio.hu/gazdasag/20210127/europa-legjobb-digitalis-innovacios-kozpontjanak-valasztottak-a-szombathelyi-kozpontu-am-lab-ot-467086
Primaria Timisoara
2022 *Results of stakeholder consultation* – etap 1 https://www.primariatm.ro/2021/10/05/sumar-al-primei-consultari-smart-city-si-transformare-digitala-timisoara/
SZAREK-IWANIUK, P. – SENETRA, A.
2020 Access to ICT in Poland and the Co-Creation of Urban Space in the Process of Modern Social Participation in a Smart City—A Case Study. *Sustainability,* 12 (5), 2136
https://doi.org/10.3390/su12052136
Szombathely
2021 *Szombathely2030 a város mesterkulcsa, ami megnyithatja a fejlődés útjának kapuját*
https://ugytudjuk.hu/cikk/2021-04-08_szombathely-2030-a-varos-mesterkulcsa-ami-megnyithatja-a-fejlodes-utjanak-kapujat
Tehimpuls
2013 *InnoMatch Regional Innovation Fair – The story* http://www.tehimpuls.ro/wp-content/uploads/2016/06/InnoMatch-Regional-Innovation-Fair_3-4.04.2013-Arad_v2.pdf
UNECE
2022 Sustainable Smart Cities

VIITANEN, J. – KINGSTON, R.
2015 Smart cities and green growth: Outsourcing democratic and environmental resilience to the global technology sector. Environ. Plan. A Econ. Space 2015, 46, 803–819.

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PATRÍCIA FANNI PORKOLÁB, ZOLTÁN ANDRÁS DÁNIEL: RECULTIVATED BROWNFIELDS - (MORE) POSITIVE DEMOGRAPHICS

Abstract

One of the consequences of the industrialisation processes of the mid-20th century was the break-up of conglomerates - mainly heavy industry - following the change of regime. Consequently, hundreds of abandoned industrial sites were left fallow, waiting to be regenerated. The phenomenon of de-industrialisation is linked to social processes, with many people leaving the areas following the decline of industry. In geographical terms, the most common phenomenon is migration from the countryside to the cities and their agglomerations, and from east to west. The latter has increased with the opening to the West with the accession to the European Union. The main motivation for migration is better living conditions, income, and employment.

One positive outcome of Hungary's accession to the EU and of the economic growth of the past two decades has been the clearance of brownfield sites and their industrial, sporting and socially useful content. This fact triggered the question of our research whether the reclamation of brownfield sites has had positive demographic effects.

In our research, we examine the known brownfield investments and compare their extent with demographic statistics provided by the HCSO. We show that brownfield redevelopment has a positive impact on emigration, i.e. it can reduce or even reverse it. The effect of these processes can also be partially confirmed for income changes. It is also confirmed that there is a strong link between industrialisation and population migration. In addition to the spatial illustration of the processes, we also present a case study to illustrate the results.

Introduction

Brownfields as development areas have really come to the fore in the last decade, both in the world and in Hungary. Although the emergence and existence of brownfield sites has been discussed in the last century, they have only received more attention since the 2000s. There is a parallel between their development and rehabilitation, the emergence of industrialisation and de-industrialisation, and the regime change in Central and Eastern Europe. After the change of regime, many industrial enterprises ceased to exist or were transformed, and industrialisation was replaced by deindustrialisation, with the loss of jobs and the disuse of previously used land and buildings. Population movements during the process of industrialisation and then deindustrialisation can also be observed in Hungary. Initially, there was a tendency to move from the countryside to the cities, as industrial enterprises tended to be established in and near the cities because of the infrastructure, but later there was a tendency to move to the urban agglomeration. The rehabilitation of brownfield sites can bring derelict land and buildings back into the economy, revitalise it and improve opportunities in cities, the quality of urban life, competitiveness and reduce urban congestion. However, brownfield redevelopment is very costly, very often requiring public or EU support to implement. In our research, we sought to find out whether there is a link between rehabilitated brownfield sites and the reversal of out-migration, and what impact brownfield investments have had on their environment. What is the relationship between industrialisation and emigration, since industrialisation-urbanisation can also be a factor influencing population movements.

The concept of brownfield was first introduced in American literature in the 1980s *("brownfield"*), which at that time referred only to abandoned industrial sites (Barta, 2007). Over time, the term brownfield has been used by other nations, with minor variations, and is thus an ambiguous and complex concept. In the literature, the term brownfield is often used alongside the term rust belt, which is a larger contiguous area and usually includes the brownfield area (Roncz & Tóthné Szita, 2013).

Brownfield sites, as used in English-speaking areas, are mostly understood to be amortized industrial areas, i.e. formerly used areas that have lost their original function (Dannert, 2016). Initially, the

British used the term "brownland", which has a meaning similar to previously disused land, i.e. land occupied by a permanent structure and associated fixed surface infrastructure (Department for Communities and Local Government (DCLG), 2006). And in the US interpretation, the original function had to have been environmentally contaminated in any case, such as abandoned gas stations, military/railroad buildings. In terms of definitions, two groups can be distinguished: an American and a European (Dannert, 2016) (Orosz, 2012) (Roncz & Tóthné Szita, 2013), which are differentiated by environmental contamination (Dannert, 2016) (Adams & Watkins, 2002), but essentially similar, they identify the concept as areas with a former industrial function. The significance of these two types of definition lies in the fact that the US was the first to enshrine the concept of brownfields and their rehabilitation in law, and the UK type has the criteria for brownfield classification and monitoring, and is closer to the European concept of brownfields (Orosz, 2012).
The brownfield concept adopted in the European Union was defined by CABERNET, the European network of experts on brownfield regeneration (Ferber, et al., 2006).
"The following types of brownfields have been identified, not all of which are contaminated: industrial (e.g. mining, textiles), military (e.g. barracks, training grounds), other economic and investment ("greyfields") (e.g. (e.g. shopping centre), transport and other infrastructure (e.g. abandoned railway lines, road sections, associated buildings), residential (former residential buildings, regardless of age, e.g. panels), cultural and social (e.g. school, sports facility), agricultural (e.g. abandoned farms)" (Orosz, 2012) (Dannert, 2016).
In Hungary, in addition to the international literature, there are also two domestic definitions of brownfields. One is the definition of VÁTI Kht. in 2003, which states that *"brownfields (rust belt) are defined as former industrial sites, economic areas, abandoned or underutilised, usually in a degraded physical state and polluted by environmental pollution, or abandoned, disused barracks areas."* (Nagy, 2003) (Dannert, 2016). Another definition is that of the research team of the Budapest Department of the Centre for Regional Research of the Hungarian Academy of Sciences: *'underutilised, sometimes vacant, former industrial sites*. (Barta, 2004a) (Dannert, 2016).
The number of brownfield sites not yet exploited is significant. The emergence of these brownfield sites is linked to the post-1989 regime change in areas formerly under Soviet control. Brownfield sites have also increased in the former EU accession countries, as industry has been significantly transformed and agricultural activity has declined, and industrial production has fallen, leaving many industrial sites abandoned. Demilitarisation has also led to an increase in brownfield sites, with the closure of many barracks. This affected both the former socialist and capitalist (western) countries, as all of them had significantly reduced their military forces after the wars. Transport was also transformed from rail transport to road transport, which also led to the closure of several railway stations (Kádár, 2011).
There are basically three categories of brownfields. The oldest brownfield type, which has been in the public domain for a long time and is repeatedly referred to in the literature, is the traditional brownfield type, which is made up of former industrial, military and transport areas (Orosz, 2012). The other type is a transitional category also known as 'greyfields'. This category is treated by some with reservations, as the brownfield definition is less applicable to them, as they do not form a contiguous area, and environmental contamination is negligible. It includes areas with former residential, other infrastructure and other economic functions (Wegner, 2005) (Waltemate, 2007) (Orosz, 2012). The third category, which is mentioned less and less by others among brownfields, are potential brownfields, also known as white fallow (Böhme, et al., 2006) (Orosz, 2012).
Investments in brownfield sites are more expensive than greenfield sites, but in the long term they can be more sustainable, environmentally, and economically beneficial, as these sites have already been used and should be re-functionalised.
The complexity of the relationship between macroeconomic structure and growth is reflected in the following: manufacturing output, productivity and employment are closely related to economic growth (Hegyi-Kéri, 2015). Some researchers point out that economic development differs from economic growth in that, during development, not only the quantity and quality of output changes, but also the technology used (Herrick & Kindleberger, 1983). The wave of the industrial revolution

that began in England brought about structural and social changes that spread through Europe to North America and many other parts of the world. It is a historical fact that economic development during this period was linked to the development of industry. Industrialisation, also known as industrialisation, led to the development of industrial zones, which were created as a function of raw material and social factors. However, the existence of these factors is not permanent, and industrialisation and de-industrialisation together influence the infrastructural conditions and the migration of labour. At first, natural factors were more important during industrialisation, but this changed and was replaced by social conditions. Several factors have influenced the decline of manufacturing industries and industrial areas: the changing internal structure, the growing own production of new industrialising areas, the depletion of raw material resources and the impact of technological development on the skills of the workforce. In terms of economic structure, the tertiary sector, i.e. the service sector, is becoming increasingly dominant, increasing employment levels (Hegyi-Kéri, 2015). According to Kaldor's laws, faster growth in manufacturing is (causally related) to faster aggregate growth, manufacturing productivity growth is endogenous to manufacturing output growth, and aggregate productivity growth is positively related to manufacturing output and employment growth (Tregenna, 2011).

All this shows that the process of industrialisation is complex and closely linked to economic growth (Hegyi-Kéri, 2015). A number of possible reasons for the start of the industrialization process have been identified, which include forced industrialization, also directed by the state, i.e. highly concentrated industrialization (Gerschenkron, 1984). In East-Central Europe, industrialisation policy has favoured an export-oriented strategy. The process of deindustrialisation arrived in this region later than in the western countries, only in the late 20th and early 21st centuries (Hegyi-Kéri, 2015). The concept of de-industrialisation has already been defined in several studies. Singh (1977) conceptualized deindustrialization as the inability of manufacturing industries to export and to meet domestic demand at a rate that would increase employment (Singh, 1977). Barta et al. argue that deindustrialisation means that the importance and share of industry in the economic structure is declining (Barta, et al., 2008).

The development of the post-Fordist production and economic system is probably linked to the deindustrialisation that first started in Western Europe and later reached Eastern Europe. The shift to a post-Fordist production system led to a significant decline in the traditional industrial districts, which were replaced by the popularity of multi-location industrial enterprises. In the case of Hungary, these processes occurred after the change of regime. As a result of this crisis, many social enterprises and cooperatives were forced to close or restructure. The already declining number of industrial workers continued to fall more drastically during this period, with a decline in the engineering, mining, metallurgy, textile and energy sectors. In Hungary, almost half of industrial capacity has become redundant. This industrial transformation spread throughout the country. After the change of regime, some of the industrial sites were regenerated from core capital, while others required municipal, state or EU support. However, even so, most of the land remains underutilised, with a patchwork of uses, probably due to high costs (Kádár, 2011).

The change in the number of people employed in manufacturing is a good indicator for measuring de-industrialisation, which is accepted by many experts and for which Saeger summarises the following reasons:

- the share of employment in manufacturing is a common indicator used to quantify economic development and industrialisation,
- the level of employment in the sector is an indicator of the size of the manufacturing sector,
- focuses on changes in the cost factor, mostly the input factor,
- the manufacturing sector has a relatively high investment demand, so if investment falls it will affect the manufacturing sector (Saeger, 1997).

Deindustrialisation therefore means that the number of people employed in industry is falling and the share of industry in gross value added is declining. The decline of industry can be due to a number of factors, such as productivity improvements resulting from technological change and development,

which cause a reduction in the number of people employed in industry; the outsourcing of services to other firms, the industrialisation and modernisation of developing countries (Lengyel, et al., 2016).
Re-industrialisation was already being addressed in the 1970s, but it only became more significant after the 2000s, in the wake of the 2008 crisis, and unfolded in parallel with globalisation processes. Re-industrialisation no longer only promotes the consolidation and relocation of low-wage, traditional technology factories, but rather focuses on the knowledge economy. Thus, the focus is shifting towards higher value-added and higher-wage industrial activities and related services. In the case of Hungary, following its accession to the European Union, manufacturing output, gross value added, labour productivity and export sales have increased significantly, but employment has declined (Lengyel, et al., 2016).

Migration

Fordism[56] or post-Fordism[57] is also related to urbanisation in the 20th century, as both in the welfare states based on the Western market economy and in the socialist countries, during centralised planned economies, cities and moving to cities became significant. In the eastern countries, different social classes began to live in cities, the existence of separate housing estates was not a priority, and industrial and residential districts were part of the city. Thus, development in these countries was also concentrated in the cities, and marked urban-rural differences emerged and persisted until the change of regime (Sykora & Stanilov, 2014) (Szívós, 2020). Following the Second World War, new cities were created across Europe, and their structural and functional location depended on their geographical (Laki, 2014). In Western Europe, the focus of development was on small and medium-sized towns in their vicinity in order to relieve the burden on the metropolises that were created, i.e. decentralisation became the goal. These smaller towns and cities also have a wide range of urban functions, are economically viable, creating and providing jobs that attract and retain population, thereby reducing immigration to metropolitan areas. In east-central Europe, new towns and cities were not created as a result of the decentralisation of existing larger towns and cities, although here too the inner city was characterised by overcrowding, but as new industrial towns or mining centres, because of the presence of a major plant or a major mineral or energy resource (Szívós, 2020). In East-Central European countries, industrialisation has focused on industrial development. Among the industries, the focus has been on heavy industry, including energy and metallurgy, and even chemicals. This industrial development required large investments, which pushed others into the background and significantly increased the demand for labour, which was met by people leaving agriculture. The creation of industrial sites was dependent on transport routes. The result was therefore a change in the employment structure, with a significant increase in the number of people employed in industry compared with agriculture, and an increase in the urban population in terms of housing and a decrease in the rural population. From the 1970s onwards, these industrial towns began to decline, increasing unemployment. As a result of economic and political change, many cities have seen their populations decline, emigration increase, become ageing settlements (Laki, 2014).
In Hungary there was also a strong industrialisation, with the emphasis on the development of heavy industry. As a result, the employment structure in Hungary was also transformed, the number of industrial workers increased, and industrial towns were created. These industrial towns were characterised by a predominance of industrial employment and a long period of population growth (Germuska, 2002) (Laki, 2014).

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[56] *"The French school of regulation refers to the period from the early 1920s to the mid-1970s as Fordism in the context of developed countries. The term* ***Fordism*** *was first used by Gramsci (1891-1937) in 1928, referring to Henry Ford's method of production, which combined extreme division of labour and standardised mass production with increased purchasing power for factory workers."* (Rechnitzer & Smahó, 2016)

[57] *"The essence of* ***post-Fordism is*** *a flexible production system, with rapidly changing product variations and batch sizes, to create a close link between manufacturing companies and consumers, the market needs."* (Blahó, et al., 2016)

As a result of the de-industrialisation and economic restructuring that began in the mid-1970s, cities that had previously been industrialised and attracted large-scale immigration were in a critical situation. Wholesale and service companies also started to expand in urban agglomerations, which pushed the population in this direction. However, this phenomenon was a later phenomenon in the CEE region, due to the lagging income levels of both private and public (Szívós, 2020).

Migratory movements in Hungary

Domestic migration is a key determinant of the spatial distribution of the population. Its impact extends to the human resources, social composition, and demography of communities, which influence the economy of the area. It can be seen from the above that the main driver of migration is the labour market, i.e. better earning opportunities and proximity in terms of amenities and environment. But other social, economic, and infrastructural factors in the labour market can also influence migration (Dövényi, et al., 2021).

Internal migration is not just about moving from villages to cities, but also from smaller settlements to larger, more economically developed areas. Until the 1960s, villages were the biggest losers from emigration because of massive industrialisation. This mainly affected the villages of the lowlands and the small rural parts of the country. The destination was mainly the capital, but also the industrial centres, county capitals and even the area around Lake Balaton. Until the 1990s, migration was still observed in the country, but to a lesser extent, also mainly from villages. At that time, the distance of migration was also shorter, typically within a county, whereas previously it was interregional (Dövényi, 2007). After the change of regime, the number of migrations initially decreased significantly, contrary to expectations, but later, the number of migrations occasionally picked up (Dövényi, 2007).

Domestic migration initially took place from villages to cities, partly due to industrialisation. Then, at the end of the 20th century, suburbanisation started to move people out of the cities and into the surrounding areas, and this was also true of the capital, and the migration balance of the municipalities improved considerably. Then, at the beginning of the 21st century, a turnaround occurred, i.e. the population started to move again towards Budapest and other cities, i.e. the municipalities close to the larger cities became the winners of the migration. The western border of the country has become a population attractor, i.e. settlements close to the Austrian border (Dövényi, et al., 2021).

The main incentive to migrate is income. From a macro point of view, this can be analysed in terms of the characteristics of municipalities, sub-regions, i.e. geographical units, i.e. regions with higher incomes and lower unemployment attract populations. Thus, migration occurs when the expected gains from migration exceed the costs of migration. In addition to economic factors, other factors influencing migration are quality of life, the environment, such as public safety, social services, and infrastructure factors, such as housing and transport (Bálint & Obádovics, 2018). In their analysis of the factors influencing migration, Bálint and Obádovics conclude that there is a much closer relationship with the income endowments of settlements in the present.

Brownfields rehabilitation as an opportunity

It has become clear that the development of brownfield sites and investments in these areas promote economic and social development, improve the quality of the environment, and intensify land use. Recognising these advantages, the recycling of brownfield sites is now perceived as an opportunity, and efforts are being made to move in this direction in terms of sustainability and environmental awareness in regions and cities. In other words, the aim is to bring unused land back into use (Dannert, 2016).

Brownfields are classified into four groups according to the cost of remediation and the value added to the cleared area:

- Type A: this is called a return on investment because the increase in value of the land cleared is greater than the cost of the land cleared.
- Type B: this is called an uncertain investment because the value of the land cleared, and the costs incurred are roughly equal.

- Type C: called a loss-making investment, i.e. they are unmarketable because the value of the land cleared is below the cost of the land.
- Type D: this type is called permanently non-functioning brownfields (Dannert, 2016).

Investing in brownfield sites requires serious strategic planning, which needs to consider many factors. Brownfield investments also have advantages and disadvantages. Advantages include the fact that it already has an established infrastructure, it is centrally located, and it is eligible for investment grants under development programmes. Disadvantages include that ownership may be unresolved, social problems may arise, demolition costs may be high, and other costs may arise during remediation (Dannert, 2016).

Brownfield investment support schemes in the European Union

In the European Union, three areas of the European Commission focus on brownfields: the Environment (DG ENV), Research and Technological Development (DG RTD) and Regional Policy (DG REGIO). DG ENV focuses on areas that are contaminated. So, from an environmental point of view, their projects focus on protecting soil, surface water and groundwater. Linked to this is the LIFE programme, which was set up in 1992 and has been called LIFE+ since 2007.

DG RTD has set up several framework programmes to revitalise brownfield sites. They have studied the hazardousness of pollutants to identify focal points, developed proposals for remediation (CLARINET[58]), studied the development of technologies for the remediation of contaminated industrial sites (NICOLE[59]) and, finally, the creation of a network of experts in brownfield revitalisation for coordinated research activities across Europe.

DG Regional Policy supports brownfield investment through the European Regional Development Fund (ERDF), which has three programmes. URBAN 1994-2006 is an existing support programme for the economic and social regeneration of urban areas. The other initiative for brownfield sites is the JESSICA programme[60] , which sought to support sustainable urban development and regeneration through financial mechanisms between 2007 and 2013. The third is INTERREG, one of the longest running programmes, which supports cross-border, transnational and interregional cooperation on territorial development.

There are a number of programmes within the European Union that concern the rehabilitation of brownfield sites. In 2007, the European Brownfields Regeneration Agenda (EUBRA) was established to ensure coordinated action (Dannert, 2016).

Brownfield investment programmes in Hungary

Hungary is one of the post-socialist countries, so the effects of this are also felt in brownfield rehabilitation. Forced socialist industrialization, extensive housing estates, and then the invasion of capitalism and suburbanization all have an influence on rehabilitation (Hirt, 2013) (Dannert, 2016). The rehabilitation of brownfield sites is understood to be primarily economic, i.e. industrial and service uses, but may also include residential and cultural functions. The process of rehabilitation itself can be complex and fraught with difficulties, as in addition to revitalising abandoned sites and restoring the blighted environment, these sites must also be returned to a functioning economy. Regeneration can only be successful if the new functions fit into the spatial and urban development plans. In addition to the regeneration of the areas, there are also economic benefits, as new investment can have a stimulating effect on the economy, boosting economic growth, improving living conditions and creating jobs (Barta, 2004b).

In Hungary, the National Environmental Remediation Programme (OKKP), launched in 1996, was the first to address contaminated sites. After the accession to the European Union in 2004, various programmes for brownfield investments appeared. After accession, the Regional Development Operational Programme (ROP) in the framework of the 1st National Development Plan (2004-2006)

[58] Contaminated Land Rehabilitation Network for Environmental Technologies

[59] Network for Industrially Contaminated Land in Europe

[60] Joint European Support for Sustainable Investment in City Areas

was the first opportunity for brownfield reclamation, which was less successful, as contiguous brownfield sites of at least 40 hectares would have met the criteria, of which there were only a small number in Hungary (Dannert, 2016).
In the next planning period, between 2007 and 2013, the Economic Development Operational Programme (EOP) within the New Hungary Development Plan (NDP), in addition to the ROP, also supported brownfield developments and integrated urban regeneration. The UDP includes the prioritisation of brownfield investments in cities over greenfields, the remediation of industrial sites, the development of infrastructure on brownfield sites and the promotion of brownfield redevelopment as part of sustainable urban development (New Hungary Development Plan, 2007) (Dannert, 2016) (Kádár, 2011).
In 2011, the New Széchenyi Plan came into force, and the rehabilitation of brownfield sites was removed from its objectives. Although urban development with social objectives and functional expansion was introduced, applications for brownfield sites were not submitted. In the 2007-2013 period as a whole, the ROPs have been responsible for brownfield developments (Dannert, 2016).
Brownfield investments will also be included in the 2014-2020 planning period. Also underlined in the development policy tasks for a sustainable and compact urban structure is: *"Preference for brownfield sites (disused industrial sites) over greenfield investments"*. The need for a central register of brownfield sites for efficient land use is recommended in the land use principles (Government of Hungary, 2014). In this planning period, a Thematic Development Programme (TFP) was established in connection with the National Development 2030 - National Development and Spatial Development Concept, which aims at the reuse and development of brownfield sites, and the exploitation of spatial opportunities, primarily in the capital, Budapest (Programme, 2014). Outside the capital, in the rest of the country, the Széchenyi 2020 Operational Programme for Spatial and Urban Development (TOP) has provided support for the rehabilitation of brownfield sites. With the aim of developing and renewing an urban and peri-urban environment attractive to investors and residents, the following was formulated: *"Special emphasis should be placed on the reintegration of under-utilised or disused areas into the settlement structure and the promotion of the functional conversion of these areas, in particular with regard to the rehabilitation of brownfield sites, in line with environmental considerations."* (Nemzetgazdasági Minisztérium, 2013).
In the 2021-2027 planning period, the rehabilitation of brownfield sites will continue to be favoured over greenfield investments, and greater emphasis will be placed on environmental aspects in the implementation of investments, such as: 'the *environmental quality of residential communities in the vicinity of brownfield sites (in terms of noise, air pollution, light pollution) is potentially threatened by any new industrial development identified as a potential source of pollution'* (Prime Minister's Office, 2021).
All this shows that there are various projects to support brownfield redevelopment, which would not be possible without these funds, or would only be possible to a very limited extent. The following section describes the data and methods that underpin our research, as well as the research itself.

Material and method

In our research, we are looking for answers to the question of the impact of the rehabilitated brownfield sites on society, and whether there has been a change in population numbers as a result of the winning applications. In addition to the rehabilitation of brownfield sites, we are also looking at the impact of socio-economic changes, i.e. industrialisation and the creation of industrial estates, on the population. In other words, on the one hand, is there a link between rehabilitated brownfield sites and the reversal of emigration, and on the other hand, what is the link between industrialisation and emigration?
Another part of our analysis is the relationship between industrialisation, the development of industrial areas and emigration. As mentioned in the literature by Saeger (1997), deindustrialisation can be measured by the number of people employed in manufacturing. Thus, we also compare the number of persons employed in manufacturing with the number of emigrations at the district level.

To carry out the research, secondary data had to be collected to validate the hypotheses. The following data were collected from the *Teir.hu* and the *CSO*[61] *STADAT* databases for the period 2002-2021 (i.e. for the last 20 years), at county and district level, related to migration and employment: domestic emigration, domestic emigration, resident population, manufacturing employment, total employment. Less information was available when compiling the brownfield database, and this information was also collected from secondary data. Information was also collected from previously available research on brownfields conducted by other researchers, with Éva Dannert's dissertation, which also used the Váti survey and extended it further, providing the most information (Dannert, 2016). There is also a website on brownfields run by the Centre for Environmental Science, which was created in 2004 with the aim of surveying brownfield sites in Hungarian cities and collecting good and bad practices related to the use of brownfields. This database consists of two parts: an investor section and a research section. The investor database contains the properties that have not yet been cleared, while the researcher database includes brownfield sites that have been used for some purpose. For us, the latter, the research database, was helpful, as well as the fact that the database contains data by region.[62]
In the literature review, we have highlighted projects supporting brownfield rehabilitation, which we can use in our research. On palyazat.gov.hu[63] we searched the database of the winners of these projects, collected the necessary data, such as type of project, municipality, year of funding, amount of funding and, if available, the size of the rehabilitated area. In compiling the brownfields database, care was taken to avoid duplication of data from different sources.

Methods used in the study

The data collected was analysed using various statistical methods. We used a ratio calculation, i.e. we calculated the ratio of two related statistical data. Within this, the distribution ratios, i.e. the part-part ratio, helped us in our research. The other most used calculation is the calculated mean, or average. We also examined relationships using correlation analysis. The correlation calculation shows the relationship between different data and their effect on each other. The sign of the correlation coefficient gives the direction of the relationship, while its absolute value gives the closeness of the relationship (Sajtos & Mitev, 2007).
The software used to carry out these methods was the following: to perform the statistical calculations, the spreadsheet application MS Excel was used, which, in addition to calculating ratios and averages, also provides the possibility of graphical representation. The analysis and plotting of relationships was carried out using IBM SPSS.

Results

For the analysis of brownfields, we did not have a database available, so we used the brownfield mapping compiled by Éva Dannert, the brownfield database created by the Centre for Environmental Sciences in 2004, and the downloaded brownfield projects (Regional Operational Programme (ROP) and Operational Programme for Spatial and Urban Development (TOP)). In addition to this data, we have also looked at the districts and regions in which the municipalities that have received funding are located, as the analysis is also carried out at these regional levels.
The resulting brownfield areas were compared with those found in the literature and with the brownfield database available on the internet. Care has been taken to ensure that those in the different databases are included only once in our collection.
We also looked at the size of brownfield sites in each county. To represent this information, we first of all used the database cited by Dannert (2016), supplemented by the data we found (projects). Our aim was to supplement the data we found. In many cases, only address or only parcel number was given for the projects. In the latter case, we used the land registry database

[61] CSO – Hungarian Central Statistical Office
[62] http://www.ktk-ces.hu/barnamezo_adatbazis.html
[63] https://www.palyazat.gov.hu/search?s=1&keyword=barnamez%C5%91&search-submit=Keres%C3%A9s

(https://info.foldhivatal.hu/tknet/) to retrieve the area, while in the former case we consulted Google Earth.

In the following, we have tried to explore the role of brownfield investment, income (Bálint & Obádovics, 2018) and emigration. For this purpose, we used data downloaded from teir.hu. For emigration, we examined the difference between inward and outward migration between 2002 and 2021, and for income, we calculated the average per capita income per district and filtered out the effect of inflation by adjusting the income data to the 2002 base. We then looked at the evolution of average incomes in the districts affected by the projects after project implementation and compared this with the national average over the same period. The number of districts affected by the brownfields (based on the information available) is 54, which is 31% of the total number of districts in Hungary. We found that out of the 54 districts affected, only 13 had higher income growth than the national average.

Once this analysis was done, we returned to looking at the population and emigration in each district before and after the implementation of the brownfield projects. Again, the analysis was carried out for the 54 districts concerned.

By performing the calculations, we found that 5 districts have seen an increase in population), while the others continue to show a decrease.

Table 1 Districts with population growth after brownfield investment

Districts	Average before	Average after	Change
Gárdony	29100,69	35757,67	***6656,98***
Mosonmagyaróvár	71933,67	78933	***6999,33***
Pannonhalma	15571,8	16110,5	***538,7***
Siófok	50739	51707	***968***
Sopron	96759,27	103985,5	***7226,23***

source: own editing

It was found that 32 of the 54 districts (59.2%) affected by the projects have reduced their emigration rate. And in 12 of the 32 districts (22.2% of the districts covered by the projects), the out-migration difference has become positive.

1Table 2 Positive out-migration balance in the post-project periods

Districts	***Domestic inward migration-immigration project ahead***	***Domestic emigration-immigration after project***	***Change***
Gárdony	463,13	**1154**	690,87
Mosonmagyaróvár	174,67	**380,25**	205,58
Siófok	223,67	**338,54**	114,87
Pannonhalma	52,93	**164,5**	111,57
Csorna	13,06	**122**	108,94
Cape Town	-36,38	**90,33**	126,71
Mohács	-96	**66,33**	162,33
Derecske	-32,67	**51,75**	84,42
Körmend	-73,73	**18,25**	91,98
Komló	-179,93	**16,75**	196,68
Celldömölk	-116,47	**8,5**	124,97
Tamási	-193,12	**1**	194,12

source: own editing

Candidate areas are considered as permanently or temporarily disadvantaged areas according to Government Decree 290/2014.[64]

[64]https://net.jogtar.hu/jogszabaly?docid=a1400290.kor&fbclid=IwAR1XUyTLmjHYct9nvkDOYqFAURDWccJwiDiIdCFQMoGvL7CRegee798l6dU

We also looked at how incomes have evolved in areas where out-migration has declined. We found that only 13 of the 32 districts had higher incomes than the national average, and only 5 districts had a positive out-migration-in-migration gap alongside rising incomes.
2Table 3 Positive income change and positive emigration-immigration balance

Districts	***Inward emigration-immigration after project (persons)***	***Change in average income compared to the national average (HUF/person/year)***
Gárdony	1154	211895
Csorna	122	91450
Pannonhalma	164,5	157445
Celldömölki	8,5	62427
Körmendi	18,25	68353

source: own editing

It can therefore be concluded that the rate of emigration has decreased in almost 60% of the project areas, and in 10 districts the inward emigration balance has become positive over the 20 years under study. The reduction in the rate of emigration also has an impact on the population. This - an axiomatic statement at the level of thought - is easy to verify. If we look at the out-migration balance for each district over the 20 years and compare this with the average population, we find a strong positive relationship. This suggests that there is a positive trend in the areas affected by brownfield investment.
In the second part of the analysis, the relationship between industrialisation-deindustrialisation and population movement was examined, based on previous literature. Saeger (1997) summarised some of the reasons why changes in the number of persons employed in manufacturing are an appropriate indicator to measure these. So, we looked at industrialisation by the share of people employed in manufacturing. For this purpose, the number of persons employed in manufacturing between 2002 and 2021 and the total number of persons employed in the period under study were collected from the *KSH STADAT* database, so that we could determine the share of persons employed in manufacturing for each county and for the capital city between 2002 and 2021.
After the comparison, we looked at how the average population in the districts concerned evolved before and after the project and how the difference between domestic emigration and emigration evolved. Few counties were able to remain in a positive field over the period under review. During the period covered by the analysis, there is only one county with a positive balance in all the periods considered, and that is the county of Győr-Moson-Sopron. Fejér county had a positive balance 18 times, Vas county 16 times and Komárom-Esztergom county 15 times. A negative balance was calculated for 8 counties throughout the period under review: Baranya, Békés, Borsod-Abaúj-Zemplén, Hajdú-Bihar, Jász-Nagykun-Szolnok, Nógrád, Szabolcs-Szatmár-Bereg and Tolna. In Budapest, the out-migration balance was positive only 7 times (in the middle of the period) in the 20 years under review.
As the balance of inward emigration and outward emigration is zero, this does not explain the decline in the resident population, so it was necessary to compare it with outward migration at the national level. The result is that, at county level, the migration flows are in a straight line, except for one outlier, which is the county of Pest.

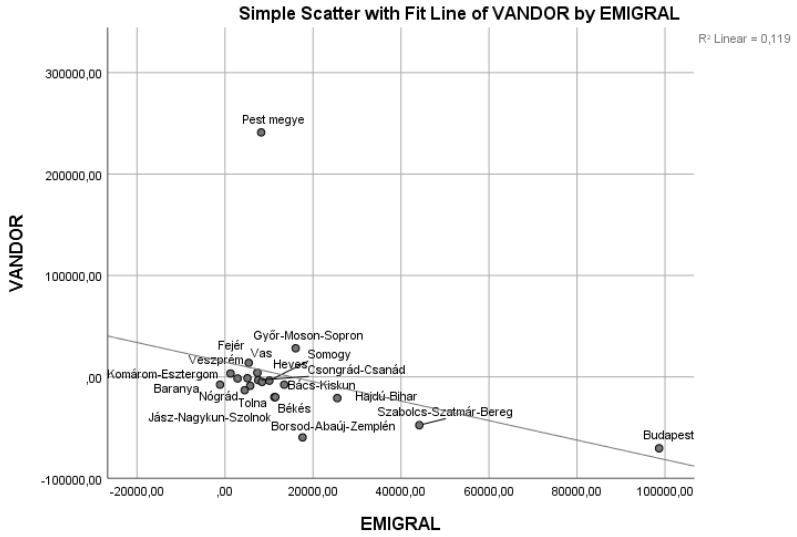

Figure 1. Migratory movements at county level
source. own ed.

In order not to bias the results, Pest county was next excluded from the sample, and the result is that there is a strong (0.727) significant relationship between inward and outward migration and outward migration.

We have looked at the share of manufacturing employment in relation to total employment. We have also looked at how the rate of inward and outward migration has evolved over the same period. A Figure *2.* shows that, once again, the Pest region differs significantly from the other regions.

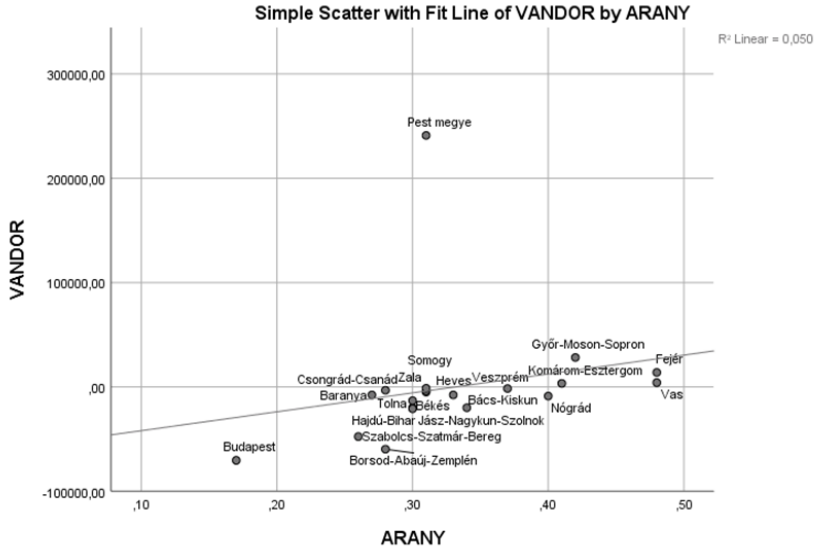

Figure 2. Migration rates between 2002 and 2021
source: own editing

To be able to carry out the analysis for the other counties, we have again excluded Pest County. Here the relationship was found to be closer, so a correlation analysis was also carried out.

We have also tried to quantify the graphical results by examining the relationship between the share of people working in manufacturing and the balance between emigration and emigration. The relationship was found to be significant and strong (0.751).

Similarly, I examined the relationship between the share of manufacturing and emigration. We found that the relationship is significant in this case as well and is moderately strong (0.585).

In addition to industrialisation, we examined the change in income over the period. To do this, we used our inflation-adjusted district database used in the first hypothesis, here looking at the change in incomes over the period. SPSS was used for the analysis to relate the change in income to the change in the resident population and to the out-migration/immigration balance.

When the relationship between income and the out-migration balance is examined, no significant relationship is found, and the measured strength is weak (0.139).
The relationship between income and change in the resident population is significant, but the strength of the relationship is weak (0.158). Based on the above, we can see that industrialisation is strongly related to the emigration-immigration balance, while it is not strongly related to income, with the note that the above does not apply to Pest county.
In the first part of the study, I examined the impact of income and found that only a fraction of the regions concerned experienced income growth.
And in the second part of the analysis, we show that for all districts in the country, the relationship between income and the out-migration balance is non-significant and weak, while the relationship between income and the change in the resident population is significant but weak.
If the districts of Pest County are excluded, we still found no different results.
Based on the above, there is no relationship with out-migration, while the relationship with population change is significant but weak.

Case study
The following is a recent feature-change investment of interest. The project is located south of the Rákóczi Bridge, on an area of about 14.5 hectares. Originally partly owned by VITUKI and partly managed by it, the site was a mixed-use property in a state of disrepair after loss of function. At the end of 2018, it was revealed that Hungary could host the 2023 World Athletics Championships following a successful bid. In a joint effort between the organisers and the government, this derelict site was converted into the National Athletics Stadium, which will host the event. The project involved the demolition of around 40 buildings, the clearance of the site of munitions and the removal and treatment of more than 1 500 tonnes of hazardous waste. The project also had to pay attention to the remaining utility structures, in particular the manhole of the pressurised sewage pipeline, and to the accessibility of the outfalls of the Ferencváros pumping station and the areas needed to carry out flood protection works. The project includes a stadium with a capacity of 40,000 people, a training ground, a clubhouse, a pitch, a promenade, a bridge and a park, at a total cost of around € 660 million.

Summary
In our research, we sought to find out whether there is any link between the rehabilitation of brownfield sites and the reduction and reversal of emigration, and what the relationship is between industrialisation and emigration in Hungary. In order to answer these questions, we first reviewed the relevant literature, including the development of brownfields, their conceptual definition, subsidy applications, the process of industrialisation and de-industrialisation, and migration in Hungary. We collected data on the brownfield investments made, covering 54 districts, which represent 31% of all districts in Hungary. Using the databases teir.hu and ksh.hu, we collected data on inward and outward migration, resident population, manufacturing employment and total employment. Our research collected and analysed 20 years of data.
To answer our research questions, we set out three hypotheses. The first is that *"Brownfields rehabilitation has a positive effect on emigration", which* we were able to confirm after looking at brownfield investments and emigration in Hungary. Our second hypothesis is that *"Industrialisation is closely related to the out-migration-immigration balance"*, for which we also needed to look at the characteristics of emigration and to measure industrialisation in terms of the number of people employed in manufacturing. This hypothesis was accepted in this study, with the proviso that Pest county should be treated separately from the other regions. Our third hypothesis, *"Income growth can have a positive effect on emigration",* was only partially accepted, as there is no relationship with emigration, while the relationship with population change is significant but weak.
In our research, we have been able to demonstrate the positive impact of brownfield investments on the resident population, which could be further investigated in a case study approach, observing one investment at a time to see what the long-term impact is and how long these trends are sustained.

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Bibliography
ADAMS, D. & WATKINS, C., 2002. Greenfields, Brownfields and Housing Development. Wiley-Blackwell.
BÁLINT, L. & OBÁDOVICS, C., 2018. Belföldi vándorlás. Demográfiai portré, pp. 217-236.
BARTA, G., 2002. Gazdasági átalakulás Budapest barnaövezetében. Budapest: MTA RKK BO.
BARTA, G., 2004a. A budapesti barnaövezet megújulási esélyei. MTA Társadalomkutató Központ, p. 347.
BARTA, G., 2004b. Magyarország az ezredfordulón.Stratégiai tanulmányok a Magyar Tudományos Akadémián. Műhelytanulmányok. A budapesti barnaövezet megújulási esélyei.. Budapest: MTA Társadalomkutató Központ.
BARTA, G., 2007. Regionális Fejlesztés Operatív Program (ROP 2.2): A városi területek rehabilitációját célzó intézkedések értékelése. Budapest: Magyar Tudományos Akadémia, Regionális Kutatások Központja.
BARTA, G., CZIRFUSZ, M. & KUKELY, G., 2008. Újraiparosodás a nagyvilágban és Magyarországon. Tér és Társadalom, pp. 1-20.
BLAHÓ, A., CZAKÓ, E. & POÓR, J., 2016. Nemzetközi menedzsment. Budapest: Akadémiai Kiadó.
BÖHME, C., HENCKEL, D. & BESECKE, A., 2006. Brachflächen in der Flächenkreislaufwirtschaft (Expertise).Eine Expertise des ExWoSt-Forschungsfeldes Kreislaufwirtschaft in der städtischen/stadtregionalen Flächennutzung–Fläche im Kreis. Bundesamt für Bauwesen und Raumordnung.
DANNERT, É., 2016. Barnamezők és kezelésük Európában, valamint Magyarországon. Pécs: ismeretlen szerző
DEPARTMENT for Communities and Local Government (DCLG), 2006. Planning Policy Statement 3. Housing, Stationery Office London: ismeretlen szerző
DÖVÉNYI, Z., 2009. A belsô vándormozgalom Magyarországon: folyamatok és struktúrák. Statisztikai Szemle, pp. 748-762.
DÖVÉNYI, Z., 2007. A belföldi vándormozgalom strukturális és területi sajátosságai Magyarországon. Demográfia, pp. 335-359.
DÖVÉNYI, Z. és mtsai., 2021. Vándorlás. In: K. K. (főszerk.), szerk. Magyarország Nemzeti Atlasza (MNA). Budapest: CSFK Földrajztudományi Intézet, pp. 44-57.
EURÓPAI BIZOTTSÁG, 2011. Budapesti Nyilatkozat. Budapest: Európai Unió.
EURÓPAI UNIÓ TANÁCS, 2007. Lipcsei Charta a fenntartható európai városokról. Lipcse: Európai Unió.
EURÓPAI UNIÓ TANÁCS, 2010. Toledói Nyilatkozat. Toledo: Európai Unió.
FERBER, U., GRIMSKI, D., MILLER, K. & NATHANAIL, P., 2006. Sustainable Brownfield Regeneration: CABERNETNetwork Report. Nottingham: University of Nottingham.
GERMUSKA, P., 2002. Ipari város, új város, szocialista város. Korall, pp. 239-259.
GERSCHENKRON, A., 1984. A gazdasági elmaradottság történelmi távlatból. Budapest: Gondolat Kiadó.
HEGYI-KÉRI, Á., 2015. A dezindusztrializáció hatása a munkaerőpiacra- A Visegrádi országok régiói és Miskolc példáján keresztül 1999-2012 között. Miskolc: „Vállalkozáselmélet és gyakorlat" Doktori Iskola.
HERRICK, B. & KINDLEBERGER, C., 1983. Economic Development. New York: McGraw-Hill.
HIRT, S., 2013. Whatever happened to the (post)socialist city?. Cities, pp. 29-38.
KÁDÁR, K., 2011. Barnamezők Magyarországon. Deturope – the central european journal of regional development and tourism, pp. 122-141.

LAKI, I., 2014. szocialista iparvárosok, újvárosok történeti vonulata Történeti sajátosságok az európai iparvárosok és a hazai szocialista iparvárosok kialakulásában a 20. század második felében. Belvedere Meridionale, pp. 1-13.
LENGYEL, I., SZAKÁLNÉ KANÓ, I., VAS, Z. & LENGYEL, B., 2016. Az újraiparosodás térbeli kérdőjelei Magyarországon. Közgazdasági Szemle, pp. 615-646.
MAGYARORSZÁG KORMÁNYA, 2014. Magyar közlöny. Budapest: ismeretlen szerző
MINISZTERELNÖKSÉG, 2021. Terület- és Településfejlesztési Operatív Program Plusz- Előzetes Környezeti Jelentés. Budapest: ismeretlen szerző
NAGY, Á., 2003. Az EU Strukturális Alapok keretében barnamezős rehabilitációra kiírandó pályázatok szakmai megalapozása (előkészítő tanulmány).. Budapest: VÁTI Kht. Településtervezési és Tájtervezési Iroda,.
NEMZETGAZDASÁGI MINISZTÉRIUM, 2013. Terület- és Településfejlesztési Operatív Program. Budapest: ismeretlen szerző
OROSZ, É., 2012. A barnamező fogalmának változó értelmezése. Tér és Társadalom, pp. 73-87.
Program, T. F., 2014. Barnamezős területek fejlesztése tematikus fejlesztési program. Budapest: ismeretlen szerző
RECHNITZER, J. & SMAHÓ, M., 2016. Területi politika. Budapest: Akadémiai Kiadó.
RONCZ, J. & TÓTHNÉ SZITA, K., 2013. A barnamezıs területek újrahasznosításának megítélése metaanalízis alapján, különös te kintettel az Északmagyarországi régióra. Északmagyarországi Stratégiai Füzetek, pp. 14-25.
SAEGER, S. S., 1997. Globalization and Deindustrialization: Myth and Reality in the OECD. Review of World Economics, pp. 579-607.
SAJTOS, L. & MITEV, A., 2007. SPSS kutatási és adatelemzési kézikönyv. Budapest: Alinea Kiadó.
SINGH, A., 1977. UK Industry and the World Economy: A Case of Deindustrialisation. Cambridge Journal of Economics, pp. 113-136.
SYKORA, L. & STANILOV, K., 2014. Confronting Suburbanization. Urban Decentralization in Postsocialist Central and Eastern Europe. Wiley Blackwell, Chichester: ismeretlen szerző
SZÍVÓS, E., 2020. Kelet-Közép-Európa nagyvárosai … a második világháborútól a 2000-es évekig: mai városfejlődésünk jelenkori gyökereiről. Budapest: Múltunk.
TERÜLETFEJLESZTÉSI BIZOTTSÁG, 1999. Európai Területfejlesztési Perspektíva (ETP)- Az Európai Unió területének kiegyensúlyozott és fenntartható fejlődése felé. Potsdam: Európai Bizottság.
TREGENNA, F., 2011. Manufacturing Productivity, Deindustrialization, and Reindustrialization. Working Paper No. 2011/57, United Nations University.
ÚJ MAGYARORSZÁG FEJLESZTÉSI TERV (2007) Európai Bizottság.
WALTEMATE, K., 2007. Greyfield Redevelopment. Umstrukturierung und Revitalisierung veralteterShopping-Malls in den USA.. Standort–Zeitschrift für Angewandte Geographie.
WEGNER, C., 2005. Sekundärnutzung von Industrie-, Gewerbe- und Verkehrsbrachen am Beispiel der StadtNürnberg.Wirtschafts- und Sozialgeographisches Institut der Friedrich-Alexander-UniversitätNürnberg,. Nürnberger Wirtschafts- und Sozialgeographische Arbeiten.
YOUNT, K., 2003. What Are Brownfields? Finding a Conceptual Definition. Environmental Practice.

FRUZSINA BOZSOKI, DR. MARIANN SZABÓ: REDEVELOPMENT OF THE HISTORICAL PUBLIC SLAUGHTERHOUSE IN BUDAPEST – RESIDENTS' PERCEPTIONS BASED ON AN ONLINE SURVEY

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Abstract
Legacy of a century of industrialization? Brownfield sites are often considered as representatives of the past in the urban fabric; therefore, their rehabilitation is favourable from the perspective of sustainable urban development. Depending on their size, they would represent opportunities from small scale to large-scale urban improvements contributing to the reduction of expansion pressure into green fields, which could contribute to achieving the EU Goal: No net land take by 2050. The brownfield redevelopment phenomenon is a global research theme discussed from regional/ national perspective (for e.g., Visegrad Countries, developing countries, China) to local case studies. On the European level, brownfield redevelopment has become a major topic in urban development context, however it is more than just a phenomenon with emerging importance, moreover an ongoing challenge for the governments, regional authorities, development agencies and institutions, communities, etc. The EU accepts a broad-spectrum definition which is based on the concept of previously developed land (originated from the UK terminology). The redevelopment of brownfields is widely discussed using CABERNET's ABC model or classification (extended later with category D) for the assessment of economic potential thus helping authorities to prioritize the investment projects. Brownfield redevelopments are carried out by private investors, Public-Private-Partnerships as well as municipalities/ NGOs who get access to various funding opportunities. Our research aims to highlight one case from the private sector, namely the case of the locally protected former Public Slaughterhouse of Budapest (Közvágóhíd) which was bought by a Turkish entrepreneur to build a residential complex in the place of the slaughterhouse. It is a case of an instructive example: despite the fact that the preliminary plans indicated the willingness to keep some of the elements of the monument, almost everything in the area has been demolished. Since government classified the project as an investment of national importance in 2018, the investor did not have to consider any restrictions during the demolition. From the perspective of the urban planning in Budapest it is accepted that the former Public Slaughterhouse would become a new sub centre. In the Budapest University of Technology and Economics, Department of Environmental Economics and Sustainability, a survey has been carried out in October 2020 resulting 204 valid answers from dominantly residents live in the territory and other stakeholders who have relation to the area about their perceptions of the redevelopment. In the course of the research, we highlight the results from liveability perspective and discuss what factors could contribute to strengthen the sub centre role of the area.
Keywords: brownfield redevelopment, survey, residents' perceptions, liveability

1. Introduction

It is widely accepted that urban centres and their environment are in continuous change due to both inner (like change in the population, expectations of inhabitants, economic structure, local businesses' needs), and outside effects (like climate change, pandemics, exogenous technological change). To raise the attention to urban resilience, Simmie & Martin (2010) notes that regional development is far from a smooth process, since it is the subject to all sorts of interruptions and disruptions, like periodic economic recessions, the unpredictable rise of major competitors elsewhere, unexpected plant closures, the challenges arising from technological change and like. And yet, there is need for supplying wide range of possibilities for the inhabitants to enable them satisfying their needs. An interesting classification of these basic social geographical functions comes from a German social geographer, Partzsch (1964) (see figure 1.)

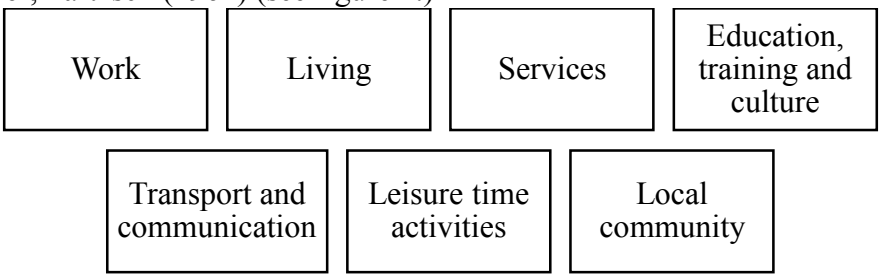

Figure 3.: The basic social geographical functions by Partzsch (1964)
Source: Partzsch (1964) in Berényi (1997) in Keserű (2013) (English translation)

Larger urban centres provide great variety in these areas. Favourably numerous working possibilities in diverse economic sectors (industry, service sector, public sector, R&D&I); diversified living options for various classes; diversified service portfolios (fog e.g. great varieties in commerce, HORECA sector); high number of different educative, training institutions; significant number of high-quality-level cultural events and institutions; efficient, easy-to-use, fast public transportation, good roads and reliable communication infrastructure; affordable or free options, parks and places for leisure time activities; places that encourage the meetings and discussion of the members of the local community. Walter Christaller, in his Central Place Theory introduced in 1933 points out that these larger urban centres provides services for their neighbourhoods, thereby they are responsible for the provision of goods and services for the surrounding market area too. If we consider the fact how these urban systems built – from bricks and blocks – are the means of change, we could accept that due to various, often interrelated effects how their role could change, which results at abandoned units in their built environment.

Do these abandoned sites – brownfields in the European Policy – represent legacy of a century of industrialization (NRTEE 2003; Czirfusz 2014; Dannert and Pirisi 2017)? Yes, indeed, there are plenty of left-behind places from that time, however it does not mean that they are generated solely during that period. Nevertheless, brownfield sites are often considered as representatives of the past in the urban fabric, testimonies of the previous economic base, cultural life, commodity. Facing the challenges derived from the urbanization, which resulted in the growing urban sprawl, their rehabilitation is favourable from the perspective of sustainable urban development (Pediaditi et al. 2010; Morio et al. 2013; Kolosz et al. 2018; Loures & Vaz 2018; Song et al. 2019). With great variety in their size, due to the previous use (from separate agricultural buildings to large industrial, for e.g., heavy industrial complexes throughout the military sites) their redevelopment opportunities are vary to large extent; nevertheless, facing the urban sprawl situation, their rehabilitation is favourable from the perspective of the EU Goal: No net land take by 2050 (Science for Environment Policy 2016). As a current policy paper issued by the European Commission (Brussels, 17 November 2021), the land take has remarkable measures: more than 400 km² of land is taken every year on a net basis by urban areas and infrastructure, predominantly at the expense of agricultural land. Besides this, intensive land management and land use change negatively impacts soil biodiversity such as earthworms, springtails and mites (EC 2021).

The question of brownfield redevelopment is both an important research phenomenon as well as a matter of regional policy. The different remediation alternatives, the relation of old and new functions, the reintegration of the redeveloped sites into the urban fabric are all areas of high interest among various shareholder and stakeholder groups. In a current study published by Rey et al. (2022) titled Neighbourhoods in Transition, differentiates six groups of brownfields as:

(1) industrial brownfields *(composed of industrial sites from the nineteenth and the first half of the twentieth centuries and large sub- or peri-urban industrial sites)*,
(2) railway brownfields *(abandoned railway stations, obsolete railway areas, industrial railway sites)*,
(3) military brownfields,
(4) waterfront brownfields,
(5) infrastructural brownfields *(including transport-related infrastructures, agro-food facilities, tertiary sector facilities, commercial brownfields, energy brownfields)*
(6) and, finally, diverse derelict sites.

As we can see, this broad-spectrum definition which is based on the concept of previously developed land (originated from the UK terminology), is far richer than the classical abandoned industrial sites, rather resembles to Partzsch's basic social geographical functions' classification.

The widely-used and acknowledged definition by CABERNET (Concerted Action on Brownfield and Economic Regeneration Network) - a European multi-stakeholder network, coordinated by University of Nottingham (UK) with the involvement of 49 participants from different European countries - focuses on the complex issues that are raised by brownfield regeneration: *"Brownfields are sites that have been affected by the former uses of the site and surrounding land; are derelict and underused; may have real or perceived contamination problems; are mainly in developed urban areas; and require intervention to bring them back to beneficial use"* (CABERNET 2006; cordis.europa.eu online).In addition to that, another contribution of the project in the *FP5-EESD - Programme for research, technological development and demonstration on "Energy, environment and sustainable development, 1998-2002"* was the development of the so-called ABC model or classification (extended later with category D) for the assessment of economic potential of the derelict sites, in order to help authorities to prioritize the investment projects. The great contribution of the model is to call the attention of the varied nature of the brownfield sites to be investments. If economically viable, brownfield redevelopments are carried out by private investors (Type A). Public-Private-Partnerships are viable options when the investment is at the borderline of profitability (Type B). Municipalities/ NGOs who would get access to various public funding opportunities and this is the chance for those poor but still valuable brownfield sites' redevelopment (Type C).

This current research aims to highlight one case from the private sector, namely the case of the locally protected former Public Slaughterhouse of Budapest (Közvágóhíd) which was bought by a Turkish entrepreneur in 2017 to build a residential complex in the place of the slaughterhouse. It is a case of an instructive example: despite the fact that the preliminary plans indicated the willingness to keep some of the elements of the monument, almost everything in the area has been demolished. Since government classified the project as an investment of national importance in 2018, they did not have to consider any restrictions during the demolition. (Kaszás for hungarytoday.com 2020)

From the perspective of the urban planning in Budapest, capital of Hungary, it is accepted that the former Public Slaughterhouse would become a new sub centre in the 9th district. In the Budapest University of Technology and Economics, Department of Environmental Economics and Sustainability, a survey has been carried out in October 2020 resulting 204 valid answers from dominantly residents live in the territory and other stakeholders who have relation to the area about their perceptions of the redevelopment. During the research, we highlight the results from liveability perspective and discuss what factors could contribute to strengthen the sub centre role of the area.

The study is structured as follows. In brief, we highlight the local history of the aera and its importance. After that, we introduce the material and methods of the research (questionnaire-based survey for mental mapping). As a next step, we highlight the results and discussion, and finally, the conclusions.

Study area

As Kaszás for hungarytoday.com (2020) describes, the city of Pest *(before Buda, Pest and Óbuda unified into one single city in 1873)* passed a resolution in 1868 to establish a public slaughterhouse, which simultaneously banned smaller private slaughterhouses operating in the city, causing increasing problems with public health due to their poor hygienic conditions. In 1872 the former public slaughterhouse – built by the plans of "van der Hude" by Julius (Gyula) Hennicke – has been opened, it had an area of 14 hectares and operated for approximately hundred years afterwards. After the closure, the buildings got temporary functions: warehouse, retail and wholesale units and smaller factories; later on, until the sale of the area by the Budapest Meat Wholesale Company (Budapesti Húsnagykereskedelmi Vállalat) rehearsal rooms, music and nightclubs operated in the buildings. (Gönczi for pestbuda.hu 2022; Kaszás for hungarytoday.com 2020)

Figure 4.: The Historical Public Slaughterhouse in Budapest.
Source: Fortepan, Budapest City Archives, Photos of György Klösz in 1880s

For the year of 2017, when a 4.8-hectare site has been sold for the development of residential complex there had been valuable investments nearby (Palace of Arts and the National Theatre building), which valued upwards the territory. For a few practitioners and inhabitants' other functions would be more attractive like the case of El Matadero slaughterhouse in Madrid, which has become a musical, cinematographic, and artistic center with its preserved buildings, or the Mattatoio in Rome. It is quite interesting to note that spontaneously the former public slaughterhouse served as a home of many artists, bands so for a short period of time it was a cultural centre. (Gönczi for pestbuda.hu 2022, Kaszás for hungarytoday.com 2020)

The brownfield redevelopment in the former public slaughterhouse represents a case for CABERNET's classification type A, the attributes of the territory make the investment profitable (for e.g. communication networks, access to cultural sites, proximity to the Danube, educational institutions), nevertheless, the extent of the investment (as Gönczi for pestbuda.hu 2022 descries "houses as high as the clouds") and the added value of the investment for not just the owners but for the local inhabitants in the district and in the city seems to be less touchable in the current status.

2. Material and Methods

The settlement and the daily use associated with it describe a complicated system. The life taking place in this system includes the geographically defined built and natural environment. The mental map is an environmental psychology approach that can contribute to settlement research with a complementary approach, highlighting the system of the relationship between human behaviour and the environment. That is, a person gets to know his environment by the actions they perform in it. We think about the environment around us objectively, but it's a subjective thing, because everyone is

connected to different places, cities, or neighbourhoods with different emotions. The mental map method is based on an active psychological process, during which the mind processes, organizes, stores, and then retrieves the information about space, related to the current action. Therefore, the result may be different compared to the real map. (Brózik & Dúll 2019)
The preparation of the mental map can be done with several methods (Table 1), which can be used in combination to "map" the examined area. The following table shows the methods of mental mapping and their relationship to each other.
Table 6.: Mental map methods

Mental map methods	
Direct	**Indirect**
• Map drawing • Structured interview • Questionnaires	• Request directions • Monitoring • Field trip • Examination of texts

Source: own compilation based on Mester (2007)

At the time of the research, due to the circumstances of the COVID-19 epidemic, we used the questionnaire method, which is another direct research method in addition to map drawing, which can be created by transforming structural interviews. The essence of this method is to replace drawing with questions about space. The questions must be designed in such a way that they do not influence the respondent. The questions are about:
1. what kind of places, neighbourhoods are known in the designated city district by the respondent;
2. characteristics associated with the examined space.
The questionnaire-based method helps to obtain a larger amount of data in a shorter time. A disadvantage of the method is that it is more impersonal and therefore more rigid. Therefore, it is best used for testing hypotheses. (Mester 2007)
The great advantage of the mental map method is that it allows us to examine social processes in space as well. With this method, the traditional data of social geography can be expanded with additional information, and the results obtained by the method can be an effective solution for solving practical problems. Among other things, it can help to explore the problems of geographical identity, settlement relations, residential segregation, and city marketing. (Kiss és Bajmócy 1996)
In addition to the direct mapping and questionnaire method, it is also possible to create a mental map using indirect methods (Mester 2007). During our research, we also used the method of observation and field trips in addition to the questionnaire survey, so we will also present these briefly.
The essence of the observation method is to examine what social groups use the examined space, how much time they spend there, for what purpose they visit the part of the city under investigation and what interactions take place there. The great advantage of the method is that we can directly perceive how the space functions during the observation period. If someone only uses this method during the examination, it is worth making multiple observations, which is why it can be very time-consuming. (Mester 2007)
The main goal of our research was to highlight, how an old industrial area, such as the former Public Slaughterhouse, which became a brownfield after losing its function over time, can be integrated back into the urban fabric. During an A-type development, how the investors pay attention to the new installation and the creation of the new functions provided by the complex. Our underlying motivation is the realization that the construction of new buildings (with complete or partial demolition of previous buildings), i.e., recultivation, is not sufficient to create an attractive, well-being-serving new part of the settlement. It is important that the developers examine many social and environmental issues during the development, so that the complex solution creates a well-livable part of the city. Otherwise, the durability of the raw materials used will not be properly utilized and the invested resources may not pay off. After all, due to the inadequate living conditions, the area can slowly but

again start to deteriorate. Based on what has just been described, the questionnaire was also entitled “Public Slaughterhouse – examination of its liveability ".
The questionnaire that forms the basis of the survey was first shared in the form of a Google Form in the Facebook groups of the residential communities in the area (1.), then on university platforms (2.) and finally, using the snowball method, on the personal Facebook platform of the researchers. The questionnaire was available for almost 2 weeks, during which period 204 completions were received. In the mental map method based on the questionnaire survey in the virtual space, it is important to delimit the area, for which the following image was shared in the form (Figure 3).

Figure 5.: The research site bordered by white line
Source: own compilation based on the Google Maps

The themes and topics of the questionnaire survey are presented as follows (Table 2).
Table 7.: Themes and topics of the questionnaire

Themes	Topics	Options of the answers
1. General data and social background	sex	choice of discreet variables
	year of birth	open ended answer
	qualification	choice of discreet variables
	number of people living in the household	open ended answer
	number of children living in the household	open ended answer
	descriptive social status	choice of discreet variables
	marital status	choice of discreet variables
	post code of actual residence	choice of discreet variables
	years of living in Budapest	choice of discreet variables
2. Familiarity of the location - MAP	frequency of visiting the area	choice of discreet variables
	objectives of the visiting the area	choice of discreet variables
3. Liveability for young people and families	the level of satisfaction	4-point Likert scale
4. To what extent the respondent is satisfied with the development	the level of satisfaction	4-point Likert scale

5. Mental mapping (at least 5 attributes the respondent can evoke)	impressions with free association method	open ended answer
6. Identification of possible problems	impressions with free association method	open ended answer

Source: own compilation (2020)

The results were evaluated using MS Excel. The research is not representative, which is acceptable from the point of view of answering the research questions since it was aimed at evaluating subjective impressions. The aim of the survey was to examine the mental map of the area users, in the case of people with different levels of information and social background.

3. Results and Discussion

During the evaluation, we examined not only individual aspects, but also the relationships between the answers. The results will be presented along the themes.

General data and social background

A total of 208 responses were received for the questionnaire survey, in which there were multiple answers from the same person, so by filtering them, the number of items that could be evaluated was reduced to 204. Almost 50% of the study participants were women and 50% were men.

Most of the respondents (125 people) live at the 9th district, most of them precisely at the area of the former Public Slaughterhouse (112 people). Since the form was also distributed using the snowball method, there are 20 respondents outside Budapest capital.

The following table (Table 3.) indicates the distribution of respondents by age group, gender, and educational level.

The table indicates that the largest minority who has filled out the questionnaire is the age group between 25 and 35 (98 responses, 48% of the sample), and that most of the respondents had a diploma (154 people, 75% of the sample). Based on this, it can be assumed - given the proportion of responses in the neighbourhood - that developments in the area are attractive to the population with higher education, which can also contribute to the development of the district.

Table 8.: Presents the respondents by age group, gender, and educational level (WMN - Woman; M - Man)

	15-18		*19-24*		*25-35*		*36-45*		*46-55*		*56-65*		*over 66*		*Total*		*All-Total*
	WMN	*M*	*WMN*	*M*	*WMN*	*M*	*WMN*	*M*	*WMN*	*M*	*WMN*	*M*	*WMN*	*M*	*WMN*	*M*	
8 primary school or less		1														1	1
professional certificate					2						1				2	1	3
Matura exam			2		2	2		2	2	2					6	6	12
Current studies at			10	9	7	5		1	1						18	15	33

higher education																	
Diploma			12	6	35	45	15	23	5	2	7	3	1		75	79	154
I don't know/ I don't answer								1								1	1
Total		1	24	15	46	52	15	27	8	4	8	3	1		101	103	204
Age group	1		39		98		42		12		11		1		204		

Source: own compilation based on the results of the survey (N=204), 2020

We were curious about those 112 respondents who live at the area of the former Public Slaughterhouse that what how long they have lived in Budapest. As Figure 4. indicates, which was drawn up based on a sample of people living in and around the former Public Slaughterhouse, it can be stated that the respondents are not natives of Budapest. The largest cluster of the sub-sample is the age group between 25 and 35 years, for whom the average number of years spent in the capital is around 10 years. The Public Slaughterhouse can be ideal for them, as they can live close to their workplace thanks to the surrounding office buildings. The rural parts of the country are also easily accessible from the territory. With the completion of the rehabilitation, a district operating as a sub-centre can be created, with a wide portfolio of services (shopping centre, culture and entertainment, easy access, high-quality public spaces, and residential buildings), thus reducing the burden on the inner parts of the capital.

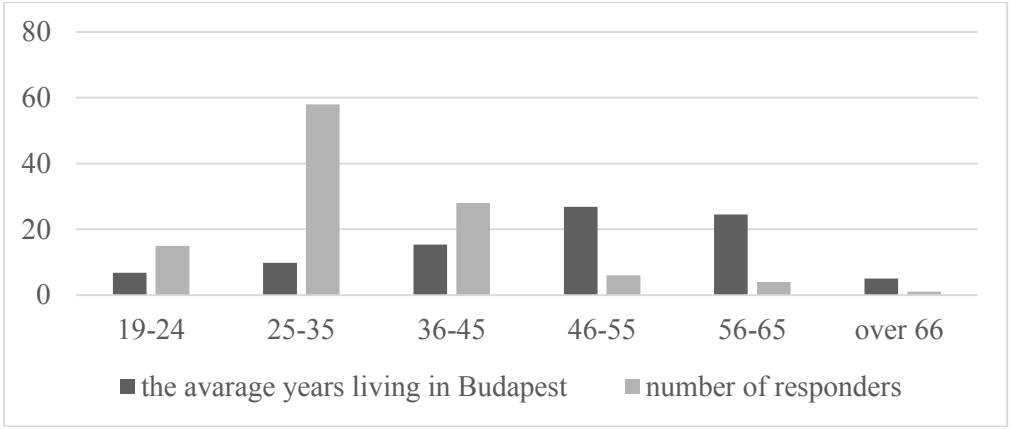

Figure 6.: The representation of the age groups lives at the area of the former Public Slaughterhouse
Source: own compilation based on the results of the survey (N=112), 2020

The income distribution of the respondents (N=204) follows the logic of age distribution; 76% of respondents have independent income and 16% are still in student (dependent) status. We also asked about the marital status of the respondents, since during the observation we saw only one playground at the area, and we were interested in how much families are attracted to the area. 24% of the respondents are in a cohabitation relationship, 28% are married and 39% are unmarried. In connection with this, we also examined *how many people live in the household of the respondents*. Most of the respondents live as a couple or alone. To the question *"How many children under the age of 18 live in your household"*, the highest number of answers was 0. Thus, based on the answers, it can be concluded that one playground and densely built-up apartment buildings are attractive to young couples and singles.

Familiarity of the location

In the questionnaire, we also sought an answer to the purpose of those who visit this area, and we grouped this according to age groups. Figure 5 below indicates the results.

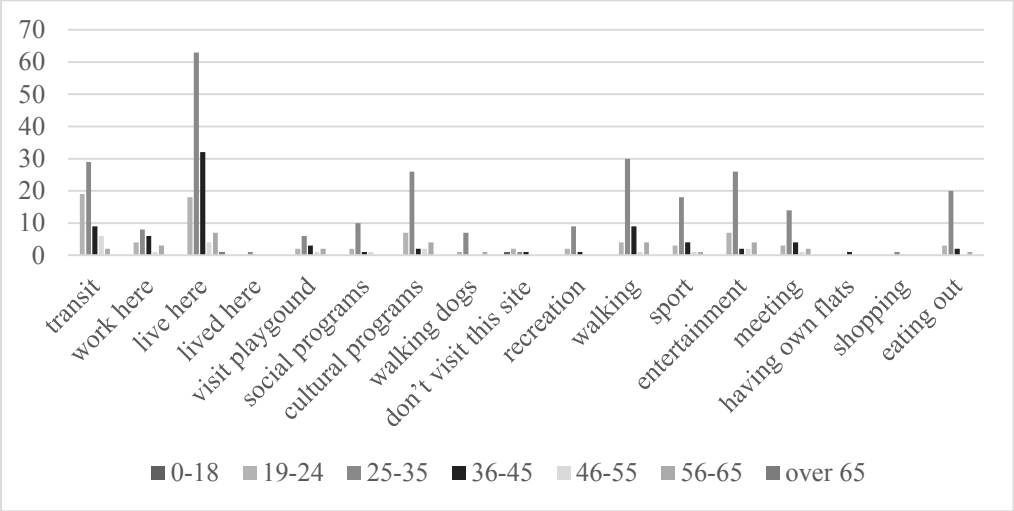

Figure 7.: The representation of the age group's objectives visiting the area
Source: own compilation based on the results of the survey (N=204), 2020

Respondents could give multiple answers to the question of what purpose they visit this area. The overwhelming majority of people indicated that they live here, and then most of the answers came that they used to go here when passing through. These were followed by entertainment and cultural programs and walking opportunities. There was also an outstanding number of responses to the possibility of working here. We analysed these answers in more detail, as they provide an opportunity to evaluate the land use patterns of the respondents.

The results can be read from the figure, which can only confirm the previous statements. Many of those, who filled out the questionnaire came from the age group between 25 and 35, and we can now see that they are the inhabitants who mainly live in this part. I would also like to highlight the option of "walking", which is also marked by many the 56-65 age group. This number could increase further with the development of suitable areas for recreation.

We also asked the respondents how often they visit the area of the former Public Slaughterhouse (Figure 6.). 64% of the respondents visit this area daily.

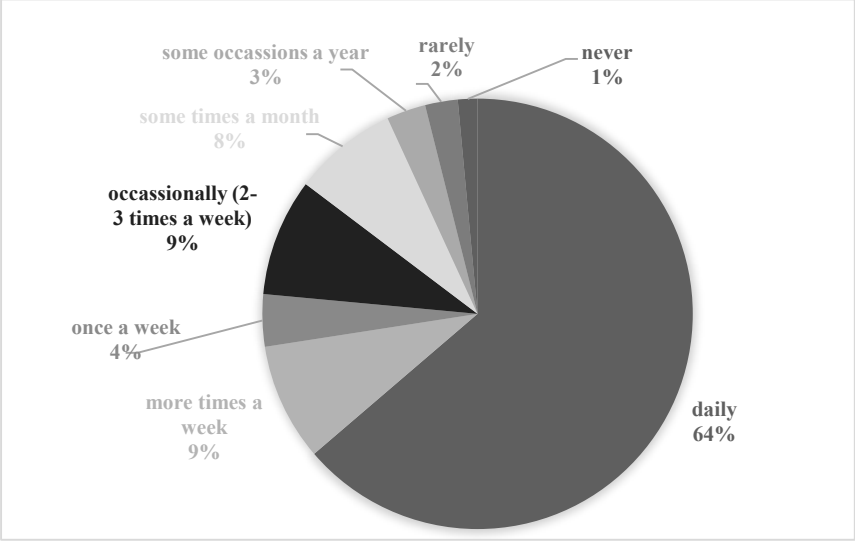

Figure 8.: Frequency of visiting the area of the former Public Slaughterhouse
Source: own compilation based on the results of the survey (N=204), 2020

Liveability for young people and families

To the question of how people with families find liveable the area, the proportion of "rather no" and "rather yes" responses were indicated in almost the same proportion, but the overwhelming majority pointed towards "yes". The same question was also formulated for young people, how liveable this area is for them. Here, the outstanding majority of answers fell on "rather yes" and "I would completely agree". It can be concluded from this that we can talk about an area with more favourable conditions for single and young people living in couples.

To what extent the respondent is satisfied with the developments

We examined several aspects of the developments. The level of satisfaction with these factors is highlighted in Table 4., below.

Table 9.: Research of satisfaction related to the developments

Factors related to the developments	Level of satisfaction				I don't know/ I don't answer [value]
	Least satisfied („1") [value]	Less satisfied („2") [value]	Rather satisfied („3") [value]	Absolutely satisfied („4") [value]	
the quality of buildings	10	32	82	55	25
landscape	32	66	72	20	14
public areas	40	91	46	13	14
greenbelts, parks	59	80	35	10	20
recreation facilities	48	79	40	12	25
safety	26	52	72	29	25
entertainment	27	55	57	42	23
accessibility	5	33	73	75	18
number and quality of playgrounds	24	36	45	27	72

Source: own compilation based on the result of the survey (N=204), 2020

The respondents are satisfied with the developments regarding four factors (residential building quality, safety, entertainment, accessibility), these factors provide opportunities for the basic needs, however, for families, the environment must offer more functions to be liveable.

Mental mapping (at least 5 attributes the respondent can evoke)

There were two optional questions in the questionnaire. In the first one, they had to list 5 factors that come to their mind from the examined area (delimited with the help of a picture). The second, related to the area's potential problems, the respondents were asked to formulate the most significant ones in their own words.

The received free-text answers are divided into 13 categories (state characteristics, related to transport nodes, culture, entertainment, trade, area under construction, environment, infrastructure, natural features, functional deficiencies, development opportunities, image of the area, feelings and impressions, society, environmental protection problem). During the assessment of the answers, we ranked them, and then they were evaluated. The evaluation has been made according to whether the associations are positive, neutral, or negative. Although the response was not mandatory, an exceptionally high number of responses, namely 170, were received. Besides the three-way-evaluation, we analysed them based on the zip code to filter the responds of the residents of the 9th district (115 answers), as well as people living in other districts of Budapest and Pest County (35 answers), and people living in the countryside (20 answers).

The respondents of the 9th district mostly expressed negative factors for the condition characteristics, such as dusty, noisy, and untidy. This is mostly due to the ongoing constructions, as well as the proximity to the traffic junction. In terms of transportation, the availability of dense and multiple means of public transportation can be considered positive, however, their difficult and somewhat dangerous accessibility, as well as the heavy traffic, were negatively evaluated. The cultural opportunities provided by the area are clearly visible, such as the Hungarian Palace of Arts (MÜPA), the National Theatre and Budapest Park (open-air festival place). Regarding trade, the number of shops can be considered insufficient, but the nearby office buildings were positively evaluated as job opportunities. Regarding the location of the area, the respondents evaluated the proximity of the Danube positively, however, the residents still miss the green surfaces. Among the answers, there was an interesting phrase that I would like to highlight: "missed opportunity". This may apply to the other negatively mentioned factors, such as overcrowding, narrow streets, dense built-up areas, little parking possibilities. Regarding the development opportunities, the ones just listed can be transferred as tasks still waiting to be solved. In terms of the area's image, the ratio of positive and negative comments were equal, the residential parks can also be classified here as neutral. In terms of feelings and impressions, emphasis was mainly placed on the quality and difficulties of the investment. In social terms, the legacies of the past were also mentioned. The main environmental protection problems are caused by negative factors arising from construction.

Like the previous group, **the residents of Budapest outside of the 9th district** expressed a dominant share of negative comments regarding the characteristics of the condition, such as deserted, noisy, and underground area. In terms of transportation, good public transportation can be considered positive and bicycle transportation was mentioned (which can also be evaluated as a positive effect of the 2020 summer innovations), but the dominance of cars emerged as a negative aspect. The cultural opportunities offered by the area also appeared here. Regarding trade, the TESCO grocery and the OBI hardware store were mentioned. During the construction process, the demolition of the buildings of the former Public Slaughterhouse was mentioned, which has a negative context in relation to monument protection considerations. Regarding the environmental comments, the lack of green space is the most decisive here as well. The "15-minute city" was mentioned as a development possibility, which may even become available with the development of the new Southern Ring Road. There were no negative comments regarding the area's image. Among the positive factors, the following expression should be highlighted: "young and classic at the same time", which shows the development of the area well. When it comes to feelings and impressions, things like social reality, “edge of town” and “area in strong need of development” are formulated. In terms of social aspects, the legacies of the past were also mentioned here, recalling a poor neighbourhood. Air pollution was highlighted here as well, which can be traced back to the lack of green areas and continuous construction work.

Many of the *respondents from outside the capital* also expressed negative comments regarding the condition characteristics, such as dilapidated, noisy and dangerous. In terms of transport, compared to the other respondents, not the transport characteristics were highlighted, but the diversity of the means of transport. This may be caused by the fact that the rural population does not use Budapest's public transport daily. The cultural opportunities provided by the area were the same here as in the previous two cases. Services and Lurdy Ház shopping mall were mostly mentioned in terms of commercial possibilities. Mentions were made about the prolonged and unpleasant works in connection to the construction processes. Regarding the environmental patterns, the lack of green areas is the most decisive factor here as well. As a development option, the revitalization of the park in front of the slaughterhouse came up, which would improve the lack of green space. Feelings and impressions show a lot of positive things, such as: many developments, opportunities for renewal and a beautifying environment.

Identification of possible problems

In the case of the second free-association question, where the problems had to be identified, 178 completions were received. The answers were analysed according to 8 categories (1: construction

difficulties, 2: environmental problems, 3: social problems, 4: traffic problems, 5: infrastructure problems, 6: difficulties due to the location of the area, 7: gaps in commercial opportunities, and 8: development gaps). After the categorization, the answers were analysed by age groups. This question was also answered in the highest proportion by the age group between 25-35 years. Based on the evaluation, according to the respondents, it is very problematic that the supplementary functions of the sudden and quickly implemented developments were not considered in the area. A larger grocery store, pharmacy and various educational institutions are missing. The issue of commercial outlets has since been resolved, a Spar grocery store and a pharmacy will be handed over in the area.

This part used to be the edge of the city, based on the development goals and the constructions, it is now starting to take on the role of the sub-centre, but for the time being this mostly only means the increased population. Difficulties arising from the location of the area are yet to be resolved, although the construction of a pharmacy and a larger grocery store in the area has already been completed. The presence of the Budapest Park open-air festival scene and the noise effects associated with heavy traffic raise a very big question of liveability for the people who live here. Furthermore, for the time being, the lack of public institutions and recreational opportunities has a negative effect on the people living in the area. The environment of the development area is still neglected, which increases the sense of danger and insecurity among the people living here. Minority and homeless problems in the wider environment are also mentioned.

The factors presented above also show that it is important to develop the brownfield areas to restore them to the urban circulation as soon as possible. However, the development must be planned in a complex way, so that the liveability of the area can develop properly together with the works of art that will be built on it.

4. Conclusion

One of the goals of the development policy of the capital and the district is to create several sub-centres in Budapest, where several functions are available to the public, in order to relieve the burden on the inner-city districts. This reduces the traffic and congestion of the inner districts and gives room for development to the outer districts. Simmie & Martin (2010) state in their study that change is not smooth and that many trends contribute to the development of economic and liveability circumstances. In the case of our study, we aimed at highlighting exactly this issue as the main result. The development of the former Public Slaughterhouse was in a half-finished state during our survey. Based on the number of fill-ins from the area, we believe that the conclusion can be drawn that the people who live there have an opinion and want to share it, they are happy to answer. *A smooth transformation is not a condition, but it is the duty of the developers to mitigate it.* Nowadays, there are more and more projects where professionals try to create a development that is liveable for many by identifying the range of stakeholders and listening to their opinions. Here, we would refer back to the functional palette defined in Partzsch's (1946) study. The housing function also involves many other functions in an area, it is not enough just to have a stable and new building stock, it is also necessary to have the appropriate institutional provision. We believe that the mental map of this research nicely outlined the current state. During the lifetime of a project, a survey of this kind can contribute a lot to its success, as they alluded to in their study (Kiss & Bajmócy 1996) regarding the results of the method.

Our study was done halfway through the development of the area, since then the old buildings have also been demolished. The central clock tower and the two bull statues at the entrance remain from the former building complex. The walls of the listed buildings will be rebuilt, and the central square will be embellished in the new plans, thus also paying tribute to the industrial heritage - the plans reveal this. At the same time, we must wait for the development to be completely ready, so our goal is to continue to monitor the area and assess the image of the final development from the point of view of the various area users. We are fortunate to be able to follow a development process throughout. In the future, we would also like to conduct interviews with experts related to the development, thus further shading the picture of the situation.

References

Brózik, P.; Keszei, B.; Dúll, A. 2019. Mentális térképezés a köztérkutatásban (‘Mental mapping in public space research’). Két környezetpszichológiai vizsgálat kutatásmódszertani tapasztalatai (‘Methodological implications of two environmental psychology studies’). *Socio.hu Társadalomtudományi Szemle. 9*(1), 19–47. doi:10.18030/socio.hu.2019.1.19

Concerted Action on Brownfield and Economic Regeneration Network (CABERNET). 2006. Sustainable Brownfield Regeneration: CABERNET Network Report. Produced by the University of Nottingham

European Comission, CORDIS. online. Concerted action on brownfield and economic regeneration network. Available at: https://cordis.europa.eu/project/id/EVK4-CT-2001-20004, downloaded at 27/03/2023

Czirfusz, M. 2014. Obliterating creative capital? Urban governance of creative industries in post-socialist Budapest. *EUROPA XXI 26*. http://dx.doi.org/10.7163/Eu21.2014.26.5

Dannert, É.; Pirisi, G. 2017. Rusty Hungary: New Insights in Brownfield Research. *European Spatial Research and Policy 24*(1). https://doi.org/10.1515/esrp-2017-0001

European Commission - Questions and answers 17.11.2021. Questions and Answers on the EU Soil Strategy. Available at: https://ec.europa.eu/commission/presscorner/api/files/document/print/en/qanda_21_5917/QANDA_21_5917_EN.pdf, downloaded at 27/03/2023

Gönczi, A. for pestbuda.hu. 30.06.2022. In memory of Marhavágóhíd - one of the capital's meat industry centres was completed 150 years ago. Available at: https://pestbuda.hu/en/post/20220630_in_memory_of_marhavagohid_one_of_the_capital_s_meat_industry_centres_was_completed_150_years_ago, downloaded at 26/03/2023

Kaszás, F. for hungarytoday.com. 21.02.2020. Only Elements of Historical Public Slaughterhouse Will Remain in New Residential Complex. Available at: https://hungarytoday.hu/only-elements-of-historical-public-slaughterhouse-will-remain-in-new-residential-complex/, downloaded at 26/03/2023

Keserű, I. 2013. Commuting patterns of secondary school students in the functional urban region of Budapest. *Hungarian Geographical Bulletin 62*(2), 197–219

Kiss, J. & Bajmócy, P. 1996. Egyetemi hallgatók mentális térképei Magyarországról (‘Mental maps of Hungary - as the university students see it’). Tér és Társadalom / *Space and Society 10*(2-3), 55–68. https://doi.org/10.17649/TET.10.2-3.365

Kolosz, B.W.; Athanasiadis, I.N.; Cadisch, G.; Dawson, T.P.; Giupponi, C.; Honzák, M.; Martinez-Lopez, J.; Marvuglia, A.; Mojtahed, V.; Ogutu, K.B.Z.; Van Delden, H.; Villa, F.; Balbi, S. 2018. Conceptual advancement of socio-ecological modelling of ecosystem services for re-evaluating Brownfield land. *Ecosystem Services 33*, Part A, 29-39, https://doi.org/10.1016/j.ecoser.2018.08.003

Loures, L., Vaz, E. 2018. Exploring expert perception towards brownfield redevelopment benefits according to their typology. *Habitat International 72*. https://doi.org/10.1016/j.habitatint.2016.11.003

Mester, T. 2007. Mentális térképezés (‘Mental mapping’). In: Kovács, É (szerk.) Közösségtanulmány: Módszertani jegyzet (‘Community studies: methodology’). Budapest, Magyarország, Pécs, Magyarország: Néprajzi Múzeum, Pécsi Tudományegyetem BTK Kommunikációs Tanszék (2007), 437 p. pp. 296-316.

Morio, M.; Schädler, S.; Finkel, M. 2013. Applying a multi-criteria genetic algorithm framework for brownfield reuse optimization: Improving redevelopment options based on stakeholder preferences. *Journal of Environmental Management 130*, 331-346, https://doi.org/10.1016/j.jenvman.2013.09.002

National Round Table on the Environment and the Economy (NRTEE). 2003. National Brownfield Redevelopment. Strategy for Canada. ISBN 1-894737-05-9

Partzsch, D. 1964. Zum Begriff der Funktionsgesellschaft. Mitt. d. Dt. Verband.f.Wohnungswesen, Städtebau u. Raumplanung

Pediaditi, K.; Doick, K. J.; Moffat, A. J. 2010. Monitoring and evaluation practice for brownfield, regeneration to greenspace initiatives: A meta-evaluation of assessment and monitoring tools. *Landscape and Urban Planning 97*(1), https://doi.org/10.1016/j.landurbplan.2010.04.007
Rey, E.; Laprise, M.; Lufkin S. 2022. Urban Brownfields: Origin, Definition, and Diversity. In: *Neighbourhoods in Transition.* The Urban Book Series. Springer, Cham. https://doi.org/10.1007/978-3-030-82208-8_2
Science for Environment Policy. 2016. No net land take by 2050? Future Brief 14. Produced for the European Commission DG Environment by the Science Communication Unit, UWE, Bristol
Simmie, J.; Martin, R. 2010. The economic resilience of regions: towards and evolutionary approach. *Cambridge Journal of Regions, Economy and Society 2010 (3)*, https://doi.org/10.1093/cjres/rsp029
Song, Y.; Kirkwood, N.; Maksimović, Č; Zheng, X.; O'Connor, D.; Jin, Y.; Hou, D. 2019. Nature based solutions for contaminated land remediation and brownfield redevelopment in cities: A review. *Science of The Total Environment 663*, 568-579, https://doi.org/10.1016/j.scitotenv.2019.01.347

Pictures
Fortepan / Budapest City Archives / Photos of György Klösz,
https://fortepan.hu/hu/photos/?id=82313

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Abstract (short)
On European level, brownfield redevelopment has become a major topic, using a broad-spectrum definition based on the concept of previously developed land (originated from the UK terminology). Our research aims to highlight one redevelopment from the private sector, the locally protected former Public Slaughterhouse of Budapest (Közvágóhíd). In the BME Department of Environmental Economics and Sustainability, a survey has been carried out in October 2020 resulting 204 valid answers from dominantly residents live in the territory and other stakeholders who have relation to the area about their perceptions of the redevelopment. During the research, we highlight the results from liveability perspective and discuss what factors could contribute to strengthen the sub centre role of the area.
Keywords: brownfield redevelopment, survey, residents' perceptions, liveability

DÁVID NAGY:
DEVELOPMENT OPPORTUNITIES FOR DANUBE FREIGHT SHIPPING AND THE EVALUATION OF THE RESULTS OF THE STRATEGY FOR THE DANUBE REGION

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The utilisation of the Danube as a waterway has always fallen short of its potential. This is mainly attributable to the geographical characteristics of the river. The Danube's water flow is uneven, with frequent low water levels in late summer and autumn. Another disadvantage is that it has few navigable tributaries, of which the Rivers Drava, Sava and the Tisza are of such size and flow that navigation is theoretically possible. The development of navigation on the Danube has always been hampered by the fact that it reaches the sea via a delta estuary, and the navigability of the individual branches could only be ensured by regular maintenance. And finally, it is a disadvantage that the river enters the Black Sea, which is a landlocked inland sea far from the main maritime transport routes. The study would answer the following questions: 1.) What is the situation of freight transport on the Danube, what are the opportunities and constraints of its development? 2.) In the context of the EUSDR, what investments are the countries undertaking to improve Danube navigation? 3.) To what extent are Danube organisations active in international projects and what are the impacts of cooperation? 4.) Whether it is possible to draw conclusions from the analysis of national and international projects on the commitment of the Danube countries to inland navigation?

I. Introduction and literature review

The utilisation of the Danube as a waterway has always fallen short of its potential. This is mainly attributable to the geographical characteristics of the river. The Danube's water flow is uneven, with frequent low water levels in late summer and autumn. Another disadvantage is that it has few navigable tributaries, of which the Rivers Drava, Sava and the Tisza are of such size and flow that navigation is theoretically possible (Hardi 2012). The development of navigation on the Danube has always been hampered by the fact that it reaches the sea via a delta estuary, and the navigability of the individual branches could only be ensured by regular maintenance. And finally, it is a disadvantage that the river enters the Black Sea, which is a landlocked inland sea far from the main maritime transport routes.

The second impediment was of a political nature, with the river often meandering across cultures and empires, and development was often hampered by devastating wars. The 19th century saw the development of the countries along the Danube and parallelly an increase in the demand for transport, while at the same time the biggest competitor to shipping, the railways, was introduced. This delay in the development of Danube shipping meant that the canal construction, waterway, and inland waterway transport network development - that had been already completed in Western Europe - were not implemented in this region. Nevertheless, this period can be considered as one of the gilded ages of Danube navigation, as the “First Imperial and Royal Private Danube Steamship Company” (D.D.S.G.), founded in 1829 had become by the end of the century the world's largest inland waterway shipping company (Huszár 2021). In addition, the Austro-Hungarian Monarchy successfully completed the regulation of the Iron Gates, the construction of several lowland canals to promote the transport of agricultural goods.

The peace that ended World War I imposed harsh conditions on the defeated states but preserved the international status of the Danube. Surrounded by hostile states, Hungary was able to connect to international trade via the Danube. It therefore established a river-sea fleet, which became essential for the country's foreign trade and supply security.

After World War II, the Danube region came under the sphere of Soviet influence, and this allowed the signing of the Belgrade Convention in 1948, which after a long period of time gave the control of the Danube to the riparian countries. In the second half of the 20th century, shipping boomed once again, with the efficient development of waterways (Iron Gate swelling dam, Danube-Black Sea Canal), the main reason of which was the transportation needs of the heavy industries established along the Danube, which had been built up along the interests of the Soviet empire.
In the 1990s, Danube shipping essentially collapsed and has not been able to recover from this crisis since. The European Union supports the development of inland waterway freight transport and its development in preference to rail and, even more so, road transport. The main reason for this is the constantly growing air and noise pollution, infrastructure needs and greenhouse gas emissions of road freight transport. The European Union Strategy for the Danube Region (hereafter referred to as the EUSDR) promotes the development of Danube waterway and port infrastructure and the modernisation of navigation and information systems. The aim of this study is to examine the extent to which the European Union's policy in support of inland waterway shipping can contribute to overcoming the obstacles and improving the performance of the sector.

Literature review

Priority area 1 of EUSDR intends to develop road, rail, air, and inland waterway transport in order "To Improve Mobility and Multimodality". Although the macro-region has quite good accessibility indicators, the average value of 68 of the Logistics Performance Index (LPI) justifies the need for action (Rafaelsen et al. 2017). There are relatively large differences among countries; LPIs in the Upper (138–150), Middle (81–86), and Lower section (51–60) illustrate diversity. In the Lower section, especially in Romania, the lack of high level road infrastructure increases the importance of inland navigation and the role of intermodal links (Ţarţavulea et al. 2011).
According to the EU Transport Scoreboard, the TEN-T inland waterways' core network was completed in nearly all member states by the end of 2016, when only Croatia (33%) and Romania (91%) had incomplete elements. (In the case of Croatia, other waterways, especially the Sava and Drava rivers also relevantly count here.) However, a detailed study of the IWT sector –such as navigable days, competitiveness, and performances of cargo transport– would show quite a different (and less positive) picture. Connected waterways and multimodal links of the TEN-T network are subjects to further development as well.
By review of the literature, it may be concluded that impacts of the EU Strategy for the Danube Region have not yet been extensively studied. Besides some indirectly related sectoral analyses (e. g. Ignjatijević et al. 2015), only a few reports or articles focus on general outcomes. A discussion paper by Chilla and Sielker (2016) raise questions about monitoring, evaluation and added value of EUSDR. Sielker (2016) aims to understand new drivers of cooperation and multi-level governance by EUSDR stakeholders' perspectives. Ngampramuan (2018) studies EUSDR's contribution on regional and sub-regional, as well as further territorial (local, provincial, national) levels. A discussion paper by Gál et al. (2013) provides a comprehensive analysis of the Danube Region and structured information to understand territorial specificities. Regional differences, comparing countries of the three (Upper, Middle, and Lower/Under) sections of the Danube River at the moment of implementation of EUSDR are illustrated by the findings in terms of unemployment rates, higher education degrees, and research and innovation spending per capita, by Czakó et al. (2014).
As most European countries have no interest in the IWT industry at all, inland navigation is an under-researched field of transport. Thus, the number of recent articles about shipping even on the Danube is low, focusing mainly on river engineering and the burning issue of navigability (e. g. Beuthe et al. 2014, Habersack et al. 2016, Glock et al. 2019). However, there are some scientific publications which address current navigation challenges and potentials in the Danube macro-region. For instance, two articles consider the steps to be taken for the promotion of IWT at the moment of implementation of EUSDR: 1) Mihic et al. (2011) present measures to stimulate sustainable development in the Danube Region on the basis of previous research findings and regulatory documents; and 2) Radmilović and Maraš (2011) map the advantages and disadvantages of inland navigation to provide a general overview of the (sub-)sector and its future in the Danube Region. A recent study by Pfoser

et al. (2018) reviews administrative barriers delimitating economic and environmental potentials of IWT on the Danube. They conclude that stakeholders from all involved countries report on similar types of barriers, thus standardization, harmonization, and digitization may remove or reduce many impacts of the revealed problems.

II. Objectives

It is appropriate to review the situation of freight shipping on the Danube, to assess the developments related to the EUSDR, and finally to identify the achievements of the past decade and the contribution of the strategy to the development of freight shipping. My analysis aims to answer the following questions:

1. What is the situation of freight transport on the Danube, what are the opportunities and constraints of its development?
2. In the context of the EUSDR, what investments are the countries undertaking to improve Danube navigation?
3. To what extent are Danube organisations active in international projects and what are the impacts of cooperation?
4. Whether it is possible to draw conclusions from the analysis of national and international projects on the commitment of the Danube countries to inland navigation?

III. Research methodology

The study area covers the countries along the Danube: Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, and Bulgaria. Where relevant, data from Moldova and Ukraine are also presented, as there has been some EUSDR-related developments implemented also in these two countries. The analysis focuses on the period between 2010 and 2020, but also considers the earlier shipping data. Data on inland waterway freight transport are extracted from the Eurostat database and compared with the Danube Committee's data, some missing data were extracted from the latter.

To ensure that the data for Germany refer exclusively to the freight traffic on the Danube, I have used indicators by the Bavarian Statistical Office (BSO), since the BSO's database for inland shipping, allows to access data separately for Danube freight traffic.

Data on investments to improve inland waterway mobility were collected from the homepage presenting the results of the EUSDR Priority 1 (https://navigation.danube-region.eu/) in March 2019 and March 2020. Based on the status of the projects, the portal distinguishes between planned projects, projects under implementation and completed projects. In the detailed analysis, 100 projects under implementation and completed were examined for the period 2007-2020, covering two EU budgetary cycles.

An important part of the study is the cumulative assessment of the data from the three Danube sections, and to this purpose I have created groups of countries. The Upper Section is represented by Germany and Austria, the Middle Section by Slovakia, Hungary, Croatia and Serbia, and the Lower Section (including the Danube-Black Sea Canal) by Romania and Bulgaria.

The research underpinning the study was accompanied by a series of interviews. The aim of the empirical research was to gain the opinions of experts and professionals who are familiar with Danube freight transport, the European Union Strategy for the Danube Region, climate change and the interaction of Danube shipping. So, the interview series was conducted with 10 shipping experts, researchers, and representatives of organisations active in Danube shipping.

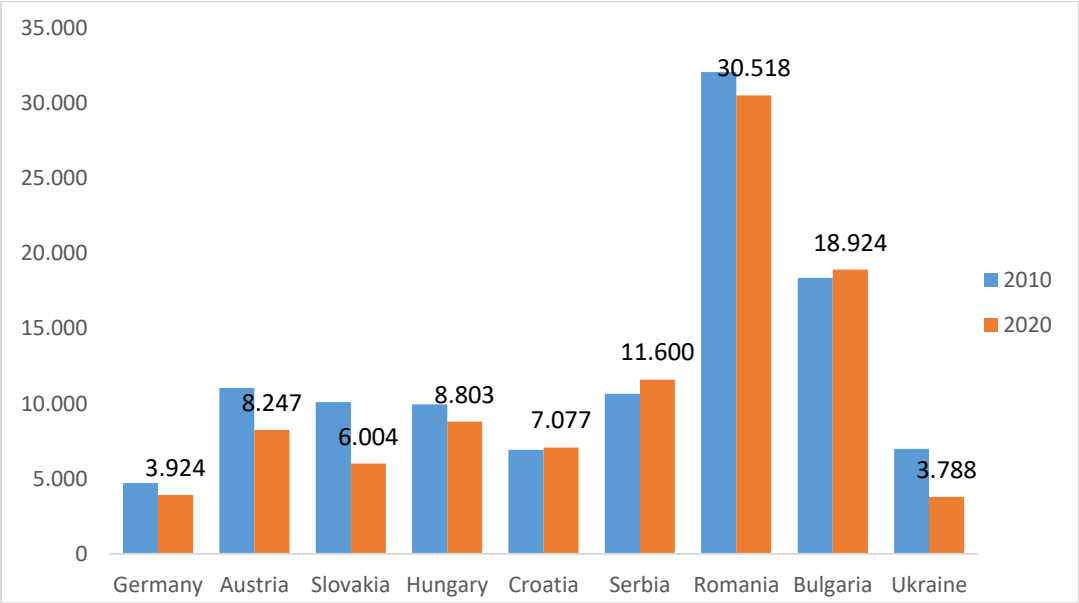
IV. Results

The research I conducted investigated the extent to which the European Union's policy to support inland waterway shipping can contribute to overcoming the obstacles and improving the performance of the sector. The barriers to Danube navigation have been studied by researchers before, but I feel that I have succeeded in using a novel approach to identify and concretise these. I was helped in this

by getting to know the opinions of the relevant actors in the sector, I managed to carry out a comprehensive statistical analysis and to clarify some uncertainties (the importance of the Danube-Black Sea Canal and Constanţa, the freight transport capacity of Serbia and Ukraine, the role of the Danube-Main-Rhine Canal, container transport). The synthesis of the results of EUSDR projects for the development of Danube shipping has not been performed before and I believe that the assessment of this was timely. I consider the answering of the research questions and the comparison of the two investigations to be the most important results of my work.

1. **What is the situation of freight transport on the Danube, what are the opportunities and constraints of its development?**

Danube freight shipping has not recovered from its decline during the 1990s until recently. Despite the removal of political obstacles and sustained economic development, it has not managed to strengthen its position within the transportation sector. Along with the growing transport demand, the share of road transport has been steadily increasing. Looking at inland freight transport performance in the Danube countries between 2010 and 2020, there is a clear decline of 14.2%.



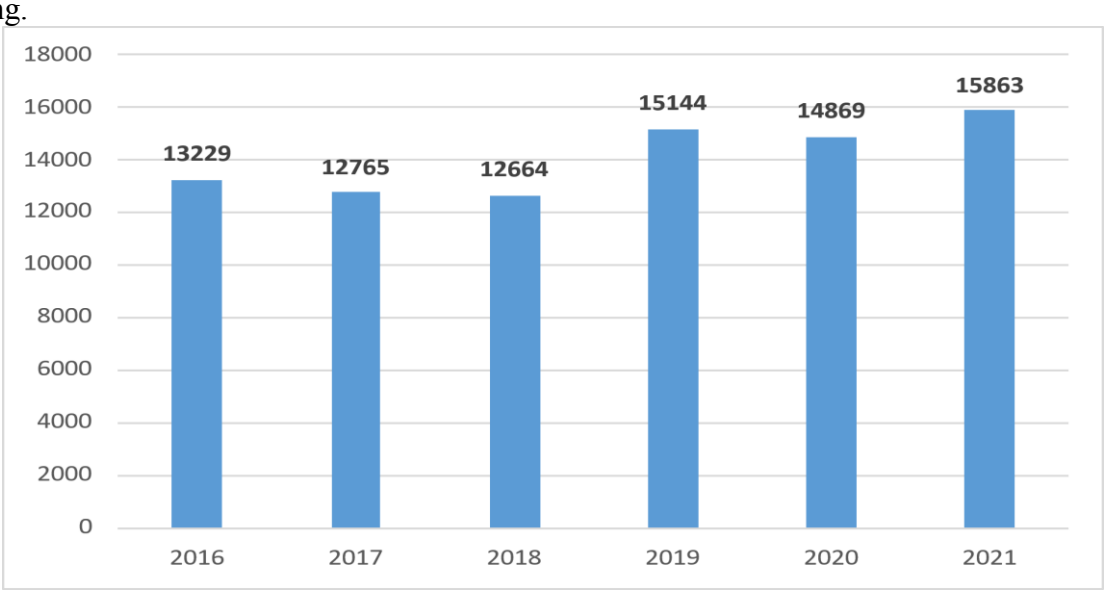
9. Figure: Inland waterway freight transport in the Danube countries 2010-2020 (thousand tonnes/year),
Source: Eurostat data, BSV, DB

Looking at the decrease in freight transport data between 2010 and 2020, two groups emerge, one being Austria, Slovakia and Ukraine, which recorded significant decreases of over 20%. Smaller declines of between 10% and 20% were recorded in Germany's Danube section and Hungary. The growing performance of Croatia, Serbia and Bulgaria shows a positive picture, while Romania also managed to exceed the volume of 2010 in 2019 (1. Figure).

I explain this decline by the availability of basic conditions for cargo shipping. The primary constraint, according to the consensus of experts, is the state of the waterway, with low water levels causing the emergence of reefs in critical sections. Although the waterway has several narrowing, ensuring the navigability of the most problematic sections could already bring significant progress. So, a major step forward would be the damming of the middle section, the need for which is also the subject to professional consensus. A novel result of the research is the concrete presentation of the waterway problem, which, in addition to the expert interviews, was made possible by the results of the FAIRway project.

Another major problem is the supply of manpower in the sector, with a growing shortage of qualified staff, especially of skippers. This problem has been exacerbated in the freight sector by the draining effect of passenger transport, which has offered more favourable conditions for boatmen. The new finding of this thesis is that it clarifies the relationship between passenger and freight transport, that

the advantage of hotel ships in terms of sluicing and administrative tasks does not cause a substantial competitive disadvantage for freight transport.
Less of a problem is the availability of ports and fleet. The port infrastructure is well developed, with trimodal terminals operating at the Upper-Section at a high level of efficiency. The Middle- and Lower-Sections are characterised mainly by ports capable of handling bulk cargo, but only a few ports offer professional container handling. A novel result is the inventory of the container handling capacity of ports, the identification of professional container terminals.
The Danube fleet has managed to remain operational despite the ageing of its shipping stock. The problem will be the renewal of the ship fleet, as the modernisation of ships' machinery and the construction of new ships are both costly investments.
A novel result of the research is the definition of the degree and criteria of competitiveness. The cost of transporting bulk goods by ship is on average 30% cheaper than by rail. However, the origin and the destination of the goods are highly relevant in the case of river transport. In all cases, the transit costs of delivery to and onward transport have to be taken into account and so only a shipping route of sufficient distance can ensure a price advantage. The combined distance of delivery to and onward transport should be less than 150 km, while the fairway shall exceed 300 km. A limiting factor is the uncertain transport time and freight rates, which not all the clients tolerate, and this risk can be made critical by the problem of navigability due to low water levels.
A new result is the recognition of a trap that has not been identified in the literature so far, namely the "small water negative spiral", triggered by climate change et all. In essence, shipping with reduced cargo at low water levels (e.g., only 750 tonnes of cargo with 1500 tonne vessels) requires more vessels and crew (creating a shortage of vessels and crew), causes ports to operate less efficiently (slower and less efficient loading), and all this raises freight rates and reduces profitability and competitiveness.
Constanţa and the Danube-Black Sea canal are among the promoters of the development of Danube freight shipping. Although previous academic works reported its limited utilisation, which was attributed to high user charges (Erdősi 2008, Hardi 2012), I will illustrate in this study that its importance has now become paramount. Most of the experts agree that the vast majority of the goods transported on the Danube reach and arrive from the sea through the Danube-Black Sea Canal, as confirmed by the Danube Commission's data. And Constanţa is the most important grain port in Europe and the fifth largest bulk port, the river freight traffic of the port is constantly increasing (2.Figure). In addition, I have shown that the Danube-Main-Rhine canal plays a minor role in cargo shipping, with no significant traffic mainly due to the quality of the waterway and the nature of the shipping.

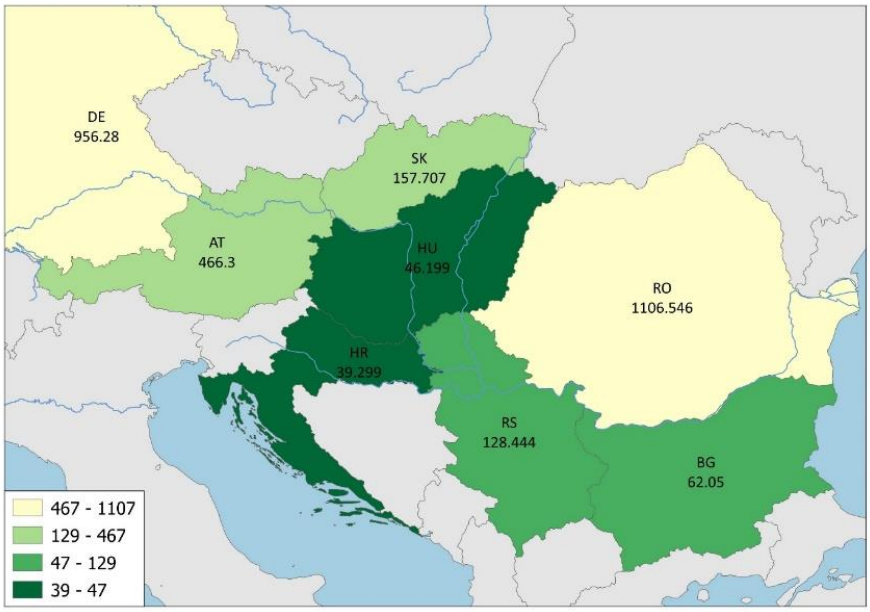


10. Figure: River freight traffic of the Port of Constanța, 2016-202, own edition
Source: Constanza Port Annual Report 2021

IWT has an important advantage, which has become apparent over the last 3 years, and that is its adaptability. The previously well-oiled transport chains have been put in crisis by the Covid-19 epidemic. After minor disruptions, river shipping has been able to adapt and has suffered a minimal decline. The Russian military intervention in February 2022 caused an even greater crisis. Danube shipping was able to give adequate respond to this situation too and make a major contribution to meeting transport needs.

2. **In the context of the EUSDR, what investments are the countries undertaking to improve Danube navigation?**

A new result of my research is a detailed analysis of the developments, especially investments, in Danube navigation. These findings confirm that Germany and Romania are making serious efforts to develop this waterway. Germany is mainly striving to ensure the navigability of the Danube-Main-Rhine waterway, while Romania's strategic objective is to increase the utilisation of the Danube-Black Sea Canal and to strengthen the role of the port of Constanta. The other Danube countries are striving to improve port infrastructure and maintain the waterway, but with a much smaller financial input. A particular problem is that Hungary and Bulgaria do not devote sufficient resources to waterway construction. Bulgaria is hampering dredging works on its territory, and thus hampers navigation too (3. Figure). The relevant intervention sites for navigability are the sections east of Vienna, Nyergesújfalu, Dunaföldvár (Solt), some sites of the Romanian-Bulgarian section, the Bechet-Corabia area, for which no concrete progress has been made during the examined decade. Slovakia has completed the reconstruction of the closing dam, which was a major investment. Hungary has progressed in the field of port development.



11. Figure: Expenditure of national projects in individual Danube countries related to the EUSDR (in millions of Euro), own edition
Source: https://navigation.danube-region.eu/

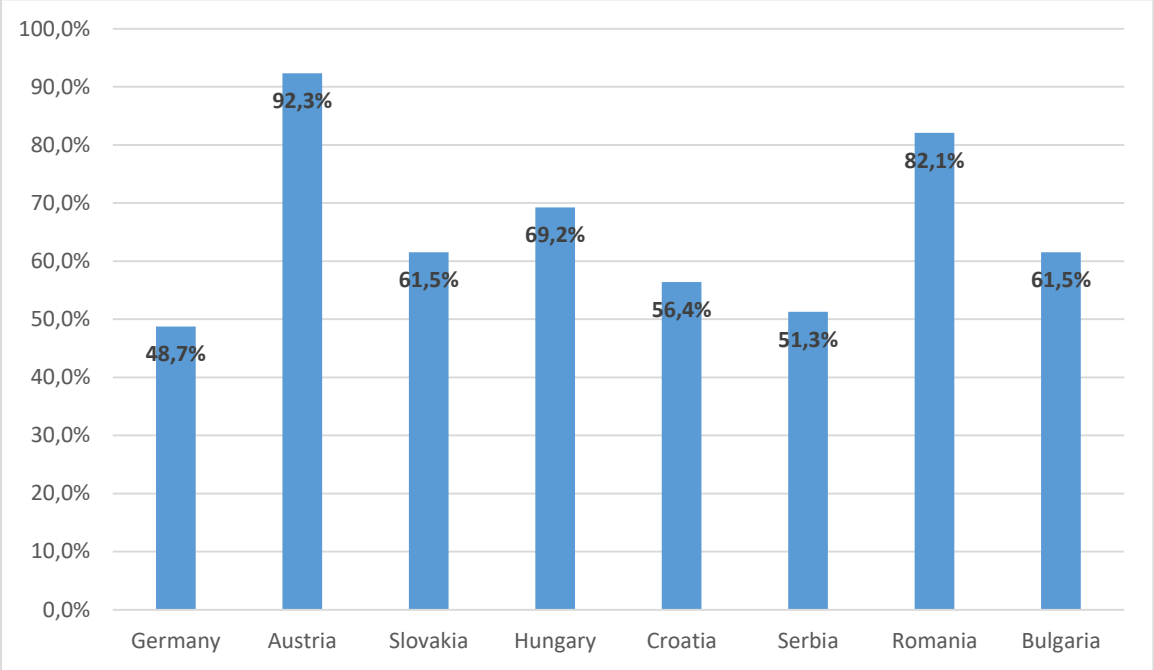
The analysis of the specific objectives of national projects showed that the share of investment projects within all development projects varies among the Danube states. A considerable number and very high cost of projects aimed at improving research, preparation and information systems can be observed. It is desirable to create some proportionality between investment and soft programmes in the financing of development (Nagy et al. 2019).
According to the experts I interviewed, the implementation of the EUSDR has had few tangible results and has not achieved the expected breakthrough in tackling the problems. The objectives of the EUSDR are sound, but they ought to be broken down to the level of operational programmes and actual activities, which has not been provided. Some have an even more negative perception and believe that nothing of substance has been done in the framework of the strategy.

3. To what extent are Danube organisations active in international projects and what are the impacts of cooperation?

The detailed analysis of the international projects related to EUSDR Priority 1 is also a new achievement that has not been done before by any other researcher. I consider the grouping I have proposed important; in terms of the affiliation of participants, three types of international projects can be identified when evaluating international projects:

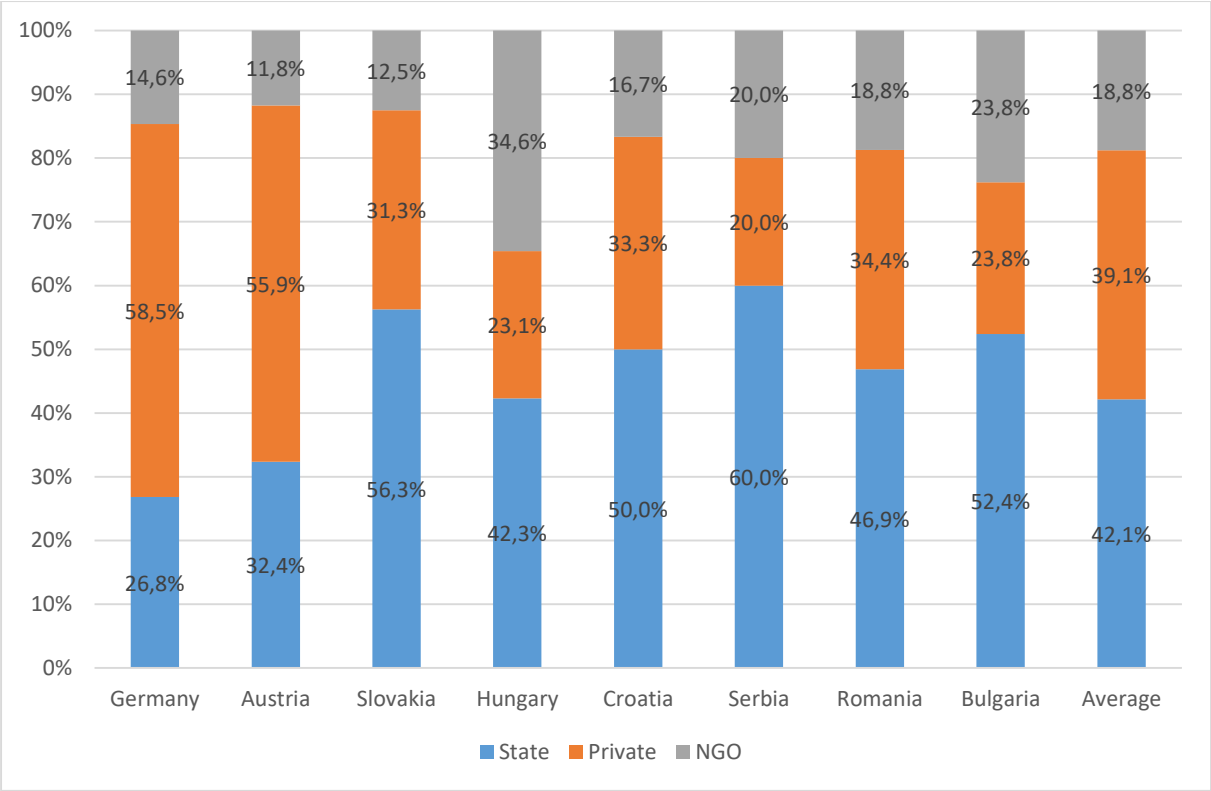
- projects in the Danube countries,
- EU projects (technological and maritime cooperation),
- projects with few actors or of a bilateral nature.

Typically, in the first half of the period under review (2007-2013), there was a higher number of projects with a broader EU scope, after which projects from the Danube countries became dominant. I found that the Danube countries' projects were more successful in terms of relevance and results. The number of projects with few participants was low.



12. Figure: Proportion of project partners from individual countries in transnational EUSDR projects (own edition)
Source: https://navigation.danube-region.eu/

Based on the activity of the Danube countries, three groups can be distinguished, the most active (A, RO), the active (DE, HU, BG) and the restrained (SK, HR, SRB) (4. Figure).
The study found that Austria plays a key role in managing international projects and coordinating research and preparatory activities. The sectoral distribution shows that in the case of Germany and Austria, the market sector's participation exceeds 50%, while the other Danube countries are dominated by public actors. This can also be assessed as a lower level of market activity in the post-socialist countries (Nagy et al 2020). (5. Figure)



13. Figure: Sectoral distribution of participants in international EUSDR projects (own edition)
Source: https://navigation.danube-region.eu/

Complex inland waterway projects and cooperation for waterway development have contributed greatly to identifying problems and the theoretical foundation of solutions. The infrastructure for monitoring the navigability of the Danube waterway has been significantly improved. Critical constrictions and fords have been identified and monitoring of the activities of individual countries to address them has been established. The harmonisation of port development planning according to a common set of criteria is also a successful area. Fleet development efforts have been given a prominent role in international projects. Possible technical solutions have been explored and presented in detail, but the question of financing has not been resolved. One of the most successful areas is the development of river information systems and the harmonisation of administration, where concrete results have been achieved. There has been a high activity in the field of environment and climate change, but the main achievements have been the theoretical grounding and the involvement of actors in a common communication platform. The latter statement is true for all international projects, with valuable studies, plans, collaborations, development of substantive innovations and preparations for their market introduction. However, it has yielded few practical results, giving rather political and cooperative impetus, creating an intellectual basis, bringing together the players and establishing regular working contacts.

4. Is it possible to draw conclusions from the analysis of national and international projects on the commitment of the Danube countries to inland navigation?

The presentation of the commitment of individual countries to the development of Danube navigation I consider a new achievement. All countries have been indisputably involved in the implementation of the strategy and have actively contributed to the efforts. However, it can be concluded that there are significant differences in the activity of the individual Danube countries in the case of projects related to EUSDR Priority Area 1. The table below classifies the countries into four categories according to the criteria I consider most important, and the figures per river-km also consider the different geographical conditions and the size of the tasks that each country has to perform (Table 1.).

By evaluating the four aspects jointly, we have attempted to draw conclusions on the different motivations of each country.

Table 1. Assessment of the motivation of countries to implement the EUSDR project.

Countries	Total cost of national projects	Total cost national projects per river km	Number of participants in international projects	Number of participants in international projects per river km
Germany	xxxx	xxxx	xxxx	xx
Austria	xxx	xxxx	xxxx	xxxx
Slovakia	xx	xx	xx	xxxx
Hungary	x	x	xxx	xxx
Croatia	x	xx	x	xxx
Serbia	xx	xx	x	x
Romania	xxxx	xxx	xxx	x
Bulgaria	xx	x	xx	xx

Source: own edition.

Although the aspects examined were objective, the conclusion on motivation cannot be considered as such, so I do not consider it justified to establish a sort of order. The countries surveyed can be divided into two groups according to their activity. The more active group is made up of Germany, Austria, Slovakia, and Romania, with the addition that Slovakia has taken on a greater role in relation to its shorter section, but Romania's outstanding involvement is diminished by the greater duties naturally deriving from its geographical location. This result is confirmed by the assessment of the experts I interviewed, who all acknowledge the commitment of Romania and Austria. In the case of Germany, the commitment to shipping is nuanced by the emphasis placed on environmental aspects, while Slovakia is doing its job regarding the waterway, but its ports are being degraded.
Countries in the moderate activity group are Hungary, Croatia, Serbia, and Bulgaria. In the case of Serbia, the level of involvement is clearly affected by the fact that the country is a non-EU member (less involvement in international projects) and Croatia has only joined in 2013. Hungary and Bulgaria have shown passivity in national projects, with no major investments, apart from the Hungarian port developments. Experts confirm the low motivation of Croatia and Hungary. Hungary's port development master plan and its port investments are acknowledged, but strong criticisms are voiced regarding waterways, fleet and training. In the case of Bulgaria, low motivation for development is also confirmed, which is explained by lack of funds and political reasons.
In the case of Serbia, the assessment of motivation should be treated with reservations, based on the opinion of the experts and other circumstances (non-EU country, economic disadvantages). Some experts consider Serbia to be explicitly committed and acknowledge its development policy and achievements.

V. Conclusion

In my view, the success of the development of Danube freight shipping in the coming decade will to a large extent depend on the success in convincing less active countries to make greater efforts in this respect. A good example could be the successful involvement of Serbia in the development of shipping. A key factor here may be whether it is possible to set strategic goals for these countries that they can identify with and providing political support to achieve them. The other key challenge is to reconcile environmental protection and the development of shipping to successfully implement appropriate compromise solutions.

References

Beuthea, M., Jourquina, B., Urbaina, N., Lingemann, I. & Ubbels, B. (2014) Climate change impacts on transport on the Rhine and Danube: A multimodal approach, Transportation Research Part D: Transp ort and Environment, Volume 27, Pages 6-11

Beyer, A. (2018). Inland waterways, transport corridors and urban waterfronts, International Transport Forum Discussion Papers, OECD Publishing, Paris.

Chilla, T. & Sielker, F. (2016) Measuring the added-value of the EUSDR–challenges and opportunities. Input Paper for DG Regio and Danube Strategy Point, Brussels.

Czakó, K., Fekete, D. & Poreisz V. (2014) Economic Differences of Countries by the River Danube, Procedia Economics and Finance 9 : 1-2 pp. 163-175. , 13 p.

Constanza Port Annual Report (2021), Port of Constanza

Gál, Z., Lux, G., Illés, I. (2013) (Eds.), Danube Region: Analysis and Long-Term Development Trends of the Macro-Region, Pécs, Magyarország: Institute of Regional Studies, Centre for Economic and Regional Studies, Hungarian Academy of Sciences, 59 p.

Erdősi F. (2008). Kelet-Európa országainak vízi közlekedése, Pécs, MTA Regionális Kutatások Központja (MTA RKK). 459 p.

European Commission (2010), European Union Strategy For Danube Region, Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions

Glock, K., Tritthart, M., Gmeiner, P., Pessenlehner, S. & Habersack, H., (2019) Evaluation of engineering measures on the Danube based on numerical analysis, Journal of Applied Water Engineering and Research, 7:1, 48-66

Hardi, T. (2012). Duna-stratégia és területi fejlődés, Akadémiai Kiadó

Habersack, H., Heinbc, T.,Stanicad, A., Liska, I., Mair, R., Jäger, E., Hauer, C. & Bradley C., (2016) Challenges of river basin management: Current status of, and prospects for, the River Danube from a river engineering perspective, Science of The Total Environment, Volume 543, Part A, Pages 828-845

Huszár Z. (2021). Pillantás a dunai gőzhajózás kezdeteibe és a DGT csúcsidőszakába. Tudás-menedzsment. 22. évf. 1. Különszám. pp. 129–136.

Ignjatijević, S., Milojević, I., Cvijanović, G., & Jandrić, M. (2015). Balance of Comparative Advantages in the Processed Food Sector of the Danube Countries. Sustainability, 7(6), 6976–6993.

Mihic, S., Golusin, M. & Mihajlovic, M., (2011) Policy and promotion of sustainable inland waterway transport in Europe – Danube River, Renewable and Sustainable Energy Reviews, Volume 15, Issue 4, Pages 1801-1809

Nagy D., Munkácsy A., & Jászberényi M. (2019). Impacts of the EU Strategy for the Danube Region (EUSDR) in light of transport volumes on the Danube river. *Deturope,* 11(3), 59–79.

Nagy D., Munkácsy A., & Jászberényi M. (2020). Organisational and Sectorial Commitment in the Development of Inland Waterways Freight Transport: Analysis of EUSDR Transnational Projects. In Edita, Stojić Karanović; Kristijan, Ristić (szerk.), *Socioeconomic and Environmental Aspects of Sustainable Development During the Fourth Industrial Revolution : Thematic Compendium.* Belgrade, Szerbia : International Scientific Forum "Danube – River of Cooperation", pp. 220–236.

Ngampramuan, S. (2018) Evaluating the EUSDR's contribution to sub-regional integration processes. Australian & New Zealand Journal of European Studies 10.2

Pfoser, S., Jung, E., & Putz, L. (2018). Same river same rules? – Administrative barriers in the Danube countries. Journal of Sustainable Development of Transport And Logistics, 3(3), 27-37.

Radmilović Z., & Maraš V. (2011) Radmilović, Z., and Vladislav Maraš. "Role of Danube inland navigation in Europe." International Journal for Traffic and Transport Engineering 1.1 (2011): 28-40.

Rafaelsen, B., Wähler C. L.,Weitzel-Mudersbach, M., Sanopoulos, A., Grozea-Helmenstein, D. & Paterson, I. (2017) Study on macro-regional strategies and their links with cohesion policy. Data and analytical report for the EUSDR, COWI

Sielker, F. (2016). New approaches in European governance? Perspectives of stakeholders in the Danube macro-region. Regional Studies, Regional Science 3.1, 88-95.
Ţarţavulea, R. I., Belu, M. G. & Paraschiv, D. M. (2011). The EU Strategy of Development for Inland Water Transport on the Danube. Intermodality and Logistics Services Ovidius University Annals, Economic Sciences Series, XI. (1), 2185-2190.

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BAJOR TIBOR:
EXPECTED IMPACT OF THE TRANSFORMATION OF THE RAILWAY SYSTEM IN UKRAINE ON CENTRAL EUROPE

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Abstract:
In 2019, the Ukrainian railway management already announced that they would begin the Europeanization of Ukrainian railways. Now this possibility has arisen again in connection with the ongoing war in the territory of the Donbas (Donets Basin) of the former Russian Tsarist Empire. The basis of the Ukrainian plan is to increase war security. At the moment, it is possible to enter Ukrainian territories by rail from Russia without obstacles, because the structure, operation, safety equipment, traffic instructions, and organizational structure of the railway lines are the same in the two countries. Converting the Ukrainian railway network to the European system is not easy and cannot be solved in less than 20-25 years, but this is only enough to transform the main lines. Today's railways in Ukraine were part of the railway lines of several countries before Trianon, these railway tracks were also built during the construction of the Hungarian, Austrian, Galician, Romanian, Russian and Polish railways. Based on economic laws, these railway lines, the XIX. in the middle and end of the 20th century, they were developed according to the economic needs of the given country and were part of the country's economic life. After the First World War, by the middle of the 1960s, changes in the political and economic situation forced adaptation in the transport system and organizational coordination of the countries in the Central European region. Based on the plans we have seen so far, it can be stated that the transformation plans in Ukraine only serve Polish economic interests. It causes serious economic disadvantages to all other countries connected to Ukrainian railways.
Keywords: railway, economic interest, exclusion, unsolvable task

The antecedents

Ukraine plans to build a standard gauge railway line
10.03.2023 10:11 a.m
Ukraine would adapt to European trends: instead of the gauge inherited from the tsarist times, it would switch to the general, standard gauge, thereby facilitating freight transport between the country at war and other states in Europe.
Ukraine plans to build railway lines with a gauge of 1,435 millimeters, which is standard in Europe. In the country at war - and in other post-Soviet states - the 1,520 millimeter gauge is the standard, which means that on the border of the former Soviet Union, it is still necessary to change the axles of railway trains upon entry and exit. This leads to a significant loss of time, so it is disadvantageous not only for passenger transport, but also for freight traffic. The different track gauge was formed back in the tsarist times, when Petersburg decided to make it more difficult to carry out a possible Western attack, learning from Napoleon's campaign.
According to the current draft, in the first stage, the transformation of the line would start from the Polish-Ukrainian border, between the Polish Hrebenne and the Ukrainian Rava Ruska, and then it would gradually reach the city of Lemberg (Lviv). The ultimate goal: the creation of a unified railway connection between Warsaw and Kiev, but plans also include the inclusion of one of the Black Sea ports in the "network". In addition to the economic benefits, we must also mention the military and humanitarian significance of the project: today, with the unification of the gauge, it would be easier to deliver aid supplies and military equipment to the country at war.

According to the plans, the first stage of the route widening, which brings economic benefits for the Polish side, can be realized by the end of 2023.[65]

„Hungarian politician Richárd Hörcsik proposed the renovation of the Galician railway line at the Europe of the Carpathians conference in Poland

Richard Hörcsik, chairman of the Parliament's European Affairs Committee, proposed the renovation of the 150-year-old first railway line in Galicia next year at the international conference called Europe of the Carpathians, held in Krasiczyn, southeastern Poland, on Saturday. At the 35th three-day conference, which started on Friday, Richárd Hörcsik spoke at a podium discussion on Central European transport, together with Polish Minister of Infrastructure Andrzej Adamczyk and Polish Member of the European Parliament Bogdan Rzonca, among others.

Hörcsik recalled: through the line opened in 1874, passing through Mezőlaborc, Homonna, Terepes, Sátoraljaújhely, the northeastern tip of the former Austro-Hungarian Monarchy joined the blood circulation of Europe. He asked the question: one hundred and fifty years ago, "the Galician railway brought rapid development to the region - why not try to renew it?" He recalled: in 2006, the journey of the commemorative train, which was started on one occasion between Sárospatak and the city of Krosno in southeastern Poland, on the existing sections of the railway, took 7 hours, while with local services it would take up to 10 hours. In 1874, however, the same section could be covered in 4 hours, he noted.

Richárd Hörcsik underlined: in the Polish-Slovak-Hungarian cooperation, the renovation of the railway line would be extremely important not only for the Polish Subcarpathian Voivodeship, but also for the Hungarian region. "We are waiting for Polish tourists," he added.

Andrzej Adamczyk and Bogdan Rzonca assured their support for the proposal. In his speech, Adamczyk underlined that the transport network being built in the countries of the Three Seas Initiative does not only mean road connections. "It is not unfounded that we are talking not only about the road Via Carpatia, but also about the Rail Carpatia, which includes, among other things, the railway line leading to Hungary," he declared. In this context, he mentioned the Rzeszów-Miskolc-Budapest railway line, on which, as he said, even with a speed of 80-120 kilometers per hour, the journey would take only 5 hours, i.e. shorter time than the journey made by car today. The transport projects implemented along the eastern border of the European Union also affect cooperation with Ukraine, Adamczyk pointed out. He expressed his hope that the European Commission will expand the resources for projects aimed at cooperation.

Also referring to the proposal of Richárd Hörcsik, the main initiator of the conference, Minister Marek Kuchcinski, head of the Polish Prime Minister's Office, presented a statement. In the document adopted on Saturday, the participants of Europe of the Carpathians call for Brussels to provide adequate funding for key investments in Central Europe, including Via Carpatia and Rail Carpatia"[66]

The track distance of the rails

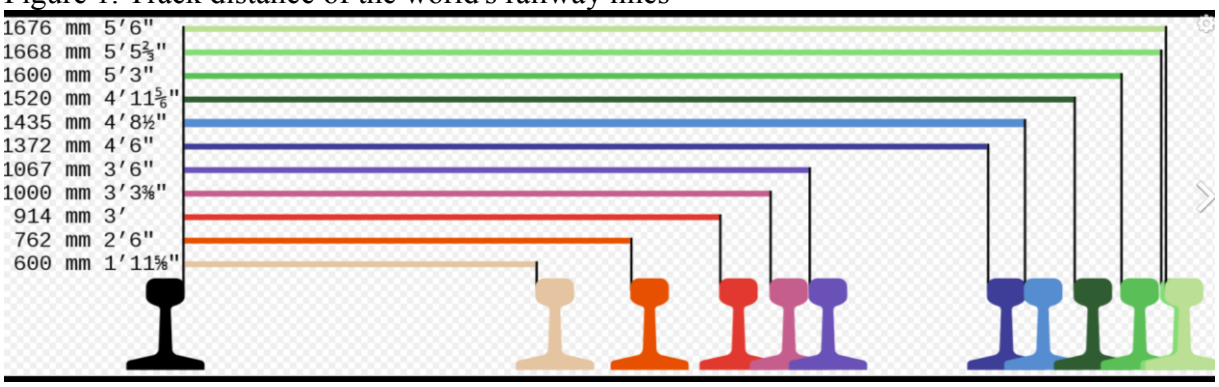
The news would contain several factual errors, which I will cover later. The main question: what would be the expected economic impact of the implementation of the program on the Central Eastern European countries? The first question: Is there a so-called normal railway gauge? The clear answer: there is no such thing.

Within the European Union, the general railway gauge is 1435 mm. This track distance is called normal by the laymen - with no small amount of European conceit. On the railway lines built in the Tsarist Russian Empire, the track distance of the rails is 1520 mm. This is known colloquially as "wide gauge". This gauge was later used and expanded by the Soviet Union and then by the successor states. Few people know that the rails on the Portuguese and Spanish railway lines are wider than in Russia. (Figure 1)

[65] Source: Rzeczpospolita.pl

[66] Source: MTI 25.02.2023. 4:45 p.m

Figure 1. Track distance of the world's railway lines[67]



The history of the development of the Central European railway system until 1917

Central Europe reacted extremely quickly to the exploitation of rail transport opportunities. Before the advent of the railway, inland waterway transport was the international trade route throughout Central Europe. (in addition to foot traffic or the cart) The Carpathians and the Alps determined the routes of water transport, so that it was not possible to sail over the mountain ranges. (This was the fundamental reason that Hungary lagged behind in European industrial development) The rivers of the Eastern European plain flowed south-east, the gateways of the water route of the Carpathian basin were Vienna and Istanbul/Byzantium. The rivers of the Balkan countries do not cross the Alps, so they were cut off from European water trade transport opportunities. It is no coincidence that Countries formed in the the XIX. and the XX. immediately took advantage of the opportunities provided by the railway.. The first international railway lines built in Central Europe are the Warsaw - Berlin and the Warsaw - Vienna railway lines. The railway line connecting the two major cities of the Russian Tsarist Empire, Warsaw and St. Petersburg, was built only later.

The following countries and parts of the country took part in the construction of the Central and Eastern European railways – of course, asserting their own economic and political interests:

1. The south-eastern German principalities and Prussia, 2. The Austrian Empire a) Kraków b) western Galicia c) the Czech Republic 3. Kingdom of Hungary a) Highlands b) Subcarpathia 4. The Russian Tsarist Empire a) Grand Duchy of Warsaw b) eastern Galicia

Each country or part of a country determines the course and main direction of railway construction from the direction of its own economic center (primarily the capital).

The first main lines were built according to the economic interests of Prussia. From the direction of Berlin through today's Western Poland to Königsberg (Kaliningrad) - Baltic States - Saint Petersburg. The track of the railway tracks built east of Warsaw is 1524 mm. The railway line built west of Warsaw has the width of the later European gauge. Warsaw is the meeting point of the two-track railway line.[68]

To the west and south of Warsaw, in the interest of the Austrian Empire, the Warsaw - Kraków - Oderberg (Bohumin) - Vienna railway line 1435 mm is being built. This railway line was joined in the west by the south-eastern German principalities at Oderberg. The railway line with the European track will also be built from Kraków to Lemberg, and will continue to be built on the north-eastern side of the Carpathians through Galicia and Bukovina to Moldavia (Károly line)[69]. In other words, the territories of today's Belarus and Ukraine are surrounded by two main railway lines starting from the Polish territories.[70]

[67] https://www.cia.gov/library/publications/resources/the-world-factbook/fields/384.html

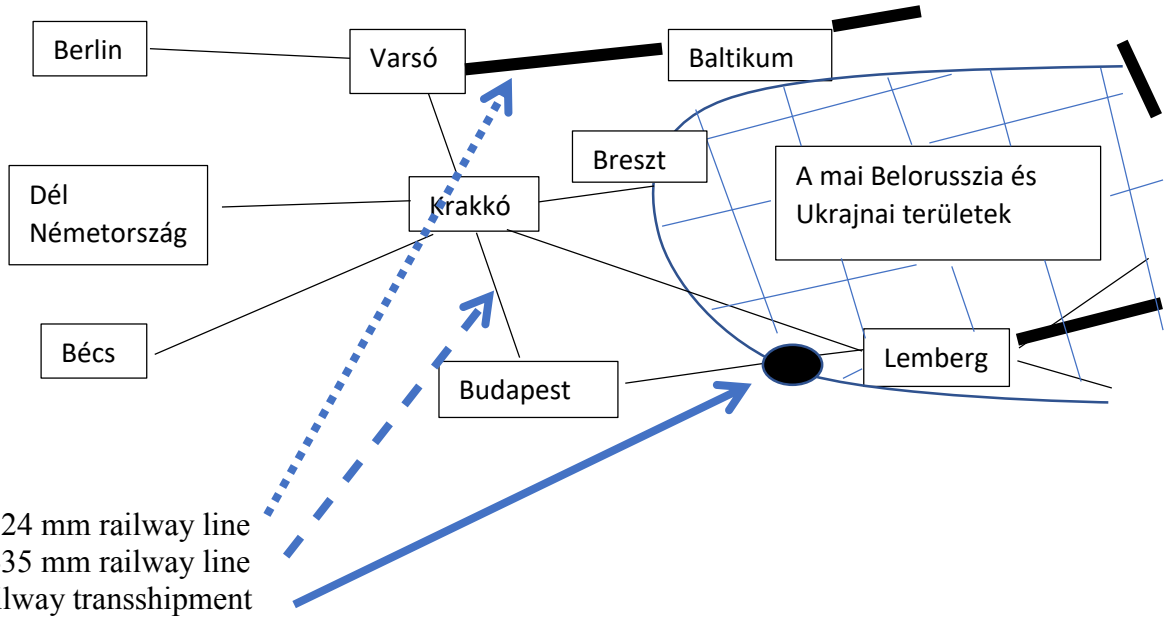
[68] Erdősi Ferenc A Visegrádi országok vasúti közlekedése MÁV Zrt 2010. 21-24. old.

[69] Erdősi Ferenc Területi érdek és vasúti közlekedés 1987. Tér és Társadalom 1.p. 45-60.

[70] Erdősi Ferenc A Visegrádi országok vasúti közlekedése MÁV Zrt 2010. 21-24. old.

The Kingdom of Hungary joins the Eastern European railway race in third place - with a considerable time lag. The Kassa – Lemberg railway line, then the eastern side of the Sátoraljaújhely – Csap – Munkács – Vereckei pass. On the western and northern sides, the Austrian railway stopped further progress.
As early as 1887, the Hungarian and Austrian railways signed a contract to establish a joint transshipment station. The Austrian railway carefully ensured that no one could reach Lemberg and through it Russia from the direction of the Carpathian basin. (Figure 2)

Figure 2. The main international railway line of Central Europe dates back to the 19th century. at the end of the century



edited by Dr. Tibor Bajor 2022.

The XX. until the beginning of the 20th century, the main railway lines did not expand significantly. The duality remains in Central Europe. From west to east is the European track, and from east to west is the 1524 mm railway line. The main meeting places are Warsaw, Lemberg. Local and wing lines, as well as local lines in different gauges, are built, but in each case based on local needs, without coordination. (Figure 3) The Austrian railway pursued a much more active expansion policy than the Prussian one.

The history of the Central European railway system between the two wars

The years following World War I brought significant changes in railway transport in Central and Eastern Europe. The borders were rearranged and the European political system significantly reshaped the trade and transport routes. As a result of various peace treaties, political agreements, pacts, and advocacy, the Central European region is completely reorganized. For a longer or shorter time, new countries are created, and historical countries regain their self-determination. Poland frees itself from Prussian and Russian dependence and thereafter engages in a constant power struggle with Russia. In practice, it wants to strengthen its position by creating conflicting states between the two countries and by gaining decisive power over Russian-European/German trade a) On March 25, 1918, the Belarusian People's Republic was proclaimed in Minsk, which was a German puppet state. In December 1918, the Red Army launched an attack and retook the country, on January 1, 1919, the Byelorussian Soviet Socialist Republic was proclaimed in Smolensk. In the spring of 1919, Polish troops attacked the country, and on August 8, Minsk was also occupied. The Soviet counter-offensive began in April 1920, they occupied Minsk on July 11, and by the end of July the entire territory of

the country, however, the Poles later recaptured the western territories and with the Riga Convention in 1921 they (eg: Brest area) came under Polish rule for 18 years . b) As a result of the Soviet-Russian economic development and internal political changes, Belarus gained a prominent role in rail transport. The most significant line became the Moscow - Brest - Warsaw - Berlin railway line. However, there are also international economic policy reasons for this. In the agreements ending World War I
Germany and Soviet Russia were excluded from European economic relations. Germany has money and technology, Soviet Russia has raw materials and manpower. The cooperation between the two countries was forced by the ANTANT states. c) At the end of 1917, the independent Ukrainian Republic was established. By 1920, the Red Army occupied the country, which from 1922 became a member state of the Soviet Union under the name Ukraine Ukrainian SSR. Its capital is Kharkiv d) The western areas of today's Ukraine became part of the newly established Poland, and on November 13, 1918, the West Ukrainian People's Republic was proclaimed. Its capital is Lvov (Lemberg). The country is under Polish supervision. On April 25, 1920, the Ukrainian-Polish troops set out to occupy Kiev, thus beginning the Polish-Soviet war. Today's western Ukrainian territories were divided between three countries in the 1920s and 1930s: Poland - Western Galicia, Romania - Northern Bukovina, Czechoslovakia - Transcarpathia. e) Following the acceptance of the Molotov-Ribbentrop Pact, the reconstruction of European gauge (1435 mm) tracks into broad gauge (1520 mm) began in the territories annexed by the Soviet Union. (Fig. 4) The reconstruction on the main lines was completed by the end of 1939. From that time, direct rail passenger transport between Lviv and Kyiv and Moscow started. f) Polish, Czechoslovak and Romanian territories remained the European gauge. Thanks to these, the border of the Russian and European gauge railway lines shifted to the west and several countries became part of the Russian-European transport routes.

The history of the development of the Central European railway system from 1939

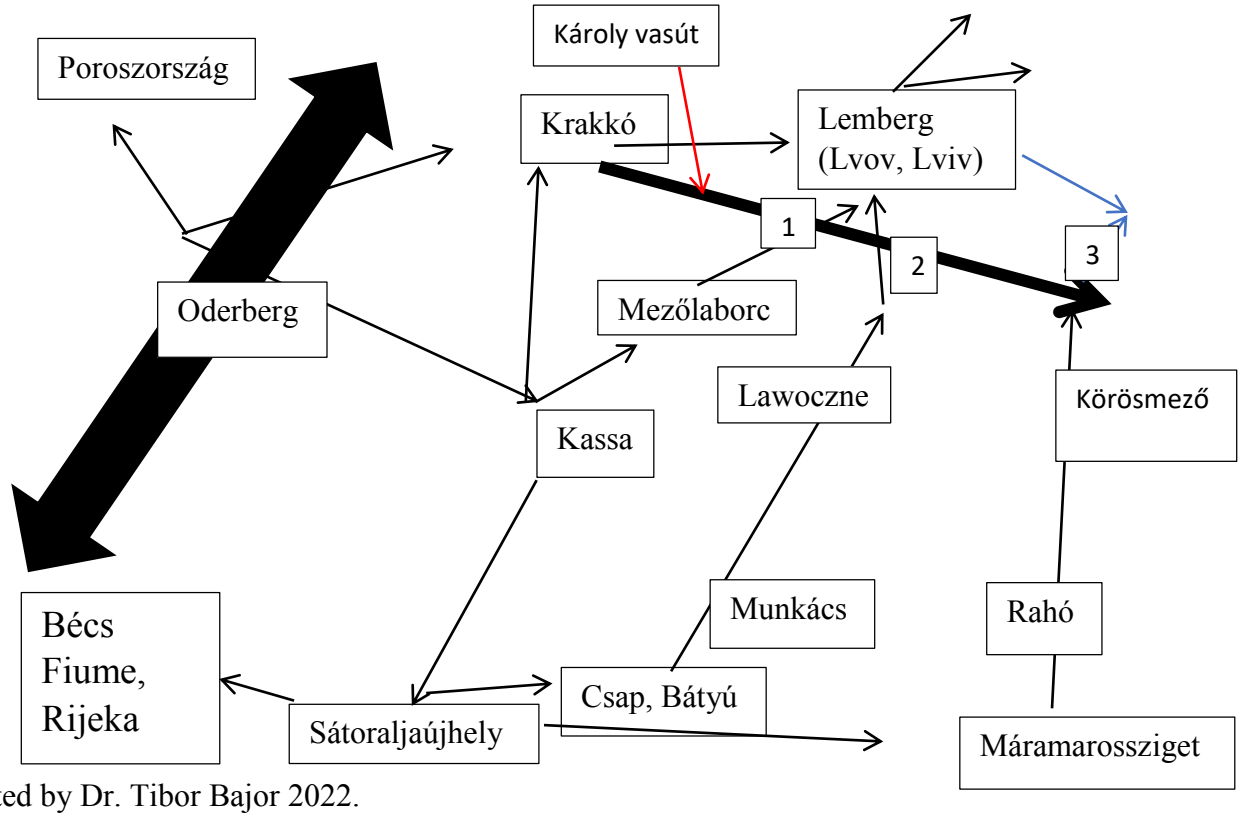
In 1941, Stalin-Horthy signed a contract for the realization of economic and commercial relations between the two countries.[71],[72] The Moscow-Kiev-Lvov-Munkács-Csap - (first Sátoraljaújhely, then Záhony) railway line became the railway line of priority between the two countries for the first time. The transfer station would have been built between Voloc and Lawoce stations on the two railway lines with different gauges. There was a model contract for the establishment and operation of the transfer station: the "Imperial-Royal Austrian State Railways of Gácsország and the Hungarian Northeast Railway Company on the joint use of railway stations at the junction of the Hungarian-Gácsország border" signed in 1884. (The contract e.) clause can be found verbatim in the agreement on direct Hungarian-Soviet-Russian rail freight and passenger traffic. March 1941 3, and in the protocol on railway transport signed on December 21, 1945 between the Railway People's Committee of the Union of Socialist Soviet Republics and the Hungarian Ministry of Trade and Transport,[73]) The transports did not start due to the bombing of Kassa.

[71] MNL_K69 1941-I-j-Szovjetunió,

[72] Dr. Bajor Tibor Záhony, a vasút és a vasúti átrakó. Doktori disszertáció 2010. Pécsi Tudományegyetem

[73] Dr. Horváth Ferenc: A Nyíregyháza-Ungvár vasútvonal 125 éves története. Záhony, 1997. Kiadó: Közlekedéstudományi Egyesület Szabolcs-Szatmár-Bereg megyei Területi Szervezetének Pályafenntartási Szakcsoportja és Logisztikai Szakcsoportja,

Figure 3. Intersection of the Imperial-Royal Austrian State Railways and the Northeast Hungarian Railways



edited by Dr. Tibor Bajor 2022.

From the end of the II. World War to 1970

After the Second World War, the borders of Central European countries changed again. The Soviet Union annexed additional territories and crossed the Carpathian Mountains. After the complete acquisition of the Ukrainian territories, the Soviet Union takes Transcarpathia from Czechoslovakia. Thus, another common border connection is created in Central Europe, the Hungarian-Soviet border. In the future, this will play a very important role in international rail traffic. The Sátoraljaújhely – Csap – Munkács – Vereckei-szoros – Lvov railway line will once again play an internationally important role, only as a result of changes in the territories of the countries, Záhony took over the role of Sátoraljaújhely. From the end of the war, this railway line - initially starting from the border station of Slovakia Ágcsernyő/Čierna - has been the main route of reparation rail transports. The countries of the Carpathian Basin (mainly Hungary) transported reparation goods, machines, raw materials, railway wagons and locomotives to the Soviet Union on this railway line. The transshipment then takes place in Munkács. After the restoration of the Tisza Bridge - at the suggestion of Hungary - the transshipment was transferred from May 21, 1947 to Csap and Záhony

Figure 4. Border changes made as a result of the Molotov-Ribbentrop Pact[74]

Since then, two main railway lines have been operating from Moscow to Europe: Moscow - Brest - Warsaw - Berlin and Moscow - Kiev - Lvov - Munkács - Csap/Záhony - south and south-eastern Europe. Since the mid-1950s, due to the decrease in reparation deliveries, Záhony has been continuously taking on the main transhipment tasks of rail transports from and to the Soviet Union to Eastern Europe, Southern Europe and South-Western Europe. The Brest crossing is the route for shipments to Northern Germany, the Benelux states, France and Great Britain. (The St. Petersburg railway transfer is not the subject of the study)

These routes were not officially designated in the railway cooperation of the former socialist countries. (Fig. 5) In fact, they used the transport routes established up to 1920, now on an international level. Only one new line was strengthened, the Moscow-Minsk-Brest line. This is due to the fact that Moscow became the capital of the Soviet Union and, in addition to its political importance, its economic potential also made it unique.

The II. In the 1960s, during the "period of peace" following World War II, a railway transport system was established - accepted by European countries. KGST did not create, but followed the events. Between 1962-66, the document and action plan of the KGST permanent subcommittee Report on the joint construction of transfer points for 1524 and 1435 mm gauge freight wagons at the railway border stations of the KGST member countries (Figure 6) subsequently laid the foundation for the construction and the location and role of railway transfer stations to be established. 1) sub-regional - local transshipment stations mainly on the Polish-Soviet border (Belarus, Ukraine) 2) primarily transshipment stations between two countries, e.g.: Soviet Union and Slovakia, Romania. 3) Transfer stations of international importance, designated as main transport routes: Brest, Záhony. After all, based on the decisions of the KGST and the relevant governments, the transport routes passing through Poland and Hungary were given an international function. A delivery circle within the KGST countries has been established. Moscow – Warsaw – Berlin – Prague – a) Budapest – Bucharest –

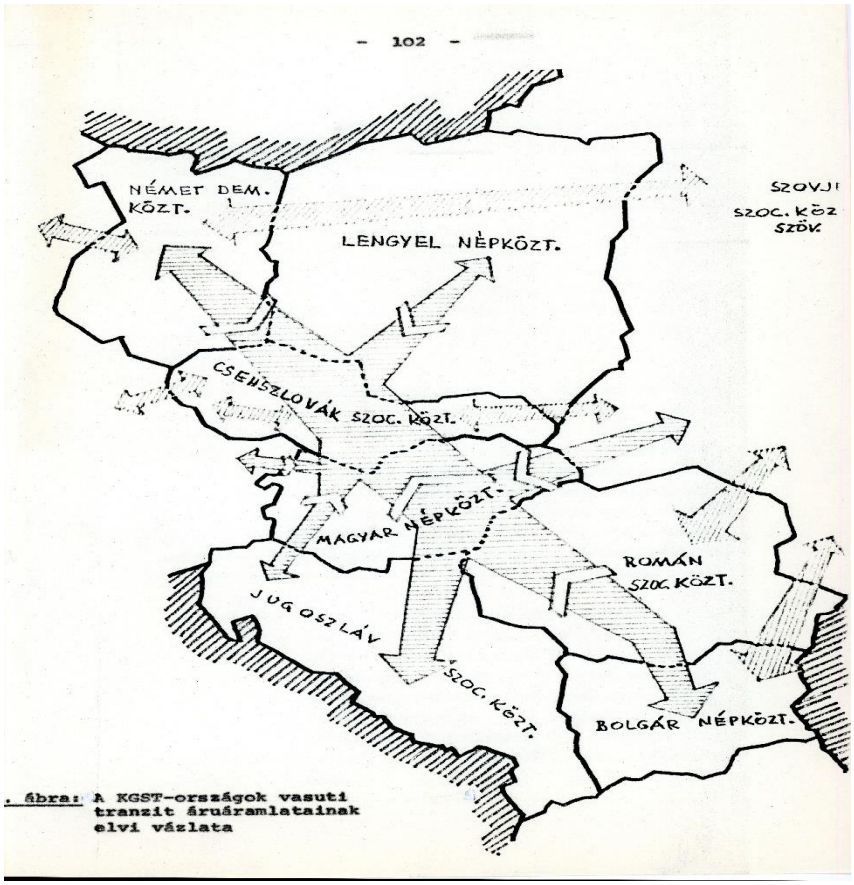
[74]http://www.rubicon.hu/magyar/nyomtathato_verzio/1939_szeptember_17_szovjet_agresszio_lengyelorszag_ellen/
http://www.rubicon.hu/magyar/oldalak/a_barbarossa_hadmuvelettel_es_a_molotov_ribbentropp_paktummal_kapcsolatos_torteneti_vita/

Sofia, b) Budapest – Kiev – Moscow. He crossed the borders of the KGST at the border of the German Democratic Republic towards Western Europe and at the border of the Hungarian People's Republic towards Southern and Western Europe. This continued to work until the economic and then social collapse of the socialist countries.

1990, the consequences of Central European political-social changes on railway transport lines

"Friendly" cooperation turned into ruthless economic competition. While Poland and Hungary loudly proclaim their thousand-year-old friendship, Poland mercilessly strives to establish a transportation, economic, and political monopoly between Asia, Eastern Europe, and Europe, to the detriment of others, especially Hungary.

Figure 5. Conceptual diagram of the rail transit goods flows of the KGST countries[75]

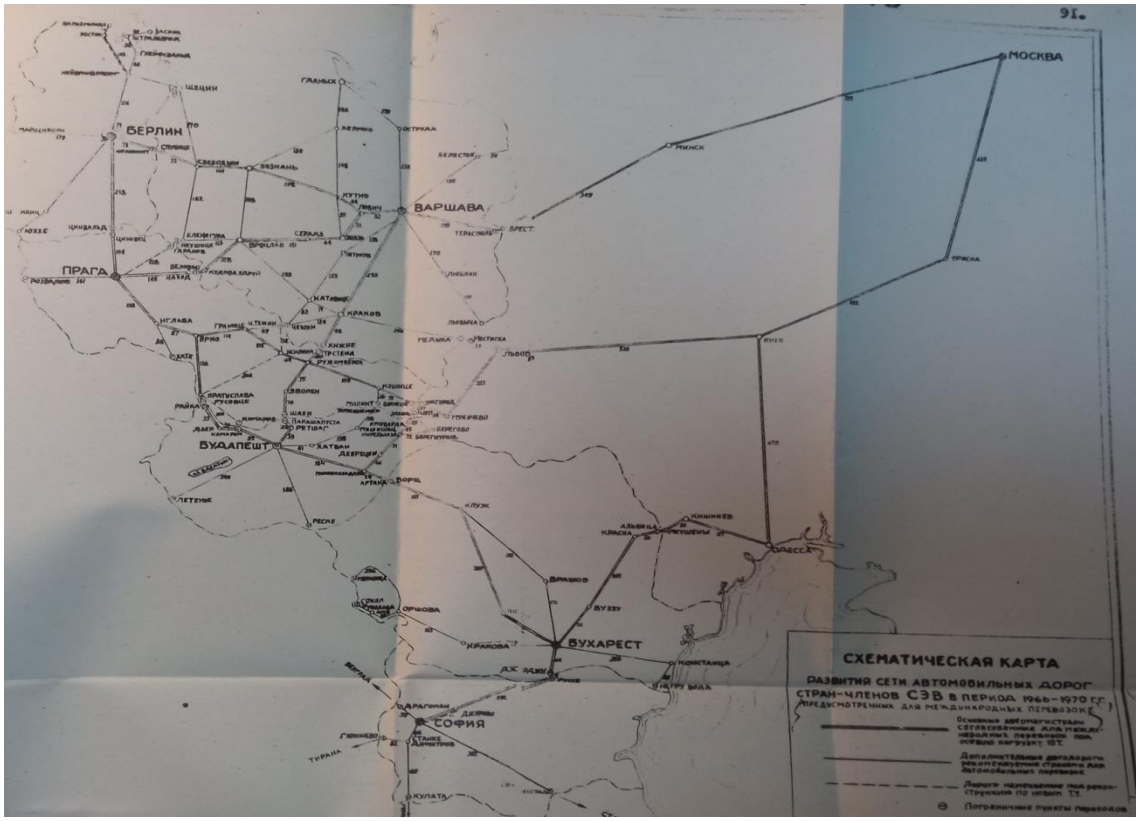


Poland has been consciously preparing for this role since the collapse of the socialist countries. Poland in World War II in addition to the European transport corridor no. This will also strengthen Poland's role in the field of European-Asian transport. The II. the competitiveness of the corridor is greatly increased by the intensive infrastructure modernization in Poland and the development of the logistics center in Malaszewicz. (Corridor III is currently not decisive in Polish rail transit freight transport.) A Polish-Ukrainian cooperation that differs from international transport corridors is Linia Hutnicza Szerokotorowa Kft. (hereinafter LHS) The company was founded in December 2000. Its special activity is the operation of the railway network between the Ukrainian border and Katowice, carrying out transshipment and axle refitting, managing railway border traffic. Its tasks include: a) carrying out wide-gauge freight, b) transshipment, transshipment, axle refitting, c) traffic servicing of

[75] MMKM_KEZGY_947_102

transshipment points, d) warehouse and customs warehouse operation. Its basic transport task is the delivery of metallurgical raw materials for the metallurgical works in Katowice. Even then, it can be determined from the development processes that its long-term goal is to acquire direct Polish-Ukrainian, Belarusian and, with it, international deliveries. After the establishment of the company, an oil refinery and a gas refinery were built, and the load capacity of the railway track was greatly improved. From Katowice via Slovakia, the transports connect to the III. ARC. VI. to corridor no., bypassing Belarus and Hungary. For 20 years, the Hungarian political leadership has not responded to the Russian leadership's proposal that Russia conduct its European trade through Hungary (Horthy-Stalin Treaty 1941).

Figure 6. The KGST Standing Subcommittee on Transport Report on the joint construction of transfer points for 1524 and a4 1435 mm gauge freight wagons at the railway border stations of the KGST member countries c. regarding the question[76]



During the structural transformation of the state railway (PKP), Poland organized the large-scale wide-gauge network and the activities carried out on it into an independent economic company. The developed system is fully EU-compliant. The coordinated Ukrainian-Polish-Slovak-Austrian transport policy is typically presented in the map published in the information brochure of the Jávorov Special Economic Zone. (Figure 7) Hungary is completely omitted from the international delivery route! Slovakia will also let the Kassai Kohó be lost, even though the 1530 mm railway line built from the Ukrainian border to Kasa is of economic importance for Slovakia. In practice, the Zagreb – Budapest – Ungvár – Lvov/Lviv section of Corridor V and the branch lines connected to it were omitted.

[76]MNL-IMG_20221124_101045.JPG

Transformation of the railway network in Ukraine and its consequences for Central Europe

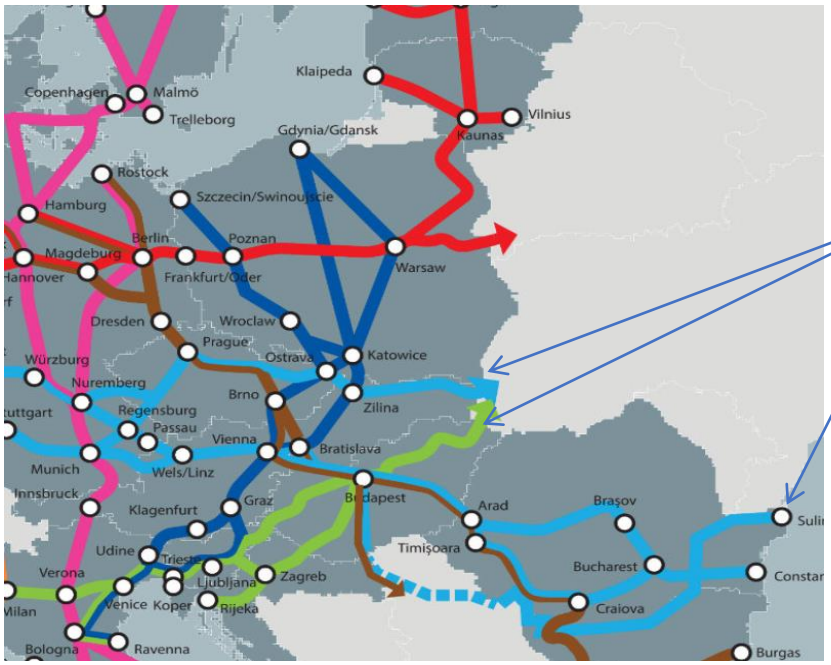
Currently, several railway border stations operate on the Ukrainian-Polish-Slovak-Hungarian-Romanian border. Since railway lines with different gauges meet, some level of transshipment takes place in every case, even if it is small. If the gauge size of the Ukrainian railway network is changed in accordance with the European Union size, then all transshipment stations connected to border crossings will be transferred to the Russian-Ukrainian border. Except for those on the Belarusian-Polish border. In other words, European and Russian gauge railway lines on the Ukrainian-Slovak-Hungarian-Romanian border will cease to exist because they will lose their former function. There is only one European border point, the Polish-Belarusian border, the function of which does not change, which is why it is given special importance. Poland becomes a monopoly in the handling of Russian and Far Eastern, as well as European, deliveries. By establishing the transit fee, it can regulate - according to its interests - the prices of raw materials and finished products bound for Europe, and can influence the access of Russian and Far Eastern goods to the European market. At the same time, the 1,520 mm railway network built from the Polish border to Katowice will remain intact, providing a significant economic advantage for Polish industry. If this idea comes true, Belarus will be in a similar situation to Poland, only on the opposite side. By suspending the Brest border crossing and transshipment stations, the Belarusian leadership can bankrupt the economy of the entire European Union. With the transformation of the railway lines, several sections of the European TEN network will lose their function and tasks. The transportation and economic center of Central Europe will be Katowice and its region, which will be directly connected to the Vienna-Poznan transportation center. (CARGO)

Possible restructuring of Ukrainian railways

Ukraine's rail transport consists of a broad-gauge, 21,655 km long track network, of which 7,145 km are double-track, and the length of electrified lines is 9,729 km. The Ukrainian railway is the 14th longest in terms of length, the 6th in passenger traffic, and the 7th in freight traffic in the world. a) Number of freight cars: 174,939 b) Number of passenger cars: 8,429 c) Number of locomotives: 2,718 d) Number of electric locomotives: 1,796 e) Number of electric locomotives: 1,443 f) Number of diesel locomotives: 186.
The speeding up of the Budapest-Belgrade railway line amounts to about HUF 1,700 billion, announced Tamás Schanda, State Secretary of the ITM in 2020. The amount includes the renovation of 660 kilometers, the construction of 200 kilometers, and the electrification of 400 kilometers of railway tracks. Budapest-Belgrade railway: it will cost 1,700 billion. On average, based on the above, the price of rebuilding 1 km of railway track (in 2020 prices) is approx. HUF 2 billion. Converted to Hungarian prices, the reconstruction of railway tracks in Ukraine: approx. HUF 60,000 billion. This cost also includes the rebuilding of structures (bridges, culverts, road crossings, etc.). The entire fleet of wagons must be replaced, as well as all the locomotives. The initial cost is incalculable, the construction would take several decades, because the track condition of the current Ukrainian railways is not suitable for European transport, this would mean that not track renovation, but new track construction is necessary. For this, railway employees still need to be trained to manage European rail traffic.

Figure 7. International transport corridor in the publication of the Jávorov Special Economic Zone

Figure 8 TEN network



The 1435 mm and 1524 mm railway gauge junctions that will be discontinued

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In summary: the transformation of the railway system in Ukraine is economically unreasonable, an investment that will never pay off. It is harmful to the economy of Central European countries and harmful to European and Asian trade. The transformation of the railway network in Ukraine discredits the European Union's regional development

politics and cause enormous economic damage to everyone except Poland. Subcarpathia and the northeastern region of Hungary, Subcarpathia, and the eastern region of Slovakia will be economically peripheral, just like in the 19th century.

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References

- Dr. Bajor Tibor Záhony, a vasút és a vasúti átrakó. Doktori disszertáció 2010. Pécsi Tudományegyetem
- Three broder's one question (dr. Bajor Tibor – dr. Egri Imre) Magyar Logisztikai Évkönyv 2011. Magyar Logisztikai Egyesület Budapest 2010. ISSN 1218-3849
- Bajor Tibor – Prykhodko Volodymyr KÁRPÁTALJA KÖZLEKEDÉSLOGISZTIKAI HELYZETE Közép-Európai Közlemények Szeged 2014. 93-104. ISSN 2064-437X, HU ISSN 2064-437X
- Dr. Bajor Tibor Magyarország pozíciója az eurázsiai közlekedési rendszerben. Polgári Szemle Főszerkesztő dr. Lentner Csaba Budapest 2014. 10. évfolyam 3-6. szám.221 – 234 p. ISSN 1786-6553
- CIA - A világ ténykönyve. www.cia.gov. [2016. július 9-i dátummal az eredetiből archiválva]. (Hozzáférés: 2010. július 13.)
- Erdősi Ferenc A Visegrádi országok vasúti közlekedése MÁV Zrt 2010. 21-24. old.
- Erdősi Ferenc Területi érdek és vasúti közlekedés 1987. Tér és Társadalom 1.p. 45-60.
- Erdősi Ferenc A Visegrádi országok vasúti közlekedése MÁV Zrt 2010. 21-24. old.
- Alternative Routes Between the Far East and Europe (With Special Regard to the Foreign Trade of Hungary) by Tibor BAJOR – Ferenc ERDŐSI Series editor Gábor Lux, Institute For Regional Studies Centre For Economic And Regional Studies Hungarian Academy Of Sciences DISCUSSION PAPERS 92 Pécs 2013 ISSN 0238-2008, ISBN 978 963 9899 66 7, 978 963 9899 67 4 (PDF)
- www.IHO.hu 2022.10.13.
- Dr. Horváth Ferenc: A Nyíregyháza-Ungvár vasútvonal 125 éves története. Záhony, 1997. Kiadó: Közlekedéstudományi Egyesület Szabolcs-Szatmár-Bereg megyei Területi Szervezetének Pályafenntartási Szakcsoportja és Logisztikai Szakcsoportja
- http://www.rubicon.hu/magyar/nyomtathato_verzio/1939_szeptember_17_szovjet_agresszio_lengyelorszag_ellen/ http://www.rubicon.hu/magyar/oldalak/a_barbarossa_hadmuvelettel_es_a_molotov_ribbentropp_paktummal_kapcsolatos_torteneti_vita/
- https://www.cia.gov/library/publications/resources/the-world-factbook/fields/384.html
- Kölcsönös Gazdasági Segítség Tanácsa Közlekedési Állandó Albizottsága Budapest 1963 december 0010/129/1963 KPM
- Macmillan, Margaret (2001): Peacemakers Six months that changed the world. Jonh Murray. London
- MMKM_KEZGY_947_102
- MNL-IMG_20221124_101045.JPG
- MNL_K69 1941-I-j-Szovjetunió
- Privátbankár.hu 2020. ÁPRILIS 8.
- Source: Rzeczpospolita.pl
- Source: MTI 25.02.2023. 4:45 p.m

ANDRÁS NÁHLIK, FRUZSINA MAGDA PANKOTAY, NIKOLETTA NÉMETH: THE WAY OF SELECTIVE WASTE FROM MOTIVATION TO PREPARATION FOR PROCESSING

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The aim of this study was determined by one of the main elements towards sustainability, through examining the selective waste management system of Sopron, Hungary.
After completing theoretical research, we collected relevant statistic data personally about the town's selective waste collection and conducted a questionnaire survey focusing on selective waste collection habits and environmentally conscious shopping.
The questionnaire survey revealed that clearly classifying the collectors into one demographic group is not possible. Those with a doctorate degree and those living in a family house collect the highest proportions of all waste types selectively, and in both cases there was a statistically strong correlation between the factors.
The main findings in order to improve the efficiency of separate waste collection are also introduced, for example the motivation of consumers, the spreading of bag collection (for plastic waste), the conscious choice of packaging and the fulfilled principles at companies in connection to selective waste collection.

Keywords: sustainability, waste management

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1. INTRODUCTION

In our modern society, the ability to manage economic or social affairs is becoming increasingly important. This is true for everyone, even young adults have to make serious decisions, whether it is about their day-to-day affairs or even their financial decisions. Moreover, in our fast-changing world, we are confronted with concepts and phenomena that sometimes puzzle even those with average knowledge (Szóka, 2021). In the 21st century, consumer habits have changed considerably, what is perfectly illustrated by the fact that we change our consumer goods much more frequently than one or two generations, when some consumer goods (e.g. shoes) lasted a lifetime. One of the reasons may be that manufacturers realised that products which are not last long make consumers to buy them more often, so manufacturers' profit grow. We can also see this increased consumption from the days of overconsumption. While in 1970 this day was 29 December, in 2019 on 26 July, in 2020 this day was 22 August, a three-week shift from the previous year due to the pandemic (Past Earth Overshoot Days, 2020). In 2021, this day already matched the previous trends: 29 July, so time is getting shorter.

The growth of consumption is also driven by the growth-oriented mindset of humanity, with newer technological product versions appearing every year, and demand for these products is also stimulated by mass media (Schäfferné Dudás, 2007). In parallel with consumption, the amount of waste is naturally increasing (Buenrostro - Bocco, 2003). This means that humanity requires for new strategies to manage the high amount of accumulated waste. We have a responsibility for our waste, and consumers must also invest energy in achieving a circular economy. Selective waste collection offers a great opportunity to do this, by organising the items that become waste and making it easier to recycle them back into production (ISWA, 2012).

Today, selective waste collection is widespread in Europe. The motivation of the population, the increase in opportunities for selective waste collection and the number of collection containers are all important factors in increasing the volume of waste collected selectively (Grodzińska-Jurczak et al., 2006). In Hungary, more than 100 million tonnes of waste are already generated annually. A significant proportion of this is plastic (including bags, sachets and PET bottles), and what is significant that the production, use and degradation of plastic has a detrimental impact on our environment (Jakab, 2018). Sopron is in the focus of our study, where two forms of plastic waste collection are present. One of them is the so-called island collection, where selective waste containers are placed in public areas. It is mainly used in the condominium zones. The other form is the so-called bag collection, where residents are given plastic and paper bags to collect their waste in them separately. These bagd are collected monthly by the waste management company of Sopron.

In our research, as the title suggests, we looked at a pathway from motivation to preparation for processing. In doing so, we aim to highlight all the stakeholders, including municipal waste management, companies, public education institutions, individuals and households. We have used different methods to investigate these, which will be described in the methodology chapter. The present publication of the research focuses on household bagged waste collection and the results of the questionnaire survey.
The importance of the research is also due to the fact that the population of the city of Sopron has been growing continuously. This process has accelerated significantly in recent years, as the proximity of the border has made the municipality a centre of internal migration (Kiss, 2015).

2. Material

Waste management, including selective waste management, is addressed in a wide range of areas. It is a topical subject and research area for the environment, economics, law, politics and engineering, and is therefore an interdisciplinary field (Seadon, 2010).

Of course, waste management is also important for the European Union, with directives, plans and legislation at Community level. But the work related to these principles is constant, with frequent improvements, modifications, additions and adaptations to improve sectoral indicators (Vehlow et.al, 2007).

In 2011, the European Commission published a Communication on a strategy for the prevention and recycling of waste. This confirmed that the recycling strategy adopted in 2005 should be followed by all Member States. The Communication sets out seven basic guidelines for both households and businesses, which have to be followed by Member States must follow. The document provides standards and suggestions for the whole life cycle of products. Waste management knowledge among the EU population needs to be updated (EC Communication 2011). The European Commission's 54-point action plan states that 40% of waste generated in the EU is recycled, but that this varies widely from 5% to 80% in different member states (EC Communication 2015). Sustainable cities and communities is the 11th of the 17-point Sustainable Development Goals (SDGs) of the UN, which also measure progress in waste management through indicators. According to the dedicated website, in 2016, the amount of municipal waste decreased by 8% compared to 2010, and the proportion of municipal waste disposed of by landfilling improved significantly (KSH, 2018). Pires et al. argue that by addressing system analysis models and tools in a synergistic way, the improved solid waste management strategies that meet current standards at a higher level could be developed, supporting the EU-compliant efforts of the waste management industry and government agencies (Pires et al, 2010).

Each Member State, including Hungary, has its own waste policy, which complements EU requirements. Based on EU data, the amount of waste per capita in Hungary is below the EU average. Only Portugal, Latvia and Croatia have less waste per capita than Hungary. The EU's waste

management priorities are environmental and and focusing on health protection. The average EU citizen uses 16 tonnes of material a year and produces 6 tonnes of waste, half of which ends up in landfills (ec.europa.eu). According to a 2017 study, only Germany and Austria recycle more than half of their waste (Gray, 2017). Taking all EU countries into account, Italy has the highest recycling rate of waste, along with Germany and Austria. The governments of these countries are encouraging recycling. The Community's target to recycle is at least 65% of the waste generated in these countries by 2030. To achieve this, it is important to focus on the principles of circular economy, with new products being manufactired or created from old ones. The circular economy, and the transition to it, means that new raw materials should be created from as much waste as possible. This is in the interest of the country's economy and its competitiveness, and internal recycling should also be considered by companies, along economic lines.

In Hungary, there are also laws, regulations and plans that set out in writing the directions for waste management, including selective waste management. The Waste Management Act mentions eight basic principles. These are recycling, self-management of waste, proximity, polluter pays, recycling of biological waste to organic waste management, cost-effectiveness, prohibition of cross-subsidisation and ensuring a reasonable profit for the public service provider.
Hungary also has a Waste Management Plan (National Waste Management Plan 2021-2027 - OHT), which outlines the state of waste management and details the objectives and the way to achieve them. Perhaps the two most important parts of the plan are the waste hierarchy and the transition to circular economy. This is in line with EU directives.

The plan also includes an Action Programme and a National Prevention Programme. The transition to a circular economy cannot be achieved without the use of chemical processes (Keijer et al., 2019). Pankotay et al. (2020) highlight the 'green' aspects of the preparation, production, sale and use phases of the life cycle of IT assets, which can be rethink, reduce, reuse, recovery. Waste management is seen as an economic, social and psychological issue. The role of metallurgy will also be important to achieve circular economy, as metals have a high intrinsic recycling potential (Reuter, 2016)

If we analyse the recycling plan, the targets have increased for paper, metal, glass and plastic waste. 50% of these materials were to be recycled by 2020, while for paper and cardboard the target was 75% by 2025 and 30% by 2030, for ferrous metals the targets were 70% and 80% for the two years mentioned above, for glass 70% and 75%, and for plastic 50% by 2025 and 55% by 2030 (National Waste Management Plan, Hungary).

Selective waste management in Hungary could have been given a new impetus after the change of regime in 1989-1990, but the transition in waste management was very slow, and selective waste management was still in its infancy at the turn of the millennium (Madarász 2001) In the mid-2000s, EU accession gave the country access to Community project funds. Some of these funds could have been used to modernise the waste management system. In the 2010s, a modernised waste management system was implemented. By 2016, there were 64 sorting plants in the country, where the different types of waste are baled. As a result, the amount of municipal solid waste has decreased, the amount of waste prepared for recycling has increased, while unluckily the amount of hazardous waste has also increased. The amount of hazardous waste continues to increase, which is a problem because in many places in Hungary there is no adequate infrastructure for the processing and disposal of this waste (Varjú - Mezei, 2020). According to a study (Kárpáti, 2014), 5.8 billion kg of waste is generated in Hungary every year. The article shows that 70% is industrial waste and 30% is household waste, and in 2012 only 34% of all waste was recycled. However, companies recycled 75% of their waste in different forms.

It is important to mention some researches. In Spain, a study on the subject was carried out in the mid-2000s, involving more than 1000 respondents (Gonzales-Torre - Adenso-Díaz, 2005). People on

the street were asked about recycling. At that time, the majority of people in Western European countries were not yet aware of this issue, although the proportion of waste collected separately in the households was already increasing. Bernardo - da Silva Lima's 2017 research in the Brazilian city of São Lourenço suggests that, in order to encourage separate collection, it would also be important to convince people that the 'work' they invest in separate collection is not wasted and that they are actually treating their waste as it should be. According to a study in Naples (Ripa et al., 2017), waste management problems are serious and it would be worth looking at the whole process to identify ways to make it more efficient. To this end, six alternatives to the life-cycle models were already developed in 2012.

Waste management is also a major problem in China A 2018 survey of the population by Xu et al. found that financial incentives are the best way to promote conscious and selective waste management. When looking at companies, it is worth analysing the issue of corporate social responsibility (CSR). This issue first emerged in Japan through the keyosei principle, which means that everyone should work for a common good (Nárady-Szeles, 2004a, cited in Szabó et al., 2013). Nowadays, there are several guidance documents that show companies how to take social responsibility. In 2013, a research (Szabó et al., 2013) was conducted to investigate CSR in waste management through a questionnaire survey.

It is not only the recycling of paper, plastic and glass that is important, but also the recycling of electrical units. With the right techniques, companies are able to recover nanomaterials from these units themselves, saving material resources (Dutta, 2018).

The future of selective waste management lies in automation, and there are developments in Hungary (Lakatos et al., 2018). The Internet of Things (IoT) can be of significant help in this process, but government also has an important role to play in its implementation (Shyam et al., 2017). The European Union considers the smart city project as an essential development direction and waste management as an essential element of this. The efficiency of these projects could be increased by the Internet of Things, according to Pardini et al. (2019). The research completed by Saha et al. (2017) highlighted that IoT can be applied to almost any area of waste management, including recycling, both in terms of material recycling and incineration.

According to Hungarian researches on selective waste collection, Szele (2005) conducted a survey in Szombathely, Hungary, to assess the awareness of the population in this area. Based on 100 respondents, their results show that in the mid-2000s the Hungarian population was still very uninformed about selective waste collection. Half of the 82 respondents collected their waste selectively on an occasional basis, and there were 20-20 students who always and never collected their waste selectively.

Zsóka (2011) found that selective waste collection is the environmental activity that most people do (40.2%). In contrast, a survey conducted by the Drinking Carton Environmental Association 6 years later found that 9 out of 10 Hungarians collect their waste in a selective way (maradokapenzemnel.blog.hu, 2017).
Németh-Mészáros (2022) examined the Western Transdanubian Region of Hungary and through a questionnaire survey (N=1130) they proved that 76.8% of the respondents collect their wastes selectively. More than 96.0% of them collect plastic in a separate container or bag. As influencing factors gender, education and type of residence were named.

3. METHODS

One of the aims of the research was to provide a more comprehensive picture of the selective waste collection habits of the residents and businesses of Sopron. We inestigated with 2,839 households in 8 districts in Sopron.

In addition to secondary research, primary research methods were also used. While the secondary research was based on national and international literature and internet sources, the primary research relied on empirical survey. Although the research included three primary methods, but in this article we would like to focus the observation of selective plastic bags, the results of the questionnaire survey, which filled by the population of Sopron, and tried to find out people's waste collection habits.

In Sopron's residential areas, residents have to collect paper and plastic in yellow and blue bags provided by the waste management company. These bags are removed by the public company's staff every month and new bags are given to the residents. In June 2020, a survey was carried out to find out how many people in each district had a bag outside their house, and if so, how many blue (paper) and how many yellow (plastic) ones were placed out to be collected. A total of 2,839 households were registered. This represents an average of 355 households per district.
As part of the research, an empirical survey was also carried out on the selective waste collection habits of the population of Sopron. The questionnaire included multiple-choice and Likert scale questions. The questions were structured thematically into four groups.
The first part concentrated on separate waste collection habits. The importance of selective waste collection was rated on a scale of 5. Other questions included: what types of waste do you collect and for how long and how have you been collecting them separately?
The second set of questions asked about shopping habits, as knowing that the amount and type of products we buy also affects the amount of waste we produce raising also and important question in waste generation. Environmental consciuosness of consumers was examined here.
The third group of questions were related to residence, how far is the nearest waste collection station (containers) is, in which type of residence do the respondents live, as the options for separate waste collection differ for the types of houses. For those living in a shared house, we wondered whether a community collection was organised per staircase.
The fourth set of questions covered demographic issues, asking about gender, age, neighbourhood of residence, economic status and education.

The analyses compared responses within each characteristic on a percentage basis and in several cases examined the correlation between two or more responses.
SPSS was used to analyse pairs of questions, such as age groups, according to how long people had been collecting their waste separately. For these analyses, we used two sets of coefficients. One is the Pearson coefficient, which determines significance. According to this, two variables are significantly related if the indicator is below the 5% level ($p<0.050$). The closeness of the relationship between the two variables was determined by the Cramer V indicator. Here, if $V=0$, there is no relationship, if $V=1$, the relationship is deterministic, the two criteria determine each other. If the result for V is between 0 and 1, the relationship is stochastic. The levels of stochastic relationship are the followings: $0<V<0.2$ it is considered to be a weak relationship, $0.2<V<0.7$ a medium one and $0.7<V<1$ a strong relationship (Sajtos-Mitev, 2013).

4. RESULTS

4.1. Results of the observation

The basic data of the waste management company of the city of Sopron in relation to selective waste management are the followings: currently the company collects selective waste in two ways: there is bag collection (plastic is collected in yellow bags, paper in blue) and there is island collection in containers. The company prefers bag collection, because their experience shows that there is less inappropriate material in the selective waste received. The company has been collecting waste in this way for several years. Only the glass containers remain, because glass cannot be collected in bags due to its fragility. The data received from the company allows for the analysis of plastic, paper and glass. The data are annualised for the period 2004 to November 2019 and not exclusively for Sopron. In the case of all three types of selective waste, it can be said that, the collected amount is increasing

year by year. This can also be explained by the fact that, on the one hand, people have started to think more consciously about their waste and, on the other hand, the population of the city of Sopron has increased year by year, so the amount of waste has also increased. In the decade 2000, the amount of paper collected separately increased significantly. The amount of plastics collected separately started to increase sharply in 2013, when bag collection was introduced in some areas. In the second decade of the 2010s, the separate collection of plastic overtook paper. The separate collection of glass has increased more or less steadily over the years included in their review.

The collected bags are transported to sorting halls. The sites operate at 100% capacity, with a single shift, and if there is a sudden increase in the amount of selective waste (e.g. during the VOLT festival), another shift is called in. The pursuit of efficiency is also important because Greco et al. (2015) show that efficiency has a significant impact on costs, so it would be worthwhile to monitor efficiency and adopt a lean approach. Sorting within paper and plastic is also in practise, for example PET bottles are sorted by colour. The sorted waste is baled and sold to national companies that use it in their production. The waste does not remain on the site for more than 2 days from delivery to sale.

In the city of Sopron, the bag collection is divided into 8 districts, which are different in terms of their structure, demography and sociology. The way in which selective waste collection is carried out was assessed by district, but it was considered that without a description of the districts and local knowledge, the differences in collection rates are not relevant at international level.

When looking at all districts, there were 3,047 yellow (plastic collection) and 1,438 blue (paper collection) bags in front of the houses. On average, there were 1.07 yellow bags and 0.49 blue bags per household. Out of the 2,839 households, 1,716 had at least 1 yellow bag on display and 1,076 had at least 1 blue bag on display. This represents 60.4% of all households was at least one yellow bag and 37.9% of all households. was at least one blue bag Interestingly, the most yellow bags were 9 per household and the most blue bags were 7 per household. So it cannot be said that almost all households living in a family house collect waste selectively, even though bag collection is a relatively simple solution for those living in this type of residence.

In total there were 1,744 households with at least one bag placed out in front of them ont he day of selective waste collection. We also found it worthwhile to look at these households to get an accurate picture of the specific collectors. We counted an average of 1.74 yellow bags and 0.82 blue bags.
In the houses where there were no bags placed out in front them, we cannot be sure that they do not collect plastic and/or paper selectively, as they may have forgotten to put them out, not collected a significant amount or have already placed them in the right containers by themselves. If we look at the households collecting plastic and/or paper in separate bags, 671 households placed out only plastic in bags on the day of the survey, 32 only blue bags, and 1,041 households both. This means that the majority of collectors collect both types of waste separately. When looking at all households surveyed, these percentages are 23.6% for plastic and 1.1% for paper only, and 36.7% for both. 38.5% of households had no bags placed out.

4.2 Results of the questionnaire survey

However the number of responses for our questionnaire survey is only 327, the results provide reliable information on the perception and opinion of Sopron citizens on waste collection. Although demographic issues were placed at the back of the questionnaire, their role in drawing conclusions has led to their inclusion at the front of the analysis.
In terms of gender, female respondents were in the majority (72%). According to age group, the responses are not balanced, because there were hardly any respondents under the age18. The majority (38%) were aged between 30 and 45, the second largest age group (28%) was between 46 and 59,

and the third largest number of respondents were young adults (24%) (19-29). Those aged 60 and over accounted for 9%.
As this was considered an important aspect, we asked about the educational status of the respondents. The relative majority of respondents had asecondary school degree (38%), the second highest percentage belonged to the ones with college graduation (26%), the third highest percentage with master degree (20%), fourth highest percentage of those with a doctorate degree (13%) and 33% had no high school education.
When looking at economic status, roughly two-thirds of the respondetns were employed. The others mainly were students, alongside retired people, those on paid maternity leave and those who are both studying and working. It can therefore be concluded that the majority of respondents are women, aged 18-59, with a secondary or higher education and working full-time in Sopron.

The first set of questions asked about how the respondents consider the importance of selective waste collection. This was rated on a scale of 1-5, with 5 being the most important. The good news is that people are so environmentally conscious that they did not rate the answer to theis question for 1 or 2. So all respondents gave to the topic at least a medium importance (only 5 respondents chose the medium rating). Thus the average rating of the 327 respondents was 4.75. Based on the responses to the demographic questions, it is worth comparing the differences observed for each group. Two types of comparison were examined: Men and women, by age 45 and over. The larger difference between the influencing factors was gender (women averaging 4.8 and men 4.6). When the respondents were divided by age (up to 45 and 46), the older respondents had a higher value (4.85) and the younger respondents a lower one (4.68). The result is surprising, as it was expected that waste management would be more important for the younger respondents. Many of them are recent school leavers, so they may heard about selective waste collection, and they were motivated by their school to apply it in their households. In addition, younger people use the internet more often and may have been motivated by different incentives to collect waste. It could also be assumed that the average of selective collectors among younger people would be higher, because they might be more receptive to the issue which affects their future.

The importance of selective waste management was rated higher by women, and a slightly higher proportion of female respondents collected waste selectively (88.9%), compared to 85.9% of men. Interestingly, the two age groups show a reversal of the order, with 90.3% of the younger age group collecting waste separately, compared to 84.3% of the older age group. This may show that those who have just finished school are collecting their waste on this way because they are motivated to do so or because they are more open to it than older people. There is little difference between the two groups in the breakdown of university graduates and non-university graduates. Contrary to what might be expected, a higher proportion of non-university graduates collect waste separately than university graduates. The rate was 89.6% for the former group and 87% for the latter. This is probably due to students, who are still in the former group but have recently graduated from public education institutions, where they were motivated to collect waste separately.

The next set of questions asked whether the respondent lived in a condominium or a detached house. It was previously assumed that a higher proportion of people living in a detached house would collect waste separatelybecause they have the option of bag collection. Accordingly, it is true that a higher proportion of people living in a family house collects waste separately, even if the relationship between waste collection and the place of living is relatively weak ($V=0.141$, $p=0.011$). It is also worth comparing the selective collection of waste with the status of the host. There is also a significant correlation between the two criteria, but it is weak again ($V=0.212$, $p=0.023$). The average of those in full-time employment is about 1% higher than the overall average. Only 65% of retired respondents collect their rubbish separately.
We also asked how well informed respondents felt to be on a scale of 5, and about exactly what waste could be placed in which bin. A score of 5 meant that they felt fully informed. The average for all

respondents was 4.07. Women feel more informed than men in this area. The average for the former was 4.1 and the latter 3.98. Older respondents felt more informed, with an average of 4.28 and 3.95 respectively. There is a statistically significant relationship between age groups in terms of feeling informed, but it was weak (V=0.172, p=0.001). There was no significant difference between the responses of graduates and non-diploma holders, with the former scoring 4.08 and the latter 4.06. A large difference was experienced between the mean of collectors and non-collectors. The average for collectors was 4.13 and for non-collectors 3.59. In conclusion, if there were more campaigns on separate waste collection, where people were made aware of exactly what type of waste to put in which bin and what can and cannot be placed in different containers, more people could switch to separate waste collection.

The next two questions asked were about habits in selective waste collection at home and at work. Of course these questions were only asked of those respondents who collect waste separately. Both were multiple-choice questions and both had other options at the end. The following types of waste could be marked: plastic, paper, glass, construction waste, electronic waste, green waste. For the question on home collection, there was an option to answer 'I do not collect at home', and for workplace collection there was an option to answer' do not collect at work'. For the latter, there were also options 'I don't have a workplace' and 'Other waste from production'.

Out of the 288 respondents who answered 'Yes' to the previous question 'Do you collect waste separately', only two said that they do not collect waste separately at home. So it can be said that, with few exceptions, those who collect waste separately at the workplace also do so at home. Most people collect plastics and paper at home, which can be explained by the fact that these two types of waste can be collected in the bag collection. Plastic is collected at home by 95.8% of collectors, while paper is collected at home by 88.2% of collectors. When compared to the total number of fillers, this is 84.4% for plastic and 77.7% for paper, which is considered a pretty good percentage. More people collect plastic than paper, but both types of waste had much higher rates in the questionnaire survey. This can be explained by the fact that the questionnaire is likely to be clicked on primarily by people who are interested in this topic. Of the types of waste identified, only construction waste is collected by less than half of the respondents. In the other option, many respondents listed the item as electronic waste, but clothes and food waste were also named.

In the case of those respondents who do selective waste collection at home, the connection between the separately collected waste and the place of their residence was examined. As it was found, there is a significant relationship between where you live and what you collect in according to all types of waste. There was a strong relationship for plastic (V=0.724, p=0.000), paper (V=0732, p=0.000), glass (V=0.720, p=0.000), construction waste (V=0.739, p=0.000), electronic waste (V=,0.732 p=0.000), and green waste (V=0.748, p=0.000). Plastic is collected by all respondents. Construction waste and green waste are collected in higher proportions in the garden housing districts.

It is also worth looking at the connection between the age groups of respondents and the types of waste they collect at home. Again, there is a significant relationship in each cases. Only in the case of paper (V=0.306, p=0.000) and electronic waste (V=0.216, p=0.009) the relationship was weak. The highest proportion of paper is collected by people aged 46-59 (96.4%), the lowest by people aged 18-29 (71%). Although no significant relationship was found, the figures suggest that glass is also collected by the highest proportion of people aged 46-59, the lowest proportion being in the age group30-45. In the case of electronic waste, the older the age group, the higher the proportion of them who collects it separately.

We also looked at what people collect waste separately at home in terms of qualifications. Again, we found a significant relationship in each cases and also a strong relationship in the case of plastic (V=0.712, p=0.000), paper (V=0707, p=0.000), glass (V=0.715, p=0.000), construction waste

(V=0.713, p=0.000), electronic waste (V=,0.723 p=0.000) and green waste (V=0.713, p=0.000). The highest proportion of all waste types is collected by the respondents with a doctorate degree. Apart from this, for all waste types, the higher the level of education of the group was, the higher the proportion of waste collected selectively. It is interesting to note that only among those who have completed secondary education is the proportion of those who separate electronic waste and green waste noticeably lower than the average.
There were 236 respondents who did not tick 'I don't have a job' in the question 'Which waste do you collect selectively at work?'. The proportion of people who do not collect waste selectively at work is much higher than those who do not do so at home. Most people also collect paper and plastic at work, with 150-150 respondents each. This represents 63.6% of the 236 respondents. The order of the nominations received for these types of waste is the same as for the previous question. Again, the least separately collected waste is construction waste. It is likely that most people do not generate this type of waste at their workplace. In the other option, it was mentioned that there are workplaces where there is no possibility for the separate collection and for the separation of hazardous waste.

The next question, how long the respondents had been collecting waste separately. This was a single-choice question, with the answer options '1-2 years', '3-4 years', '5-6 years' or 'Longer ago'. This question was only asked of those who collected waste separately. 37% of the respondents ticked 'Longer' (equal percentages of women and men - 37%-37%). The second highest number of respondents indicated '3-4 years ago' (30%), 24% have been collecting for 5-6 years and 9% have only switched to separate collection one or two years ago. For the age groups compared, the gender response for 'Longer ago' was 37%-37% for both. When grouping collectors by gender according to how long they have been collecting waste separately, no significant difference was observed.

Is there a difference between the responses of people living in an apartement building and those living in a detached house? There were no remarkable differences, but it is important to note that the small differences show that on average, people living in a block of flats started collecting waste earlier. When we examined by age how long people have been collecting waste, we found that there is a significant relationship between the two criteria, which is moderately strong (V=0.530 p=0.000), with older age groups tending to have been collecting waste selectively for longer.
Among those who collect waste selectively, there was also a question about where they collected their rubbish: at home, at work, or in public places. This was a multiple-choice question with other response options, where they could write the name of the place of collection. This was a summary type of multiple-choice question. Who collects what kind of waste at home and at work was included in an earlier question. The answer options were 'At home, in separate bags', 'In public places, at collection stations', 'At work, at school'. The responses showed that most people collected at home (76.4%), followed by work (63.2%) and less than half of those who completed the questionnaire, collected in public places (42%). The latter figure could be significantly increased if more opportunities were provided in public spaces. Among the other options, many respondents indicated supermarkets and taking their waste from home to public selective collection points.

It is worth looking at how people collect and whether there is a correlation between age groups and the form of collection. In all three cases the correlation is strong: 'At home, in separate bags' (V=0.719, p=0.000), 'At work, at school' (V=0.716, p=0.000), 'In public places, at collection stations' (V=0.712, p=0.000). For collection at home the people aged 46-59 meant the highest proportion (81.9%) and people aged 30-45 the lowest proportion (71.3%). In the case of 'At work or school' the highest proportion was reached by people aged 46-59 (50.6%) and the lowest from people aged 60 and over (21.1%), the latter explained by the fact that many of them are retired. In public spaces, the highest proportion of people aged 60 and over collect (73.7%), and the lowest proportion of people aged 18-29.
We also found it worthwhile to compare the propensity to collect separately with the status of the host sector. Here again, the relationship is strong across the board, at home (V=0.722, p=0.000), at

work (V=727, p=0.000) and in public places (V=0.712, p=0.000). At home, all unemployed people collect waste separately, with the lowest proportion (70.6%) among those who work full-time. At work, a higher proportion of those who are studying while working collect separately. Retired people (76.9%) and those who work full-time (70.6%) are the most likely to collect in public places.

The next question was about who motivated the respondent to collect rubbish separately. In addition to ’other’, the respondents could select from seven other options. The vast majority of respondents who were asked this question because they collect waste selectively (84%) consider themselves to be environmentally aware. Among all respondents (327), this proportion is 74%. This is a relatively high rate. The significant association is strong with the response ’I am an environmentally conscious person’ (V=0.719, p=0.000). The lowest proportion of 18-25 year olds (72.5%) and the highest proportion of 46-59 year olds (88%) clicked on this question. Almost ¼ of the respondents were (also) motivated by family, again a significantly close relationship (V=0.761, p=0.000). 53.6% of 18-29 year olds were motivated by parents and relatives. This proportion was lowest among 46 to 59 year olds (12%). Influencers motivated only five of the respondents, so it was the least frequently indicated response option.
When broken down by age group, the response ’I am an environmentally aware person’ was more popular with older people (87.3%) and less popular with younger ones (82.3%). Both the response ’Parents, relatives’ and ’Friends’ were more popular with younger people. This is what I had expected, because families try to raise younger people, and younger people tend to have closer ties with friends, as they may have more time for each other. Staff and management have a greater influence on older people based on the completions. The media was cited as a motivating factor in equal proportions by the two age groups we split. Influencers motivated a total of 5 respondents out of the completers, including only one person in the older age group. In total, 12 people were motivated by a campaign among the collectors, 8 of them belonging to the younger age group.

Two questions were also asked of those who selected ’No’ to the question ’Do you collect your waste separately?’. One question asked why you do not collect waste separately and the other asked whether you had thought about switching to separate collection. The number of answers in these two questions was low, with few people indicating that they do not collect their waste separately (39 respondents).

’Why don't you collect waste selectively?’ was a multiple-choice question with other response options. The response options were ’I didn't think of it’, ’I don't have time’, ’I live in a block of flats and the selective collection station is far away’, ’I don't consider it important to collect’. The 25 most clicked on ’I live in a condominium and it is far from the nearest collection point’, 64.1% of those who do not collect, and ’I don't think it is important to collect’. Consequently, it would be good if there were more collection stations in the city's housing estates. A solution would be to place the recycling containers in the single-family zones too. A total of 6 respondents indicated that they did not have the time or had not thought of it, and 1 respondent did not consider selective waste collection to be important. Several respondents also indicated that separate waste collection is not organised well in the city of Sopron. On the contrary, we know that, with some effort, everyone would have the possibility to collect their rubbish separately. The second question to those who do not collect separately was whether they had thought about doing so. This was a single-choice question, but there was also an ’Other’ option. Here the answer options were ’Yes, but I have not yet got around to taking action’, ’Yes, but I don't have the time’, ’No’. 61% (23 people) of the respondents had thought about it but had not yet reached the point of action. Only 5% (2 respondents) have not thought about the possibility of separate waste collection. In the other response option, some respondents said that they did not see it as an option, and one respondent mentioned that he or she started collecting occasionally, as part of a campaign. In the future, the collection process could be facilitated by smart bins that detect the material of the waste placed in them and sort it accordingly (Wahab, 2014).

Table 1: Summary of separate waste collection habits

Question	Result
How do you rate the importance of separate waste collection? (5 being the most important)	4,75
Do you collect your waste separately?	88,1% - Yes 11,9% - No
Which types of waste do you collect separately at home? (Multiple choice question)	Plastic – 95,8% Paper – 88,2% Glass – 77,4% Construction waste– 27,4% Electronic waste– 61,8% Green waste– 50,3%
Which waste do you collect separately at work? (Multiple choice question)	Plastic – 63,6% Paper – 63,6% Glass – 5,1% Construction waste– – 22% Electronic waste – 13,1% Green waste – 8,9%
How long have you been collecting waste separately?	1-2 years – 9% 3-4 years - 30,2% 4-5 years – 24% Longer – 36,8%
Where do you collect waste separately? (Multiple choice question)	At home, in bags – 76,4% In public places, at collection points – 63,2% At work, school – 42%
Who motivated you to collect your rubbish separately?	I am an environmentally conscious person – 84% Parents, relatives – 24% Friends – 10,1% Co-workers, management – 10,4% Media – 10,8% Spotted during a campaign – 4,2%
Why don't you collect your waste separately?	I haven't thought of it – 15,4% I don't have time – 15,4% I live in a block of flats and it's a long way to the collection point – 64,1% I don't think collection is important – 2,6%
Have you thought about collecting your waste separately?	Yes, but I haven't got round to taking action yet – 60,5% Yes, but I don't have the time – 15,8% No – 5,3% Other – 18,4%
How well informed do you feel to be about exactly what waste can be placed in the different separate waste containers? (5 being the most likely)	4,06

Source: own data, own editing

As the products we buy every day are perhaps the biggest source of waste, we thought that it isimportant to include a set of questions on the shopping habits of respondents.
For certain products only, most people are careful to buy products that are recyclable or easily degradable. The proportion of people who do not pay attention at all is ¼, and only 4% pays attention for all products.
We asked whether respondents, as shoppers, usually pay attention to buying products that are easily degradable or recyclable in the store. Respondents were divided into two groups according to whether they shop more or less often per week. The same percentage points were obtained for the answers ’I don't usually pay attention’ and ’For some products’. 25% for the former and 32% for the latter. The answer ’For most products’ was selected by 36% of those who shop several times a week and 40% of those who shop less often. Among those who buy in smaller quantities, a higher proportion are those who pay attention to recyclability for all products and for some products. The next question asked about what people are using for packing when shopping. This was important to ask because of the significant amount of waste generated from packaging. This was a multiple-choice question with other options to indicate the type of packaging. The answer options were ’In a single-use nylon bag’, ’In a reusable nylon bag’, ’In a paper bag’, ’In a wicker bag’, ’In a plastic basket’, ’I take it in my hand’, ’I put it back in the shopping trolley and from there I transfer it to the car’. Most people (133 respondents) 40.7% (also) clicked on 'Put back in shopping trolley, transfer to car from there'. This is a good solution because it means not using so many bags. Reusable nylon bags are used by 34.6%. It is a positive sign that the single-use plastic bag is the least ticked option (11 people, 3.4% of all completers). Single-use nylon bags are used more by graduates and reusable bags are used more by non-graduates. Both personal bags and wicker baskets are used slightly more by graduates.

5. CONCLUSION

In historical terms, in the last 40 years waste handled by landfill lessen to half of the waste we generate, which is a relatively good result,, but we have to improve that ratio. The primary options of doing this could be motivation, information, but above all financial motivation. The use of more frequent collection bins and the more efficient organisation of community collections would be important, but the question is who would cover the costs.
The primary targets for motivation are logically the ones, whose activities and work processes generate waste. Motivation needs to be complex, with different ways of reaching different demographic groups. The most important thing would be to educate people about why it is important to separate waste and exactly what should be put in which bin. It is also important to have community selective collections, as humans are social creatures and are more likely to prefer to collect waste in a community. It would therefore be worthwhile organising collection campaigns for managers and employees in schools and workplaces. It would be more effective if there were competition between the participants. Feedback is also important.
However, it should be examined how much money the company should invest in this. On an experimental basis, bag collection could be tried in apartement buildings to see if this could lead to better results. As it turns out, there is statistical evidence that plastic is collected in higher proportions in suburban areas, which is also due to bag collection. Based on the observation of the bags, it can be said that this collection method has met the expectations, with the average number of plastic bags in front of houses showing that there is a bag in front of every house. Paper collection is perhaps less popular than plastic collection, and could perhaps be more widely disseminated with a suitable campaign, such as ’Protect the trees’.
There are often not enough resources to cover the costs of public awareness-raising or motivation. Therefore, public authorities should not only promote selective waste management through legislation or regulations, but should also be proactive, for example by providing adequate funding to increase the rate of selective waste collection.

6. REFERENCES

BERNARDO, M. –LIMA, R. (2017): Using Action Research to Implement Selective Waste Collection Program in a Brazilian City Systemic. *Practice and Action Research* volume 30, pages 593–608 DOI: 10.1007/s11213-017-9416-9

BONNYAI, Z. (1991): In: Árvai J. (szerk.): Hulladékgazdálkodási kézikönyv. *[Waste Management Handbook]* Műszaki kiadó, Budapest pp. 178-215.

BOZA, O.– MISIK, T. (2010): Környezeti attitűd vizsgálat az edelényi gimnáziumban. A szelektív hulladékgyűjtés megítélése.*[Environmental attitude test in Edeleny high school. Assessment of selective waste collection] Acta Acad. Agriensis, Sectio Pericemonologica* volume 37, pages. 29-42

BUENROSTRO, O. – BOCCO, G. (2003): Solid waste management in municipalities in Mexico: goals and perspectives. *Resources, Conservation and Recycling* Volume 39, Pages 251-263. DOI: /10.1016/S0921-3449(03)00031-4

DUTTA, T. et al. (2018): Recovery of nanomaterials from battery and electronic wastes: A new paradigm of environmental waste management. *Renewable and Sustainable Energy Reviews*, Volume 82, Part 3, Pages 3694-3704. DOI: 10.1016/j.rser.2017.10.094.

EUROPEAN COMMISSION (2011): Report From The Commission To The European Parliament The Council, The European Economic And Social Committee And The Commitee Of The Regions. on the Thematic Strategy on the Prevention and Recycling of Waste

EUROPEAN COMMISSION (2015): Communication From The Commission To The European Parliament The Council, The European Economic And Social Committee And The Commitee Of The Region. Closing the loop - An EU action plan for the Circular Economy

GRECO G, et al. (2015): Drivers of solid waste collection costs. Empirical evidence from Italy. *Journal of Cleaner Production*, Volume 106, Pages 364-371 DOI: 10.1016/j.jclepro.2014.07.011.

GRODZIŃSKA-JURCZAK, M. et al. (2006): Effects of an educational campaign on public environmental attitudes and behaviour in Poland. *Resources, Conservation and Recycling*. Volume 46, Issue 2, Pages 182-197 DOI: 10.1016/j.resconrec.2005.06.010

INTERNATIONAL SOLID WASTE ASSOCIACION (ISWA) (2012): Globalization and waste management. Phase 1: Concepts and facts. Florence: International Solid Waste Management Associacion Congress (report)

JAKAB Zs. (2018): Műanyag hulladékok pirolízise folyékony tüzelőanyagok előállítása céljából. *[Pyrolysis of plastic waste to produce liquid fuels]* TDK dolgozat, Miskolci Egyetem pp. 4-8

KÁRPÁTI, J. (2014): Értékes hulladék. [Valuable waste] *Logisztikai híradó,* Volume 24 Issue 2

KEIJER, T, et al. (2019): Circular chemistry to enable a circular economy. *Nature Chemistry*, Volume 11, Issue 3, Pages 190-195 DOI: 10.1038/s41557-019-0226-9

KISS E. É. (2015). Egy kutatás előzményeképp: Sopron népességéről és a vándorlásról. *[As a prelude to a research: Sopron's population and migration] E-CONOM*, Volume 4 Issue 1, Pages 47-56. DOI: 10.17836/EC.2015.1.047

LAKATOS, I. et al. (2018): Emelt szintű szelektív hulladékgyűjtés automatizálási lehetőségének bemutatása. Innováció és fenntartható felszíni közlekedés *[Presentation of the possibility of automating high-level selective waste collection. Innovation and sustainable surface transport]* XII. IFFK-Konferencia Anyagai 2018. Augusztus 29 - Augusztus 31. Paper 27. pages. 383-388

MADARÁSZ, B. (2001): Települési szilárdhulladék-lerakók és környezeti problémáik. *[Municipal solid waste landfills and their environmental problems] Földrajzi értesítő* Volume 5 Issue 1-4. pages. 335-347.

NÉMETH, N.; MÉSZÁROS, K. (2022): A nyugat-dunántúli háztartások vizsgálata a hulladékközpontú környezettudatossági indexen keresztül. *[Examining households in Western Transdanubia through the waste-centred environmental awareness index]* Statisztikai Szemle 100:10. Volume 11. pages.1025-1054. DOI: https://doi.org/10.20311/stat2022.11.hu1025

PANKOTAY, F. M.; SZIGETI, Zs.; SÓTONYI, T.; PATAKI, L.(2020): Az informatikai termékek életciklusának sajátosságai *[Specificities of the lifecycle of IT products]* In: Lencsés, E; Pataki, L. (szerk.) Menedzsment válaszok a XXI. század gazdasági és társadalmi kihívásaira Budapest, Magyarország:Inform Kiadó 283 p.;pp. 65-78., 14 p. DOI: 10.18515/dBEM.M2020.n01.ch05

PILAR L. GONZÁLEZ-TORRE,B. Adenso-Díaz (2005) Influence of distance on the motivation and frequency of household recycling *Waste Management* Volume 25, Issue 1, Pages 15-23 https://doi.org/10.1016/j.wasman.2004.08.007
PIRES, A. et al. (2011): Solid waste management in European countries: A review of systems analysis techniques. *Journal of Environmental Management* Volume 92, Pages 1033-1050 DOI: 10.1016/j.jenvman.2010.11.024
REUTER, M. A. (2016) Digitalizing the Circular Economy. Metallurgical and Materials Transaction B-process *Metallurgy and Materials Processing Science*, Volume 47 Issue 6 Page 3194-3220
RIPA, M. (2017) The relevance of site-specific data in Life Cycle Assessment (LCA). The case of the municipal solid waste management in the metropolitan city of Naples (Italy). *Journal of Cleaner Production*, Volume 142, Pages 445-460 DOI: 10.1016/j.jclepro.2016.09.149.
SAHA, H.N. et al., (2017): Waste management using Internet of Things (IoT). 8th Annual Industrial Automation and Electromechanical Engineering Conference (IEMECON), Bangkok, pp. 359-363.
SAJTOS, L.-MITEV, A. (2013): SPSS Kutatási és adatelemzési kézikönyv. *[SPSS Research and Data Analysis Handbook]* Alinea Kiadó, Budapest
SCHÄFFERNÉ DUDÁS K. (2007): A környezettudatos fogyasztói magatartás vizsgálata Magyarországon, különös tekintettel a szelektív hulladékgyűjtő magatartásra. *[Examining environmentally conscious consumer behaviour in Hungary, with a special focus on selective waste collection]* In: Vadovics, E. – Gulyás, E. (szerk.): Fenntartható fogyasztás Magyarországon - tudományos konferencia. Konferenciakötet, pp. 181-202.
SEADON, J. K. (2010): Sustainable waste management systems. *Journal of Cleaner Production*, Volume 18, Issues 16–17, Pages1639-1651 DOI: https://doi.org/10.1016/j.jclepro.2010.07.009.
SHYAM, G.K. et al. (2017): Smart Waste Management using Internet-of-Things (IoT). 2017 Second International Conference On Computing and Communications Technologies (ICCCT'17). pp. 199-203. DOI: 10.1109/ICCCT2.2017.7972276
SZABÓ et al. (2013): Társadalmi felelősségvállalás a hulladékgazdálkodásban. *[Social responsibility in waste management.]* Hulladék Online elektronikus folyóirat, Volume 4 Issue 1.
SZÓKA, K. (2021): A pénzügyi kultúra és tudatosság meghatározása és magyarországi helyzete. *[Definition and status of financial culture and awareness in Hungary.]* Economica (Szolnok) 12 : 3-4 pp. 1-8.
VARJÚ, V.- MEZEI, C. (2020): Hulladékgazdálkodás. *[Waste management]* In: Czirfusz, R. (szerk.): Területi kihívások és területi politikák Magyarországon, 2010-2020 Budapest : Közgazdaság- és Regionális Tudományi Kutatóközpont Regionális Kutatások Intézete, pp. 105-110.
VEHLOW, J., BERGFELDT, B., VISSER, R. et al. (2007) European Union waste management strategy and the importance of biogenic waste. *Journal of Material Cycles and Waste Management* Volume 9, Pages 130–139 https://doi.org/10.1007/s10163-007-0178-9
WAHAB, M. H. A. (2014): Smart Recycle Bin: A Conceptual Approach of Smart Waste Management with Integrated Web Based System. 2014 International Conference on IT Convergence and Security (ICITCS). DOI: 10.1109/ICITCS.2014.7021812
XU, L. (2018): Economic incentive and social influence to overcome household waste separation dilemma: A field intervention study. *Waste management* Volume 77, Pages 522-531 DOI: 10.1016/j.wasman.2018.04.048.
ZSÓKA Á. (2011): Környezeti tudatosság jelenleg és cselekvési hajlandóság a jövőre nézve. *[Environmental awareness now and willingness to act in the future. In The economics of the ecological footprint.]* In: Az ökológiai lábnyom ökonómiája. AULA, Budapest, pp. 56-76

Download, online resource:
KSH (2018c): Fenntartható fejlődési célok: A fenntartható fejlődési célok és az Agenda 2030 keretrendszer *[The Sustainable Development Goals (SDGs) and the Agenda 2030 framework]* (2018) https://www.ksh.hu/sdg (Download: 20. April 2020)

GRAY, A (2017) Germany recycles more than any other country https://www.weforum.org/agenda/2017/12/germany-recycles-more-than-any-other-country/ (Download: 22. January 2020)
Selective waste management, and video competition (2017) https://maradokapenzemnel.blog.hu/2017/11/24/szelektiv_hulladekgyujtes_es_a_150_000_ft-os_videopalyazat (Download: 5. October 2020)

SZELE Zs. (2005) Szelektív hulladékgyűjtés Szombathelyen 100 Szombathelyi polgár megkérdezése alapján. Kérdőíves felmérés összesítés *[Selective waste collection in Szombathely based on a survey of 100 Szombathely citizens. Questionnaire survey summary]* http://www.kerekerdo.org/html/100_valasz_a_szombathelyi_szel.html (Download 25- March 2020)
Past world overshoot days https://www.overshootday.org/newsroom/past-earth-overshoot-days (Download: 27. September 2020)

FITTY VALDI ARIE:
PANEL ESTIMATING EXPORTS AND IMPORTS OF THE AUTOMOTIVE INDUSTRY ON ECONOMIC GROWTH: EVIDENCE OF AUSTRIA, HUNGARY AND ROMANIA

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Abstract: The emerging automotive sector in Europe is again a concern after the Covid-19 pandemic storm. The automotive industry is essential in increasing revenue for a country and influencing an open economy. Even so, there are several manufacturers whose supply and demand for raw materials, costs, and employees are critical in the business activities of this sector. The objective of this study is to analyze the effect of exports and imports in the automotive industry on economic growth. Technical analysis used in this study is multiple regression to see the effect of the independent variables, exports, and imports, has on GDP as the dependent variable using panel data for 2017-2021. The data used is secondary, with the research object being Austria, Hungary, and Romania, countries in emerging markets in the European automotive sector. Findings regarding of the multiple-regression model, *f*-test and *t*-test show that the Austrian, Hungarian, and Romanian automotive industries significantly influence overall GDP, even though there are demands in the era of energy sustainability which is a significant concern for the government in creating an energy-efficient automotive industry.

Keywords: Export, Import, GDP, Automotive sector

1. Introduction

One indicator that assesses the size of a country's industrial, the automotive industry, is related to productivity. The automotive industry is one of the dynamic sectors supporting a country's economic growth; apart from having a sizeable contribution to GDP, the manufacturing industry, especially the automotive sector, also contributes to exports, imports, and employment. The automotive industry is also one of the largest commodities traded between international countries, not only in the form of finished goods but also intermediate products, such as components or spare parts, that attract investors to make competitive decisions in this industry (Mitra et al., 2020). In 2020 the emerging European automotive sector experienced its worst year due to the covid-19 pandemic, with production and sales levels falling to their lowest level (EMIS Insight). Even in uncertain monetary and fiscal conditions, this still provided a positive stimulus for the government, industry, and society to continue maximizing income from this sector. As a result, in 2021, based on OICA data, the production of the automotive industry in Europe can revive with a value of 8.1% y/y, nearly 4.7mn units (EMIS,2021). Economic growth, which is reflected in changes in economic activity in GDP, can increase if the value of net exports of a country is experiencing positive growth. The positive export value indicates that the goods or services produced by the estate are much in demand by other countries, so the value of exports is more significant than imports. The EU automotive sector is an essential part of the economy; according to this Industry, IPOL data generating turnover representing more than 7% of the EU GDP, which amounted to around EUR 936 billion in 2020. Strategically, the EU automotive sector contributes to the EU trade balance, generating a surplus of EUR 74 billion, and more than 5.6 million vehicles exported annually worldwide.

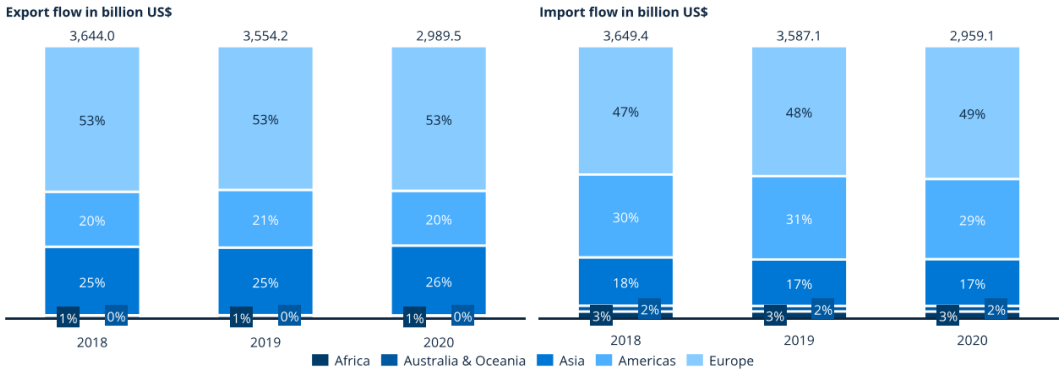


Figure 1.1 International Trade: Imports and Exports Automotive Industry In Europe
Sources : Sources: Statista 2022; WTO 2022

Figure 1.1 shows the emerging market for the automotive industry in Europe significantly controlling exports and imports with a significant value of 53% for exports with relatively stable fluctuations in export values of around 3 billion US in the 2018-2020 period for the import value economically it has a real value stable at 49%. From figure 1.1, the value of exports which is more significant than imports will undoubtedly increase people's economic activities. In neoclassical theory and theoretical competitive advantage, it is said that trade activity occurs because there is an advantage in the resources of the country, so the process of accumulation of output will increase economic growth (Bakari & Mabrouki, 2017). Export and import activities are critical in establishing relations between countries to increase the value of GDP compared to the total population in the country. Export is one of the advantages of cooperation with other countries to improve the country's foreign exchange (Batubara, 2013). Based on the importance of export and import of the automotive industry in Europe for economic development, through this research, we will analyze the relationship between economic indicators (export and import) to GDP. Then, this research investigates the determinants of export and import in three European countries, namely Austria, Hungary, and Romania, which have the potential for significant development of the automotive industry and are also supported by accurate data from independent sources. Figure 1.2 shows the automotive industry's position in Austria, Hungary, and Romania in an intermediate position compared to other European countries. From this data, the emerging industrial markets for these three countries will continue to grow and contribute to GDP growth.

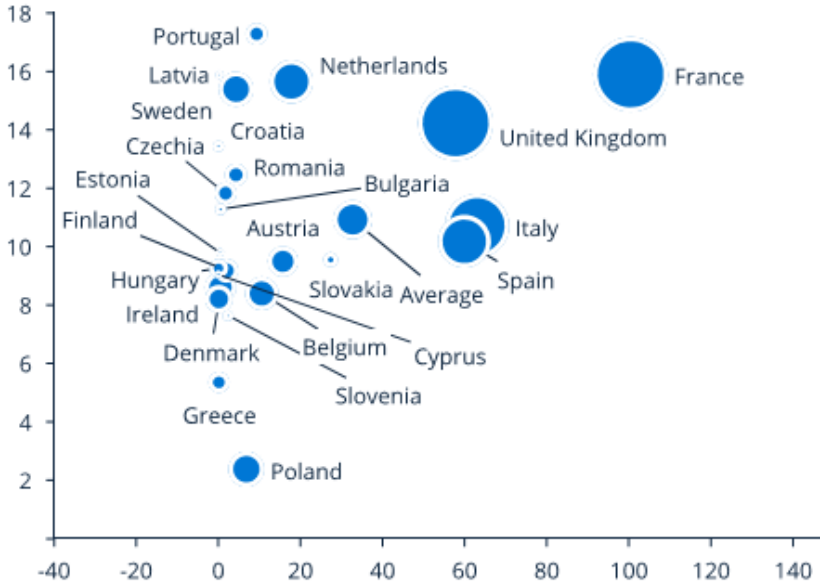


Figure 1.2 Automotive Industry Revenue to GDP in 2021

Sources: Statista 2022

Based on panel data collected from 2017-2021 from STATISTA and EMIS, data on the development of exports, imports, and GDP of Austria, Hungary, and Romania can be seen in table 1.1 below.
Tabel.1.1 Automotive Exports, imports, and GDP of Austria, Hungary, and Romania
(In Bn Euro)

Year	Country	Export	Import	GDP
2017	Austria	18.46	7.89	417.11
2017	Hungary	17.7	9.98	143.14
2017	Romania	10.16	6.91	211.70
2018	Austria	20.48	7.47	455.37
2018	Hungary	17.35	10.48	160.59
2018	Romania	11.73	8.22	241.46
2019	Austria	21.7	8.05	445.06
2019	Hungary	19.41	10.74	163.52
2019	Romania	11.68	8.59	249.88
2020	Austria	18	6.17	432.91
2020	Hungary	17.16	9.59	156.74
2020	Romania	10.67	7.27	249.51
2021	Austria	20.1	6.61	477.08
2021	Hungary	18.49	10.57	182.28
2021	Romania	11.05	7.68	284.09

Sources: Statista, EMIS2022

Table 1.1 shows a positive relationship between exports and imports from the three countries used as research objects. However, there are significant differences in GDP in 2020 due to the Covid-19 pandemic. Of course, the impact of the Ukraine and Russia wars needs to be considered for the future automotive industry's future development in Europe.

2. Literature Review

Several studies address the importance of exports and imports to a country's economic development, particularly in the automotive industry. The findings from these studies indicate a positive effect of exports and imports on GDP statistically. (Chakraborty et al., 2020) examine India's global product industry and standards; this study investigated whether domestic policy reforms regarding exports and imports in India are sufficient to conform to international GDP standards. The results of the study show that after there was an adjustment to the 1998 UNECE standard, India's relative trade with these countries has increased both in terms of automotive components and car products.2017 (Barnes et al., 2017) investigated the development of the automotive sector in South Africa and Thailand. The idea was motivated by high levels of domestic demand, government support, and rapid international integration, but the Thai industry was growing much faster. The results of this study indicate that the Thai automotive industry has cost advantages and a sizeable enterprise-level market. Another study (Abedini & Péridy, 2009) examines Iran's export potential in the automotive industry with an empirical bilateral trade model approach on new theoretical developments of the gravitational equation, sectoral variables (car production, import tariffs), and other native variables, such as expectations and hysteresis. The research findings show Iran's current car exports are around 100 times less than their exact value. This suggests a significant export potential for Iran, especially for India, China, Russia, and its smaller neighbors (Turkey, Pakistan, and Central Asian countries). The description of the research above is also supported by the research (Smith & Sarabi, 2021), which analyzes the role of the UK in the automotive sector, with a focus on UK trade relations within and between regions. The findings of the research show a high level of integration in Europe & Central Asia; while in the East Asia & Pacific region there are opportunities to acquire resources with the

Middle East & North Africa as export destinations.. Most of these studies use the VAR analysis technique to show the correlation between exports and imports and the GDP value. However, in contrast, studies conducted (Bakari & Mabrouki, 2017) using the Counteraction Test and Granger-Causality Test analysis. As a result, the VAR estimation shows that exports and imports have no effect on economic growth, and the causality test of exports and imports does not cause economic growth in Panama. Referring to (O'Rourke, 2003) as the basic concept of the H-O trade theory approach, where productivity differences occur because the production factors needed by each country in producing certain goods are not the same, so the price of the goods produced is different. Referring to some of these studies, *the hypothesis of this study is H-O: exports and imports are negatively associated with GDP in the automotive industry in Austria, Hungary, and Romania, H-1: exports and imports are positively associated with GDP in the automotive industry in Austria, Hungary, and Romania*

3. Research Methodology

This research uses data type in the form of quantitative descriptive data using several time series data in the form of figures in the form of export (X1), import (X2), and gross domestic product (Y) variables from the three countries of Austria, Hungary, and Romania. The processed data is secondary and accessed via Statista and EMIS 2022. Multiple linear regression analysis is used as a technique in data analysis to determine the effect of two or more linear variables on the independent variables. Linear regression is a method used to express the relationship pattern between the response variable and the predictor variable. Multiple linear regression analysis is used if there is more than one predictor variable (Walpole & Mayers, 2012). the multiple regression model used in this study is a modification of the neo-classical economic model adopted by (Zang & Baimbridge, 2012) with the following formula :

$Yt = f (Lt, Kt, X, A, Xt N,)$

$YGDPt = Ln\beta o + Ln\beta_1 EX_1 t + Ln\beta_2 t\ IM_2 t$

$YGDPt$ = GDP Austria, Hungary, and Romania

$Ln\beta_1 EX_1 t$ = Export Austria, Hungary, and Romania

$Ln\beta_2 t\ IM_2 t$ = Import Austria, Hungary, and Romania

t = period 2017-2021

4. Result and Discussion

Data management is carried out in several stages, such as the classical assumption test, which consists of normality, multicollinearity, heteroscedasticity, and autocorrelation tests, then continued with multiple regression tests, *t*-tests, *f*-tests, and finally, the coefficient of determination test.

4.1 Normality Test

This study uses statistical analysis in the normality test, namely the Kolgomorov-Smirnov test, as shown in Figure 4.1.

Figure 4.1. Kolgomorov-Smirnof Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		15
Normal Parameters[a,b]	Mean	0.0000000
	Std. Deviation	42.34462400
Most Extreme Differences	Absolute	0.127
	Positive	0.127
	Negative	-0.117

Test Statistic			0.127
Asymp. Sig. (2-tailed)[c]			.200[d]
Monte Carlo Sig. (2-tailed)[e]	Sig.		0.729
	99% Confidence Interval	Lower Bound	0.717
		Upper Bound	0.740
a. Test distribution is Normal.			
b. Calculated from data.			
c. Lilliefors Significance Correction.			
d. This is a lower bound of the true significance.			
e. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000.			

Source: spss 27

According to (*The Concise Encyclopedia of Statistics*, 2008) Kolmogorov–Smirnov test is a nonparametric fit test used to determine whether two distributions are different or whether the underlying probability distribution is different from the hypothesized distribution. It is used when we have two samples from two diverse populations. The results of the normality test it can be concluded that testing the comparative hypothesis of two independent samples with ordinal data forms arranged in a cumulative frequency distribution table with an interval system can be carried out in three countries, namely Austria, Hungary, and Romania because they have fulfilled the requirements where the value if p > 0, 05.

4.2 Multicollinearity Test

The next step is to perform a multicollinearity test to find out whether the regression model finds a correlation between the independent variables or the independent variables (Daoud, 2018).

Tabel.4.2 Multicolinearity Test

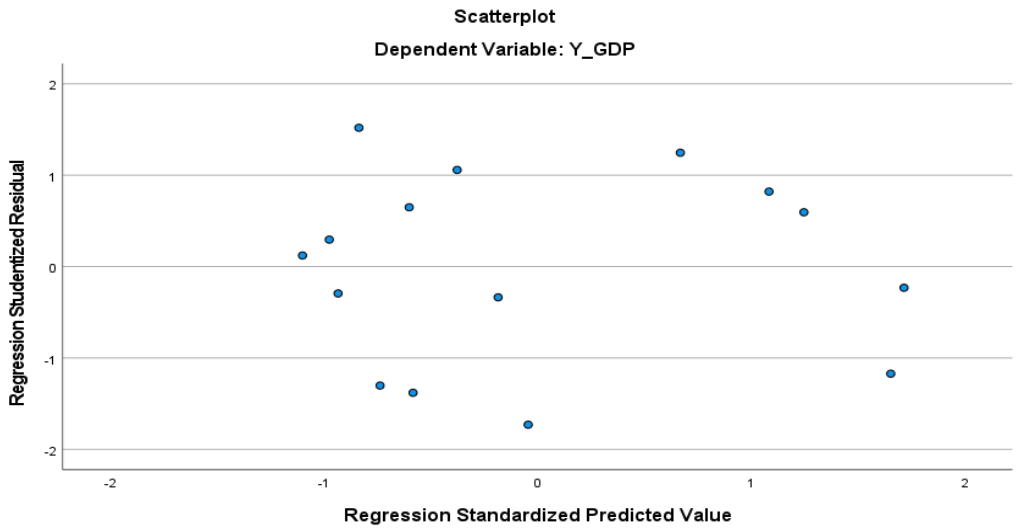
Coefficients[a]			
Model		Collinearity Statistics	
		Tolerance	VIF
1	X1_Export	0.949	1.054
	X2_Import	0.949	1.054
a. Dependent Variable: Y_GDP			

Source: spss 27

It is reflected in the tolerance value, and the variance inflation factor (VIF) value find whether or not multicollinearity exists in the regression model based on table 4.1; the cut-off tolerance value used in the correlation between export and import variables from the three countries is 0.949 > 0.10 or the VIF value above number 10 is 1,054.

4.3 Heterocedascity Test

Heteroscedasticity is defined as the variation of the phrase "variable error is not constant" after predictors are included in the regression model, where the variability changes as a function of something that is not in the model (Astivia & Zumbo, 2019). The basis for deciding that there is no heteroscedasticity in the data is by using the scatter plot shown in figure 4.3, where there is no clear pattern, and the dots are spread.



Tabel.4.3 Heterocedascity Test
Source: spss 27

4.4 Autocorrelation Test

The last stage in the classical assumption test (see figure 4.4) It is an autocorrelation test that aims to test the linear regression model; there is a correlation between confounding errors in period t and crushing mistakes in the previous t-1 period (Baltagi, 2011).

Figure 4.4 Autocorrelation Test

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.376[a]	0.141	-0.002	21.94463
a. Predictors: (Constant), X2_Import, X1_Export				
b. Dependent Variable: ABRESID				

Source: spss 27

One of the most popular formal tests to detect autocorrelation is the Durbin-Watson Test. From the results of the SPSS test in figure 4.4, the DW value is 1,782 then compared to the Durbin Watson (DW) table where in this study, the number of independent variables is two (k = 2) and the sample (n = 15) then the value du = 1,543 is obtained. From the above results, it can be concluded that there is no autocorrelation because of the importance of DW > DU (1.782 > 1.543).

4.5 Multiple-Regression Model Estimation

To analyze the multiple regression model in this study, researchers used panel data for the 2017-2021 period. Panel data is combined between time series data and cross-sectional data and can also be interpreted as integrated data where the behavior of cross-sectional units (e.g., companies, countries, and individuals) can be observed over time (Ghozali,2017). The results of multiple regression data processing using SPSS 27 can be seen in Figure 4.5.

Figure 4.5. Multiple-Regression Result

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	589.364	77.488		7.606	0.000
	X1_Export	18.594	3.123	0.599	5.954	0.000
	X2_Import	-72.171	8.310	-0.873	-8.685	0.000
a. Dependent Variable: Y_GDP						

Source: spss 27

Multiple Linear Regression is a statistical method widely used to model the relationship between Dependent and Independent variables to create a model to predict the value of a variable. This research can be continued in modeling a multiple linear regression model (with the OLS approach) because it meets the classical assumption test requirements. Based on Figure 4.5, the estimated model obtained is :

$YGDPt = Ln\beta o + Ln\beta_1 EX_1 t + Ln\beta_2 t\ IM_2 t$

Or

$$YGDPt = 589.364 + 18.594\ EX_1 t + -72.171\ IM_2 t + e$$

the regression coefficient for exports is 18,594 and for imports is -72,171 for the three countries in the time period (t) 2017-2021. The export regression coefficient is positive, meaning that the total automotive industry exports in Austria, Hungary, and Romania will also increase when GDP increases. Likewise, when GDP falls, exports also fall. An increase in GDP by 1 billion(euro) will increase the number of automotive exports in the three countries by 18,594 billion(euro) and vice versa. The positive Import regression coefficient has the same meaning as the Export regression coefficient. When the Automotive Import Value in Austria, Hungary, and Romania decreases, the GDP will increase. An increase in the GDP value of 1 billion (euro) impacts a decrease in the import value of -72 billion (euro) in the three countries.

4.6 t-test

To test whether the parameters of both the regression coefficients and constants have estimated the equation or multiple linear regression models, the t-test is used. The point is that these parameters can explain the behavior of the independent variables in influencing the dependent variable. Based on figure 4.5, the calculated t value (SPSS output is shown in column sig.) is smaller than the error rate (alpha) of 0.05, so it can be it is said that the independent variable (from the t count) has a positive associated with the dependent variable, whereas if the prob value, in other words, the hypothesis (H1) of this study, can be accepted that the Export and Import of the Automotive industry in Austria, Hungary, and Romania have a positive effect on GDP.

4.7 f-test

The initial stage is to identify whether the regression model's estimation is feasible. A model reliability or feasibility test, more popularly known as the f- test, is carried out (Sureiman & Mangera, 2020). the results of the f-test can be seen in the ANOVA table (see figure 4.6), showing a significant value smaller than the level error (alpha) of 0.05; it can be said that the estimated regression model is feasible.

Figure 4.6 ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	192889.889	2	96444.944	46.104	.000[b]
	Residual	25102.941	12	2091.912		
	Total	217992.829	14			
a. Dependent Variable: Y_GDP						
b. Predictors: (Constant), X2_Import, X1_Export						

Source: spss 27

4.8 Coefficient of determination

The coefficient of determination explaining the variation in the effect of the independent variables on the dependent variable can be measured by the R-Square or Adjusted R-Square value. The R-Square value (see figure 4.4), which is 0.885, shows that the proportion of the influence of the Export and Import variables of the automotive industry in Austria, Hungary, and Romania on the GDP variable is 88.5%. In comparison, the remaining 11.5% is influenced by other variables, not in linear regression models.

5. Conclusion and Recommendation

The classic assumption test, namely the normality test, heteroscedasticity test, multicollinearity, and autocollinearity test, there are no symptoms at the classical assumption stage, so the research model is considered eligible. Based on the research results show the results of statistical tests Austrian, Hungarian and Romanian export and import variables shows a significant effect on each country's gross domestic product (GDP).The industry has recently had to shift its current production to zero-emission drives. This poses a significant challenge for the Emerging European automotive sector as this transition period is so short that it will require massive investment in employee reskilling and upskilling, development of new technologies, robotics, and automation. This is in line with the sustainability program in the automotive sector, which will be directed towards developing electric cars to save energy resources that are increasingly limited and prices are soaring. Researchers provide recommendations to continue to support growth in the automotive sector not only in Austria, Hungary, and Romania but also in the EU as a whole by maximizing existing technological resources and reducing the volume of imports so that GDP can increase.

References

Abedini, Javad Péridy, Nicolas.(2009). The emergence of Iran in the world car industry: An estimation of its export potential, World Economy, v.32,p. 790-818,doi 10.1111/j.1467-9701.2008.01153.x

Astivia, Oscar L.Olvera Zumbo, Bruno D.(2019). Heteroskedasticity in multiple regression analysis: What it is, how to detect it and how to solve it with applications in R and SPSS, Practical Assessment, Research and Evaluation, v.24,p. 1-16, ISSN 15317714

Bakari, S., & Mabrouki, M. (2017). Impact of exports and imports on economic growth: new evidence from Panama. Journal of Smart Economic Growth, 2(1), 67-79.

Baltagi, Badi H.(2011). Autocorrelation in Regression BT - International Encyclopedia of Statistical Science,p.76–77, doi 10.1007/978-3-642-04898-2_128

Barnes, Justin,Black, Anthony, Techakanont, Kriengkrai.(2017). Industrial Policy, Multinational Strategy and Domestic Capability: A Comparative Analysis of the Development of South Africa's and Thailand's Automotive Industries, The European Journal of Development Research, v.29,p. 37-53, doi 10.1057/ejdr.2015.63

Chakraborty, D.Chaisse, J.Pahari, S,.(2019) Global auto industry and product standards: A

critical review of India's economic and regulatory experience, Journal of International Trade Law and Policy,v.19,p.8-35,doi 10.1108/JITLP-10-2019-0063
Daoud, Jamal I.(2018). Multicollinearity and Regression Analysis, Journal of Physics: Conference Series,v.949, doi 10.1088/1742-6596/949/1/012009
Dison, Batubara.(2013). Analysis of Export Relations, Imports, PDB, Causality and Co-Integration Analysis Between Exports, Imports. jurnal Ekonomi Kuantitatif Terapan,v.8,p. 46-55.
Ghozali, I. (2017). Structural Equation Model of the Concept and Application of the AMOS 24 Program. Semarang: Diponegoro University Publishing Agency.
Kolmogorov–Smirnov Test,(2008).The Concise Encyclopedia of Statistics. Springer, New York, NY. https://doi.org/10.1007/978-0-387-32833-1_214
O'Rourke, Anastasia (2003), A new politics of engagement: Shareholder activism for corporate social responsibility, Business Strategy and the Environment, v12,p. 227-239, doi 10.1002/bse.364
Pathikonda, V. and and Farole, T. (2016), "The capabilities driving participation in global value chains", Policy Research Working Paper 7804, World Bank, Washington, DC.
Smith, Matthew Sarabi, Yasaman.(2021). UK trading patterns within and between regions in the automotive sector—A network analysis, World Economy,v.44,p. 510-529,doi 10.1111/twec.13006
Sureiman, Onchiri Mangera, CallenMoraa.(2020). F-test of overall significance in regression analysis simplified, Journal of the Practice of Sciences,v.6,p. 116,doi 10.4103/jpcs.jpcs_18_20
Walpole and Mayers,(2012). Probability and Statistics for Engineers and Scientist - 9th Edition,Prentice Hall ISBN 10: 0-321-62911-6ISBN 13: 978-0-321-62911-1
Zang, Wenyu,Baimbridge, Mark (2014). Exports, imports and economic growth in South Korea and Japan: a tale of two economies, Applied Economics, v.44,p. 361-372,doi 10.1080/00036846.2010.508722
Website
https://www.emis.com/php/home/
https://www.statista.com/

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VIRÁGH ATTILA, KASSAY JÁNOS:
TODAY'S GLOBALISATION CHALLENGES IN THE LIGHT OF THE EROI INDICATOR

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"...there will be no survival where the environment creates more complex problems than the organisational problem-solving capacity can respond to." (Malik, 1984: 192)

Abstract
"Deglobalisation", "blocking", a crisis of livelihood that refers to the "catabolism of capitalism"... Terms that are increasingly common not only in sensationalist media headlines, but are also becoming increasingly fashionable in professional circles. In our study, we want to highlight the fact that today's crisis symptoms are not independent indicators, but may well be the consequences of a deeper energetic context. We believe that the so-called "Energy return on energy invested" (EROI or EROEI) indicator, at a level of abstraction more complex than the empirical level, can shed light on the deeper energetic context of the increasingly severe and diverse symptoms of the crises we have experienced in recent years. A theoretical explanatory framework is therefore proposed to make this new reality more narrative.

Keywords: Energy return on energy invested, EROI, interpretative theories, complex systems, deglobalisation

Introduction, or raising the problem

Humans are creative, storytelling, social creatures with a unique capacity for story-telling. The world of energy, which is the basis of our existence, is also conceptualised in terms of security, competitiveness and sustainability. The last few years have been special, not least because each of these three values is facing challenges, particularly in Europe.

The pandemics and the war in Ukraine have also highlighted that the world at its current level of complexity is highly unstable and vulnerable, which in the energy sector brings with it risks to security of supply, competitiveness and sustainability. Not only is it questionable whether the energy needed to run our social, economic and political systems will be available at competitive prices in the future, but it is also uncertain whether these resources, which are essential for our existence, will be available in sufficient quantity and quality. The problem also carries significant sustainability risks, of course, since the polycrisis described above will and may require the initiation of transformations that can be justified from the point of view of security of supply and that could divert resources away from cleaner energies. According to Count Metternich, everything has to change in order for everything to stay the same. At worst, the energy situation in Europe could be preserved, at great cost and expense, without the essential transformations that would lead the old continent and our region towards a greener and more competitive future.
Our study aims to draw attention to the fact that, although the crises of our times can be explained by many things, the challenges we face are not only the causes of these phenomena, but also the symptoms of a crisis of an energetic nature that goes beyond themselves. We believe that, given the specificities of human nature and the scarcity of global resources, our current organisation of existence is not sustainable at the current level of complexity of globalisation.

Theoretical framing or the disciplinary foundations of the approach

"The great evolution of the human species is not possible until there is a great change in the foundations of its way of thinking." John Stuart Mill, 1873 [2009], 93.

You always want to be "in the picture". To do this, he must be able to answer 1) what happened? 2) what is happening? 3.) what should be happening? And in the case of the latter question, to clarify 4) what should be done?

"Man uses language to communicate thoughts and beliefs, and these are a source of knowledge about the world that is orders of magnitude greater than his own experience, since they include the experiences of the community and even of the ancestors expressed in beliefs. It is with this ability that we have conquered the planet, and it may be because of the negative effects of this ability that we will destroy it." (Csányi, 2022, p. 39) Words weave the narrative, the story, or narrative, of our common things, and also the large frame stories, metanarratives, behind them.

In science, the so-called "linguistic turn" represented a paradigm shift, since language was no longer considered a neutral medium, especially by discourse theorists. According to this post-modern approach, language, coming from the philosophical direction, no longer simply describes and reflects reality, but also shapes and forms it. Since we can only narrate what can be expressed linguistically, language seems to overtake all other cognitive functions in terms of relevance. This is the interpretive theoretical premise on which we base our study.

The social, economic and political experiences of recent years have left individuals and communities in a state of shock, as too much change happens in too short a time and information overload leads to unprecedented exposure of the human psyche. In order to continue to provide a framework of understanding of what is happening in the world, the turbulence and sweeping nature of change makes it difficult to see clearly, but it is perhaps more important than ever to strive to do so. Indeed, a comfortable and qualitative existence is not possible without a narrative clarification of reality.

According to John Casti (2012), mathematician and chaos theorist, the first step towards realism is to throw utopias in the bin! To do this, however, we need a narrative that is aligned with reality, given our starting point about human nature. It is through the images that the human imagination conjures up that we are somehow able to see the future. But this is not an easy task in itself, and it can lead to anomalies of its own.

A narrative is semi-political, since it evokes our collective imagination, provides us with social lessons, is situated in a moral dimension and makes us judge it (Békés, 2020, 298.) According to this, one does not use a language in a completely innocent way. Every language carries a set of values, interpretations and images of reality, which influence the consciousness of the person who uses it (Berger, 1998, 20). As our world moves towards complexity, we become more and more vulnerable in our interpretation of reality. This also applies to the experts who know and describe the various sub-disciplines!

Language can also be seen as a factor of power. The arsenal of language politics is very broad, including the marshaling of words, the selection of concepts, the acquisition of the power of interpretation, the framing of events, the assignment of meaning to certain expressions and the creation of their emotional overtones (Békés, 2020).It follows that the political relations can be changed by rearranging the relations of discourse, but not necessarily by a deeper understanding or comprehension of the context of wider reality. The hegemony of social actions controlled by professional discourses of power may be sufficient to dominate the moment (van Dijk, 2000, 450), but it is not necessarily capable of changing the foundations of reality.

In addition, in increasingly large and complex social systems, knowledge and information, whether perceived or real, based on narratives, usually comes through some kind of intermediary, which is not ideal in terms of the trust placed in it, since it does not directly confront us with reality, but mostly with a medium that often distorts the story.

The widespread and traditionally simplistic storytelling and categorisation, both in favour of and against the scientific and power elites of the day, often leads us to believe that we know more than

we really do. For example, we expect all swans to be white and are shocked when a black one swims by (Taleb, 2007).
In accordance with the Polish-born futurologist Alvin Toffler, we believe that instead of specialists, we need revisionists who can live with the new and can at least partially restore their security (Toffler, 1970).Since we are condemned to cooperation, our common history must be based on common assumptions, and this requires a common interpretative framework, a common narrative.
The German political scientist Tilo Schabert highlights the essence of the dilemma in his classic work "Boston Politics":
"Indeed, if we look at the future as it has been imagined in the past, we will not find any of the visions we seek in its entirety. Instead, we will find a plurality of images. The future was imagined very differently at different times. Seen from the past, the future is nothing but a series of images. Not, as we might superficially suppose, the time that follows. Rather, it is movement beyond time: the movement of the human imagination, drawing from the present to create images of the future. But the present changes at every moment, so our images of the future change: we are constantly moving 'from the future' into 'the future'" (Schabert, 2022, p. 364).
Because of the plurality of images, it is not easy to find answers to the following questions about our culture when trying to capture the story of the future: 1.) What should we preserve/what should be preserved? 2) What should we change/what should change? And the main dilemma: 3.) How?
Niels Bohr is right: "It is difficult to predict, especially about the future." So we won't go there. But we agree with Tilo Schabert that the future is creativity. "We don't know the future. But we know the images of the future that the past has created. And they show us the way to the future: our creativity." (Schabert, 2022, p. 379). While animals live in the eternal present, and thus are not able to recall the past or imagine the future at will, and to shape their behaviour accordingly, humans are not only able to remember, but also to form alternative visions of the future (Csányi, 2022, 261).We are therefore able to form images of the past and the future, and thus we can be somewhat future-oriented. Futurology is similar to a long jump, where the distance and direction of the jump (past and stories about the past) and the way of the jump (linking narratives of the present and the past with an image of the imaginable future) have a significant impact on the qualitative characteristics of futurology.
Of course, human creative imagery has its own limitations, one could say that causal interpretations are often illusory and, if for no other reason, can lead in unexpected directions. If we run the distance we want to jump from the wrong direction and distance, we may not land in the way and with the result we expect. Although narratives help us to make sense of reality, we often become prisoners of our own alternative stories of reality interpretation and creation. In our complex systems, not only is the amount of information growing, but also the gap between what we really know and what we think we know (Silver, 2012).
Even if the construction of discourses can keep us alert, the paradigmatic power of the ideas that are formed can hinder the efforts needed to make real sense of them. Our brain prefers data that confirms and validates our pre-existing ideas, so poorly managed information narrows our horizons rather than expands them (Johnson, 2012).
A further difficulty is the dynamics of change. Unfortunately, we are not able to detect changes of an exponential nature, and in particular their consequences, in time with our ordinary, i.e. linear, way of thinking, i.e. we do not notice when the pace of change itself is accelerating. Since the images in our minds, the ideas we have about things, do not fully correspond to the real nature of things, we need, in addition to empirical knowledge, a rational system to bridge the gap between image and reality. We therefore need to take steps towards some kind of abstract understanding of how the world works to complement the empirical approach.
We see the foundation of understanding reality in an energetic approach. We believe that the looming threats (be it the pandemic, the war in Ukraine and the energy, economic and financial crisis that can be linked to them) are not primarily independent causes of the crisis, but symptoms of an underlying problem, i.e. an energy efficiency challenge!

Methodological foundations of the approach, or causality as an indicator of abstraction

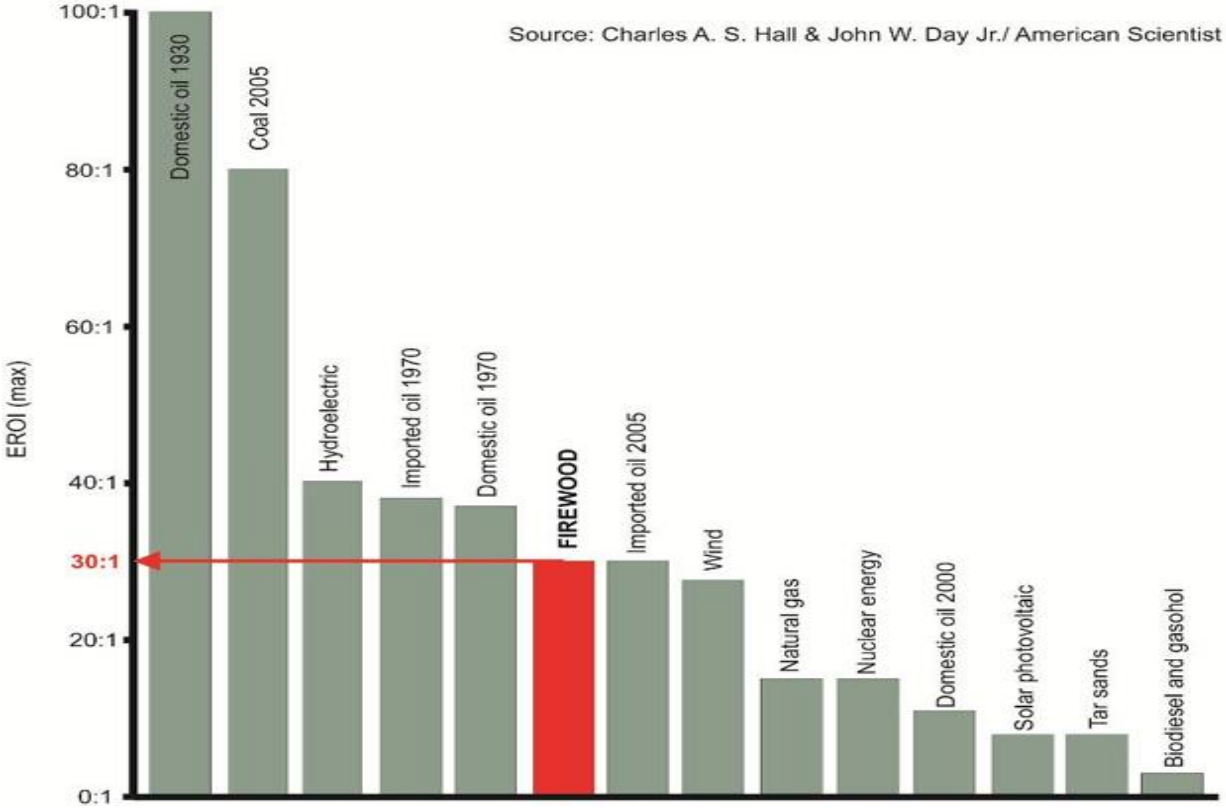
A homeostatic relationship between resources and needs would be necessary (Mumford, 1934)

For an alternative approach to reality, we use the Energy return on energy invested (EROI or EROEI) indicator, which shows how much energy is available for a given energy source, taking into account the energy use that was needed to produce that energy source. In short, it means how many units of energy can be produced per unit of energy input. More simply, how much energy we need to get energy. The way to calculate EROI is as follows:

EROI= Energy Returned / Energy Invested.

While a high EROI generally indicates that the energy carrier is more efficient and less damaging to the environment, a lower EROI indicates the opposite, higher costs and environmental impacts.

Graphic no1.: The dynamics of the EROI value by resources



Sources: C.S. Hall & J.W, Day, 2006

Energy has always been the basis of almost all elements of social functioning, be it individual subsistence, economic performance, military capabilities, communication, etc., so its quantity, price, and the conditions of production, transport, storage and consumption are reflected in most socio-economic processes. In this sense, energy is a "total" product." (Ciuta, 2010) The eras of homo sapiens have been markedly determined by the energy sources they have used. According to Geoffrey West, British particle physicist (2017), all organisms in the world are based on networks with very similar logics that ensure access to the resources needed to function in the most efficient way possible, without waste. This is no different for homo sapiens, who for the vast majority of their roughly 300,000 years of existence were no different from any other species on Earth. For thousands of years, human life remained unchanged and limited to subsistence, using energy from food for most of our existence, which was converted into muscle power and heat (Gelencsér, 2022).

During this long period, essentially all our efforts have been devoted to getting the energy we need. This has allowed the emergence of stable but low-complexity systems in the form of small tribal societies based on kinship relations. Where a minimum of surplus energy was available, it allowed man not only to use the ready-made objects found in nature as tools, but also to consciously assemble or transform them into increasingly complex systems, to his own advantage. In other words, the capacity for human invention was already present in this prehistoric period.

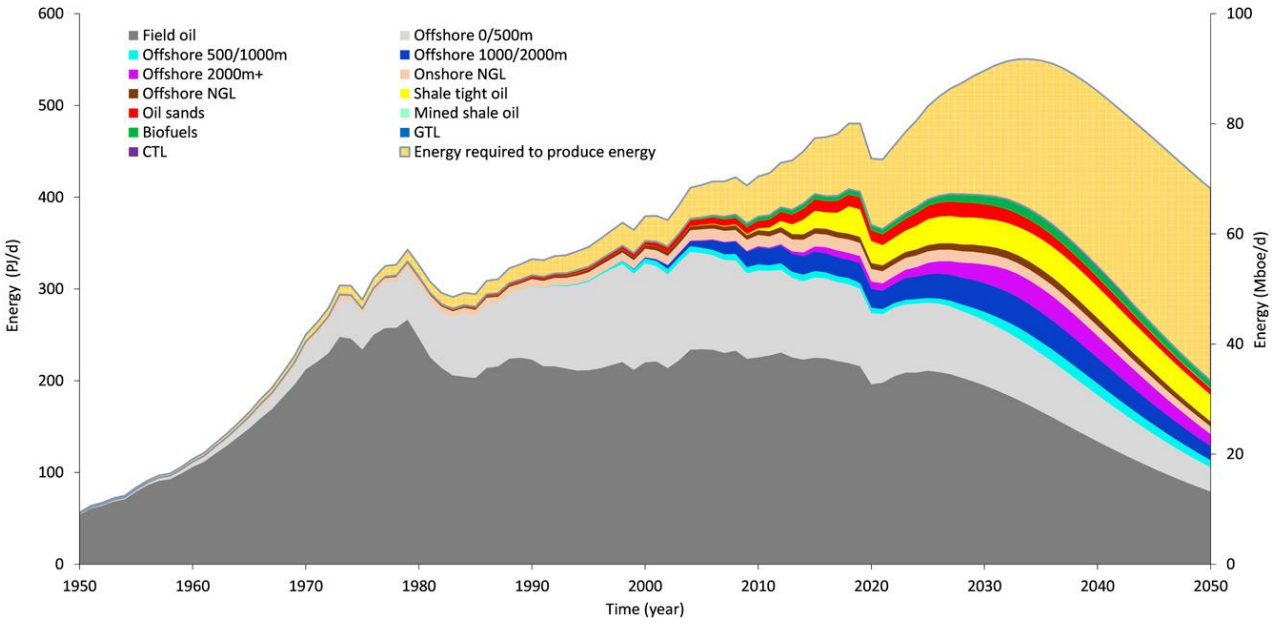
However, the low value of EROI meant that the potential for what we now call 'technological progress' was limited. One of these early inventions was fire, which proved to be a very potent source of energy, facilitating the possibility of complexity in human communities. Around 12,000 years ago, after the last ice age, a major turning point began when the so-called agricultural, or Neolithic, revolution took place almost everywhere on Earth in just a few thousand years. As a result, societies began to grow significantly in number. This meant that individuals and communities specialising in the production of different products required a wider range of interactions between populations, which the previous way of life, based mainly on family ties, could no longer satisfy. The energy basis for this turnaround is as follows: the energy costs of organising the first advanced grain-based civilisations were reduced by the fact that, unlike other crops, it was easier to measure, transport and store grain, and thus easier for the nascent first empires to tax it, which helped the complexity of power and economic structures to unfold. (Scott, 2017) This raised the EROI from a stable value of 1 to 2 to as high as 5. In other words, one unit of energy can now generate not one but up to four times as much energy. Our systems of organisation have thus opened the way to a significant increase in the previous level of complexity. The complex political, religious and economic systems, the ancient and then medieval empires appeared, and with them the built environment, in many cases still visible today, with its huge temples, fortresses and irrigation systems. The pace of innovation, especially in the fields of agriculture, animal husbandry and the trade that went hand in hand with it, may have accelerated compared with earlier dynamics. However, this did not lead to any significant turnaround in living standards and social complexity for a long time after the EROI leap after the prehistoric era. Although the population has increased in quantity, there has been no qualitative change in terms of long-term trends. In parallel, there has been no significant change in EROI. According to Oded Galor, professor of economics at Brown University in the US, the knowledge available in ancient Jerusalem would have been largely up to date even at the turn of the 19th century. The income per capita remained below the minimum subsistence level, the population was decimated by frequent epidemics and famine, one in four newborns did not reach their first birthday, and average life expectancy rarely exceeded forty years (Galor, 2022, 12, 59).

The first energy transition began in 13th century Britain with the gradual shift from wood to coal. Initially, coal had the advantage of cheap price and availability, rather than higher calorific value, and it was only when the technological conditions for pumping water from mines became available that it could be extracted in any meaningful way. The advent of the steam locomotive and the steam ship made it possible to cover distances more efficiently than ever before, and also marked the beginning of an intensive process of market integration. The automation of the textile industry and new, cheaper ways of smelting iron ore, which can also be traced back to the increasing use of coal, which has a high EROI potential, also fall within this period. Following the coal era of the developed world, oil and gas emerged and soon gained ground, increasing the energy surplus available to us in just decades. In the middle of the 19th century, during the second industrial revolution, steam engines were gradually replaced by electricity in factories and the first automobiles appeared at the end of the century. By this time, the EROI had risen to an extreme of 100! The high EROI hydrocarbons discovered and brought into production have thus increased the complexity of our political, economic and social systems exponentially in the space of a few decades. The surplus of fossil energy has made global civilisation possible. The time available and the rapidly changing technological environment have further catalysed creativity and, through it, innovation, which, alongside education - especially the mass diffusion of literacy - has had a multiplier effect on the development of human capital. This could also provide a further positive feedback loop in the improvement of public health (medicines, vaccines, etc.) through modern scientific achievements.

Invention has accompanied human history from the beginning, but on a different scale than has been the case since the age of hydrocarbons, thanks to the surplus energy available. While the achievements of the dawn of human civilisation may have seemed a matter of chance, they also required the surplus energy necessary to generate inspiration. Later, in our increasingly complex social, economic and political systems, they became more conscious and thus more targeted.

In the first year of the last millennium, 2001, the amount of new information generated in a single year was roughly the same as the total amount of new information generated in the history of civilisation. This number doubled again in 2002 and has since increased several times a year (Gurri, 2018). This is also based on energy-related innovations, with the emergence of new technologies to facilitate the flow of information (from the first industrial electromagnetic telegraph (Morse, 1844), the phonograph (Edison, 1877), the radio (Marconi, 1895) to today's telecommunications devices. Innovation, already systematically sought through research and development, is increasingly reducing the time between the formulation of novel ideas and the exploitation of the resulting products and services.
The rise of the EROI indicator since the Industrial Revolution has led to a world average increase in per capita income of fourteen times since the beginning of the 19th century, while life expectancy at birth has more than doubled (Galor, 2022, 60). Excess energy has increased innovation, and innovation has increased the efficiency and diversity of uses of excess energy in all fields (science, art, sport, etc.).

Outcome, or what does the EROI indicator-based narrative show?
"Ancient rat spreads disease through our minds,/ the unthought thought." (Attila József, 1937)
Life, and human existence within it, can be described as a timeless struggle between the forces of complexity and disorder, where complexity is the ordering force in chaos, which is annihilated by entropy (Christian, 2018).Eredmény, avagy mit mutat az EROI mutató alapú narratíva?
Life, and human existence within it, can be described as a timeless struggle between the forces of complexity and disorder, where complexity is the ordering force in chaos, and entropy is the force that destroys it (Christian, 2018.)
Hydrocarbons have made possible seemingly limitless economic development. The surplus energy available to us has created societies of ever greater numbers, in which specialisation, expertise, the amount of information and the speed at which it flows have been more important than ever before. The resulting system, in the form of a self-exciting feedback system, further increased the potential for the emergence and accelerating diffusion of new technologies. However, the extreme complexity of current constructs, thought or said to be equilibrium, makes them rather complex, fragile and unstable. Today, there are many research workshops around the world that take an interdisciplinary approach to the challenges associated with our complex systems, including the mathematical regularities that pervade nature and the human world to understand them. Examples include the Santa Fe Institute and the X-Center in Vienna, where the prediction of extreme events caused by humans is studied in the light of complex systems. It is not a new idea in our cultural history that, since modernity, the changes that have been posited as progress, whereby our world has become increasingly complex, are not necessarily a success story in terms of good, bad and true. According to Gilbert K. Chesterton, "Mankind is not enjoying his own inventions, and by producing more and more inventions he is leaving farther and farther behind him the power of his own happiness and pleasure." (Chesterton, 2021, 114) Nobel Prize-winning economist Daniel Kahneman and his colleagues (2021) see one of the downsides of the increasing complexity of our lives as the fact that modern society is becoming noisier and less coherent.
Moreover, more and more people believe that we have reached the limits of growth. The efficiency of the means (power stations, engines, production lines, etc.) needed to keep the world economy growing is already slowing down year by year, so the economic policy mission for the 21st century may be to manage the stagnation that is gradually but surely coming.
Underlying this is a simple but under-emphasised fact: in a closed system, fossil stocks with high EROI potential are declining and there are no substitutes with the current mainstream technological knowledge to produce EROI values comparable to those of the past.
Figure 2: Evolution of energy production and EROI to 2040

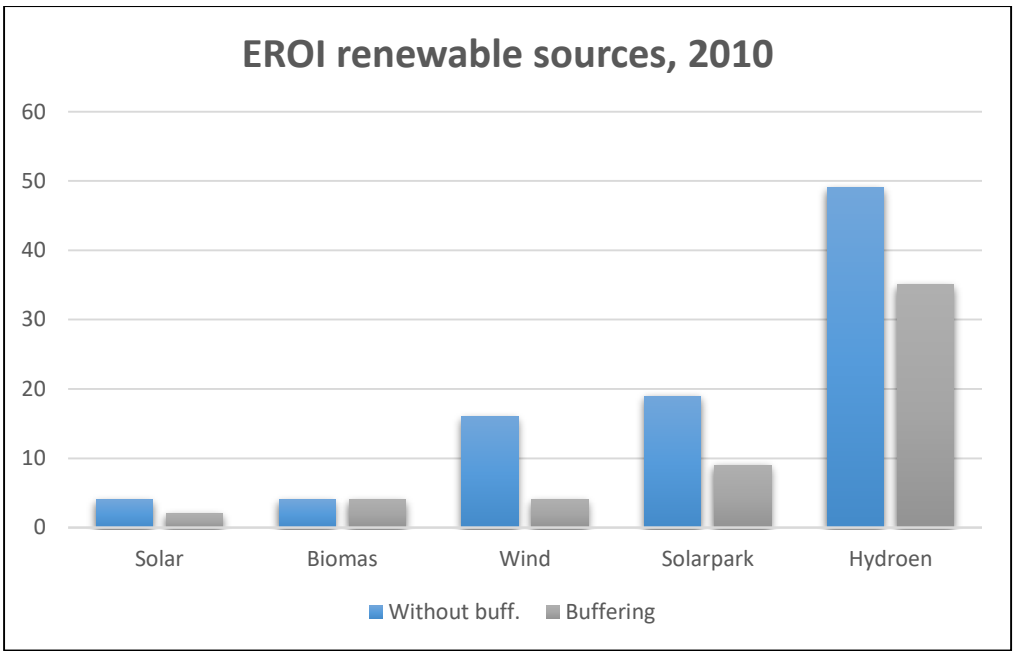


Forrás: Louis Delannoy, Pierre-Yves Longaretti, David J. Murphy, Emmanuel Prados, 2010

The hydrocarbons with the highest EROI, i.e. low-hanging fruit for energy, were already consumed during the 20th century. The challenge is compounded by the fact that our digital lifestyle is based entirely on mineral resources. There are finite amounts of raw materials available for the production of batteries, screens and essential components, and a significant proportion of these are concentrated in problematic parts of the planet (Parikka, 2015). Since the second half of the 20th century, the EROI of conventional fossil fuels has been declining at an accelerating rate from around 100 in the past to around 20-30 today, and has fallen to around 100 for oil. The exploration, access and extraction of newer fields is a more difficult and technologically complex task, and their EROI is therefore lower. The EROI of unconventional fossil deposits, shale oil and shale gas, is now only between 5 and 10. Of the renewable energies, solar, wind and biomass can be considered competitive. However, the EROI for the industrial and residential use of these so-called green energies, including the costs of materials and storage, is just over 1. The inherently low power density of renewable energy flows and the relatively high power density of modern final energy uses are therefore difficult to reconcile (V. Smil, 2009). The modern world economy is energy intensive, as is complex society with its subsystems, which implies high and constant power systems.

This also means that reorganising the world economy on a renewable energy basis is not realistic and will not be realistic in the foreseeable future. Energy transmission can only be replaced by energy addition. So, in itself, the rise of renewables is not a solution to the scale of the challenge. A national economy based on 100 % renewable energy would use 100 times as much land for energy production as our current economies. This land would have to be taken away from food production (Yergin, 2023). In addition, the scale of the problem is compounded by the fact that it is not only costly to develop to maintain our current culture, but also to merely maintain our existing systems, not counting the need to grow. The biggest question is how, given all this, we can achieve carbon neutrality in a global economic environment where 80 per cent of the energy produced comes from fossil fuels such as coal, oil and natural gas. Although wind and solar power are also increasing, they are a complement to the increasing use of conventional energy sources.

Figure 3.: EROI for renewable resources



Forrás: Hall, Lamber, Balogh adatai alapján (2010)

Just to offset existing oil fields, the oil industry needs to explore for and produce another 3-5 billion barrels of oil a year. The International Energy Agency calculates that some $20,000 billion would need to be invested in natural gas and oil development over the next two decades, not counting the transformation costs of the war in Ukraine (Yergin, 2023, 405). In terms of the raw material demand for the energy transition, the International Energy Agency sees the net zero emissions target date of 2050 as leading to a surge in demand for key minerals as the world moves from a fuel-intensive to a mineral-intensive system. This could lead to numerous bottlenecks, shortages and price spikes (IEA, 2021). When an organisation reaches the limits of this capability, repair and maintenance take over and then collapse can occur (West, 2017).Collapse is the relatively rapid and spectacular loss of the existing level of complexity.

This is not a new idea. Polymius, predicting the fall of Rome as early as the 2nd century BC, believed that human communities age and decline in a similar way to living organisms. What makes the situation dramatic is the risk around the sustainability of the almost globe-spanning, growth-oriented complexity of our way of being. If we look for an analogy among organisms for the sole purpose of growth at any cost, we soon come to cancer cells, which expand at the cost of their own lives. At present, the only microcosm we know where the finite nature of expansion is not treated as a fact is mainstream economics. Overall, we are now using more energy per unit of new energy than ever before. According to Václav Smil (2019), we are able to produce ten times more food and thus energy per hectare of land today than we did a hundred years ago, but this tenfold efficiency requires a ninetyfold increase in energy use when taking into account the resources needed throughout the production process, from the manufacture of agricultural machinery to the electricity supply and fertilizer application. Modern agriculture has therefore become a net energy consumer, i.e. the energy content of the food produced is less than the total energy required (Gelencsér, 2022). Of course, energy carriers are constantly being formed, and fossilisation is still going on in the earth's crust and in the depths of the ocean, but they are not yet ready for use, and their extraction is neither energetically nor economically profitable; it is the use of energy accumulated in geological times that has made this huge leap forward in civilisation possible. More and more people see the growing complexity of human civilisation as a threat rather than a virtue. Evolution rarely favours the complex over the simple. (Coker, 2015) The system of globalisation is unsustainable without adequate supplies of resources and energy, as its apparent stability is precisely the need to increase the complexity generated by economic growth. The solution currently lies beyond the human knowledge horizon that can be assumed today. The solution is not to increase the complexity of less complex systems, but to simplify complex systems (Casti, 2012).

Conclusion, or the geopolitics of the unsustainability of complexity

"To a large extent, we are all the end products of, or have to deal with the consequences of, patterns of behaviour and events that came into being or happened decades, centuries, even millennia before we were born." (Galor, 2022, 150)

Prior to the use of hydrocarbons, the energy needs of human existence were met locally by human or animal muscle power, burning biomass (wood, dung, etc.) had an EROI of 1 to 2 or slightly above, i.e. in real time the labour and/or energy invested yielded a return that was, in general, sufficient to make a living and maintain this production system. At that time, neither the scale of energy consumption nor the trade in energy commodities was significant, so energy dilemmas were not relevant. This situation began to change significantly in the 18th and 19th centuries during the Industrial Revolution. The global expansion of energy, including the use of hydrocarbons - initially coal and later oil and natural gas - was accompanied by an unprecedented increase in energy use, creating complex political, social, economic and cultural interconnections and organisations on a global scale, bringing the different regions of the globe to the level of living they enjoy today. Globalisation would have been unthinkable without meeting the growing demand for energy. In the light of current global demographic trends, exponentially rising energy consumption, also due to the multiplying demands in developing countries, and the problem of the ever-scarcer and more costly resources to provide it, the struggle for energy sources and carriers, and the raw materials to produce and store them, may intensify, and the issues of energy security and geopolitics will be heightened. In agreement with András Gelencsér (2022), we believe that the world today has entered an era of scarce energy and mineral resources. The energy challenge outlined in our paper may, in the future, further increase the prevalence of geopolitical considerations. Given our current level of technological knowledge, the needs of our modern societies and the trends highlighted by the EROI indicator, the survival of the complex systems we have built for the 21st century is more than uncertain.

The transformations taking place in the world, which can be identified mainly through the EROI indicator in global terms, are due to energy trends that appear to be narrowing, and could entail a transformation, a halt or even a reversal of the globalisation processes that have been underway. It may well be that the war in Ukraine, if not necessarily the cause, then its prolongation, may become a particular way of reducing the complexity of the sustainability of our complex systems, which may be evident to the wider public in the form of economic and political blockages. The war in Ukraine can therefore be interpreted as one of the symptoms of the crisis outlined in our study. In other words, Russian aggression is not primarily the cause of possible deglobalisation processes, but a striking manifestation of them. The war may catalyse a specific transformation in which the focus may be on energy security in the wake of Russian aggression and where the transformation may even lead to a new economic and military bloc.

The protracted war may also contribute to the legitimacy of narratives of bloc-building in global discourses, which, by demonstrating the creative power of language, may also change the existing market and international framework conditions, as a kind of self-fulfilling prophecy. All these changes confirm the importance of a professional study of geopolitical processes and the conceptualisation processes surrounding them in the 21st century, the fundamentals of which include the application of the EROI-based approach to the interpretation of the unfolding situation, as presented in our study.

In conclusion, it is important to note that the primary purpose of our study is not to seek solutions to the challenges outlined above, as this would require concerted action beyond ourselves, while reconciling a range of social, economic, political and scientific considerations. We see the need to provide a realistic picture of the emerging energy situation. We believe that an abstract approach based on the so-called EROI indicator would be useful in this respect, providing a more stable framework for the narratives that can be developed through everyday experience around us, and which would allow us to tell a more comprehensive story. In this way, we can become more visionary, by finding not only imaginable but also feasible solutions to the situation we want to exist in. Our aim was therefore to bring imagination and reality closer together, so that the distinction between life

according to needs and life according to wants, and the reasons behind the choice between them, can be distinguished and explained at the level of everyday life.
We do not feel entitled to draw hasty or even deterministic conclusions about future processes. It is not our intention, therefore, to plunge the reader into a kind of collective melancholy by reviewing the processes outlined, but merely to dispel some possible illusions in our analysis. Our motto, then, is the classic saying: "Hope for the best, but prepare for the worst." To quote Dan Breznitz (2021), innovation is nothing more than the hope of charting one's own course of development. So we need hope, but it must be based on a foundation free of illusions. Without it, there can be no ideas that are solid, feasible and achievable. Although scientific realism, i.e. realism based on knowable facts, is not in all cases and in all respects a suitable means of holding human communities together, i.e. accepting that the only criterion for ideas as a means of inspiration is not how accurately they represent reality but how they inspire action by the members of the community, this does not mean that we can build our future on castles in the air. We therefore believe in the potential of so-called adaptive innovation, i.e. taking existing achievements and knowledge and applying them in one's own environment, according to one's own needs and changing circumstances, always bearing in mind the energy principle that the human brain, which is necessary to develop the creativity required for innovation, also consumes an enormous amount of energy, so ideas must also be provided with energy.
We see the challenge of the age as being whether, with the energy surplus, measured in EROI, made available in recent centuries largely by fossil fuels, we have the time and creative potential, with or without the help of the extremely complex systems we have developed today, to transform human existence into the future of the age through revolutionary innovations, including the ability to transform cultural frameworks, as defined by human nature.
In our view, the line of thought derived from the energetic origins outlined in this paper may provide a specific explanation of the current narratives of deglobalization and blocking, along which we believe further interpretative and geopolitical research is needed in the future.

References

Békés Márton: Kulturális hadviselés. Közép- és Kelet-európai Történelem és Társadalom Kutatásokért Közalapítvány, Budapest, 2020.
Berger, Peter L.: A globális kultúra négy arc. (Szabó Dávid ford.), 2000, 1998. július-augusztus.
Breznitz, Dan: Innovation in Real Places. Strategies for Prosperity in an Unforgiving World. Oxford University Press, 2021.
Bowen Liu a, Jun Matsushima: *Annual changes in energy quality and quality of life:* A cross-national study of 29 OECD and 37 non-OECD countries, Energy Reports, 2019
Casti, John: X-Events. Complexity Overload and the Collapse of Everything. HarperCollins, 2012.
Ciuta, Felix: Conceptual Notes on Energy Security: Total or Banal Security? Security Dialogue, 43(2), 123-144, 2010.
Charles A. S. Hall, Jessica G. Lambert, Stephen B. Balogh: *EROI of different fuel sand the implications for society*,in Energy Policy 2010,
Chesterton, Gilbert Keith: A józan ész nevében, Századvég Kiadó, Budapest, 2021.
Christian, David: Origin Story. A Big History of Everything. Little, Brown Spark, 2018.
Cohen, Mark Nathan: Health and the Rise of Civilisation, Yale University Press, 1989.
Coker, Christopher: Future War, Polity, 2015.
Csányi Vilmos: Íme az ember! Open Books, Budapest, 2022.
Diamond, Jared: Háborúk, járványok, technikák: A társadalmak fátumai. Typotex, 2000.
Foucault, Michel: A diskurzus rendje. (Török Gábor ford.) In: Holmi, 1991. http://hu.scribd.com/doc/31184449/Michel-Foucault-A-diskurzus-rendje Letöltve: 2012. december 18.
Galor, Oded: Az emberiség utazása. A modern világ egyenlőtlenséglnek okai. Libri, Budapest,
Gelencsér András: Ábrándok bűvöletében. A fenntartható fejlődés korlátai. Akadémia Kiadó, Budapest, 2022.

Gibbons, Ann: How farming shaped Europeans' immunity, Science 373, no. 6560, 2021.
Gurri, Martin: The Revolt of the Public and the Crisis of Authority in the New Millennium. Ideas for Progress, 2018.
IEA: Net Zero by 2050: A Roadmap for the Global Energy Sector, 2021. május. https://www.iea.org/reports/net-zero-by-2050 Letöltve: 2023. március 7.
Jessica G. Lambert, Charles A.S. Hall, Stephen Balogh, Ajay Gupta, Michelle Arnold: *Energy, EROI and quality of life* Energy Policy, 2013
Johnson, Clay A.: The Information Diet. A Case for Conscious Consumption. O'Reilly Media, 2012.
Kahneman, Daniel - Sibony, Olivier – Sunstein, Cass: Noise. A Flaw in Human Judgment. Little, Brown Spark, 2021.
Louis Delannoya, Pierre-Yves Longarettia,c, David J. Murphyd and Emmanuel Pradosa *Peak oil and the low-carbon energy transition: a net-energy perspective*, Energy Policy, 2021
Malik, Fredmund: Strategie des Managenents komplexer Systeme. Haupt, Bern, Stuttgart, 1984.
Mill, John Stuart: The Autobiography of John Stuart Mill (Seven Treasures Publications, USA, 2009.
Mumford, Lewis: Technics and Civilisation. Harcourt, Blace and Company, 1934.
Parikka, Jussi: A Geology of Media. University of Minnesota Press, 2015.
Schabert, Tilo: Boston Politics, A kreatív hatalomgyakorlás művészete, MCC Press – Alapjogokért Központ, Budapest, 2022.
Scott, James C.: Against the Grain: A Deep History of the Earliest States, Yale University Press, 2017.
Ségurel, Laure – Bon, Céline: Ont he evolution of lactase persistence in humans, Annual Review of Genomics and Human Genetics 18, 2017.
Silver, Nate: The Signal and the Noise. Why So Many Predictions Fail, but Some Don't. Allen Lane, 2012.
Smil, Václav: Growth. From Microorganisms to Megacities. The MIT Press, 2019.
Smil, Václav: Energy Transitions: Global and National Perspectives, Praeger, Santa Barbara, 2017.
Susskind, Jamie: Politika a jövőben. Életünk a technológia uralta világban. Athenaeum, Budapest, 2021.
Taleb, Nassim Nicholas: The Black Swan. The Impact ofthe Highly Improbable. Random House and Penguin Books, 2007.
Toffler, Alvin: Future Shock. Random House, 1970.
van Dijk, Teun A.: A kritikai diskurzuselemzés elvei [1993] (Kriza Borbála ford.) In: Szövegváltozatok a kultúrára. Nyelv, szimbólum, retorika, diskurzus. Szabó Márton – Kiss Balázs – Boda Zsolt (Szerk.). Nemzeti Tankönyvkiadó, Budapest, 2000.
Yergin, Daniel: Változó világtérkép. Energia, klíma és a nemzetek közti konfliktusok, MCC Press, Budapest, 2023.
Virág Attila: Diskurzuselemzés a politika- és vezetéstudományban. Vezetéstudomány, 45(3), 2014.
West, Geoffrey: Scale. The Universal Laws of Life and Death in Organisms, Cities and Companies. Weidenfeld & Nicolson, 2017.
Wittgenstein, Ludwig: Logikai-filozófiai értekezés. (Márkus György ford.) Akadémia Kiadó, Budapest, 1989.