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Editorial office
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Editor in Chief: Adrienn Reisinger
Vice Editor: Adrienn Dernóczy-Polyák
Administration: László Buics

Proof Editors | Natasha Fiona Borbély-Bailey and John Paul Kowalchuk

E-mail | tgeszerkesztoseg@sze.hu
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Győr, 31 December 2018

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ESZTER KAZINCZY

Financial shocks and their impacts on the banking sector's clientele in South-East Europe

Abstract

Generally speaking, the banking sector in South-East Europe (SEE) is lagging behind the new member states of the EU both horizontally and vertically. It is characterised by a high level of euro usage, a moderate development process and a general lack of trust. The paper focuses on the general importance of financial development, inclusion and literacy. The analysis highlights the roots of certain characteristics that are related to financial literacy or behaviour in SEE, by focusing on the shocks that affected the retail segment's deposits. Based on the relevant literature, the paper finds a list of various shock events from the socialist time period until the 2008 financial crisis that had fundamental affects on the region's financial habits. Related to this topic, policymakers should address a number of challenges for further stability.

Keywords: South-East Europe, financial literacy, financial shocks, banking sector

INTRODUCTION

When referring to the region of South-East Europe[1] (SEE) the following countries are covered; Albania, Bosnia and Herzegovina, Croatia[2], Kosovo[3], the former Yugoslav Republic of (FYR) Macedonia[4], Montenegro and Serbia. This region is particularly important for the European Union (EU). All of the reviewed countries are EU members, candidate or potential candidate countries. The two regions have built various economic ties between each other, including trade and FDI. SEE's economic and political stability is a fundamental interest of the EU, likewise of various other international institutions.

[1] SEE can be used as a synonym for the "Western Balkans", implying various political, historical and geographical interpretations, see Todorova (1997) or Mazower (2000). Here we stick to the phrase of SEE, comprising of the listed countries. Nevertheless, the borders of SEE are not clear-cut.
[2] The presence of Croatia among the SEE countries can be a source of debate. Currently it rather belongs to the group of the EU's new member states. Still, within this paper, it is added to SEE due to the common history and for the sake of comparison.
[3] This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and with the ICJ Opinion on the Kosovo Declaration of Independence.
[4] According to recent negotiations, FYR Macedonia's name is expected to change to Republic of North Macedonia. Still, due to specific uncertainty, the paper uses the name as "FYR Macedonia".

It is inevitable to discuss the role of the financial sector and the financial literacy in a market economy. On a macro level banks contribute to economic growth e.g., by curbing market frictions and allocating assets in a more efficient way[5]. Noteworthy, that the effect is bidirectional. Still, generally speaking, the financial system's stability contributes to the overall economy's prosperity. On a micro level, the individuals' and the firms' inclusion to the financial sector can support their development and help them during critical times (Demirgüc-Kunt et al., 2018). Nevertheless, these advantages can have a positive effect in the case a society's financial inclusion and financial literacy reaches an appropriate level.

Financial decisions are based on a wide range of factors. Shiller (2000), for instance, analyses stock market booms with a multidisciplinary perspective, by using economics (including behavioural economics), psychology, demography, sociology and history. Anderson et al. (2011) prove – by analysing data from 60 countries – that culture does matter regarding investment decisions. Countries with higher uncertainty avoidance behaviour represent higher home bias, with a less diversified foreign portfolio. Beckman et al. (2013) show that the life-cycle hypothesis holds even for the region of Central, East and South-East Europe. Age[6], education or income affects the propensity to save. They find that age can also determine portfolio choices, as younger individuals have a higher propensity (for example) for life insurance, whereas the older generation rather hold savings deposits. Nevertheless, in the case of SEE, savings are primarily held in cash or deposits. The reasons behind this are discussed further in the paper.

It is important to be aware of the fact, that the financial sector in SEE is bank-based, as the banking sector accounts for the great majority of the financial system's assets. Its proportion was between 68–92% in 2016 Q2 (ECB, 2017, 6; CNB). This banking sector is mainly foreign-owned, as the foreign (mainly EU-headquartered) banks' asset share varies around 70–85% (ECB, 2017, 6; CNB) in all of the reviewed countries.

The goal of the paper is to prove that a sequence of various shock effects led to a "late coming" development process, a general mistrust and a high share of euro usage. The analysis highlights the most important factors that influenced the financial behaviour and literacy in SEE. As the region has a bank-based financial system, we focus on the banking sector, or more precisely on the retail segment's deposit base. Within this paper, this is treated as an indicator of shocks. Aside from this, we use a multidisciplinary methodology, which is based on historical facts, macroeconomic and financial sector indicators. Thus, the comparative analysis is based on economic history and statistics from

[5] To read more on this topic see e.g., Demirgüc-Kunt–Levine (eds.) (2001) or Levine (1997).
[6] They find a hump-shaped relationship between age and savings.

the respective central banks and international institutions. If applicable, the EU or the euro area (EA) is included in the comparison. These lead us to the main characteristics of the retail segment and the current state of the financial literacy in SEE. One should emphasise, that an in-depth analysis on the latter topic is not available due to the lack of surveys for the region. Nevertheless, the existing literature and datasets[7] reflect the main characteristics of the banking sector, but the roots and underlying reasons are usually not highlighted. The paper would like to contribute to the scarce literature on this topic.

The paper is structured as follows: chapter 1 describes the applied terminologies that are crucial for the study. This also includes a brief literature review on the various approaches and underlines the importance of the subject. The next chapter presents the various general and country specific shocks that formed the overall population's or the banking clientele's financial behaviour. Based on these experiences, chapter 3 highlights some of the main characteristics that can be applied to the banking sector in SEE. Finally, the conclusion summarises both the shock factors and their consequences, which lead to implications for policymakers.

1. RELEVANT TERMS

1.1. BANKING CRISIS OR FINANCIAL SHOCKS?

There is a wide range of literature on financial crises[8]. Reinhart and Rogoff (2010) provide an overview of the main types of financial crises. An important observation is that a banking crisis is usually preceded by rising private indebtedness. It is important to underline, that in SEE this was particularly valid before the global crisis that started in 2008.

Calomiris and Haber (2014) focuses on banking crises, incorporating two main types: systemic insolvency crises and systemic illiquidity crises. In the former, banks have negative net worth and government intervention is required when exceeding a certain critical percentage of GDP. As for the latter case, systemic illiquidity disruption occurs, for example, widespread bank runs. This does not generate insolvency and government intervention. This approach is more restrictive compared to the definition of negative events – e.g., a failure of a single large bank – which are treated as crisis.

Laeven and Valencia (2012) – underpinning the work of Reinhart and Rogoff (2010) – find that crises occur in certain waves, which often coincide with credit

[7] See the EBRD's Transition reports, the ECB's Occasional Paper Series on "Financial stability assessment of EU candidate and potential candidate countries" or the World Bank's Findex database.
[8] See Bernhagen–Chari (2011), Calomiris–Haber (2014), Stojanov (2009).

cycles. Also, they confirm that banking crises are frequently preceded by credit booms – about one in three. They state that "a banking crisis is defined as systemic if two conditions are met:

1. Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations)
2. Significant banking policy intervention measures in response to significant losses in the banking system." (Laeven–Valencia, 2012, 4)

In their analytical work Albania, Bosnia and Herzegovina and Croatia are included. However based on their definition, they pinpoint banking crises only during the transition period of the mentioned countries.

The phenomenon of financial shocks cannot be clearly distinguished from financial crisis. In the relevant literature they are often used as synonyms. Nevertheless, if we want to differentiate between the term of financial crisis and financial shock, then the latter can be defined as a more frequent phenomenon. It can be considered as an exogenous factor in a model, maybe not even with the ability of identifying its main cause, like for instance in the case of a news story or noise. As for the financial crisis, it has more widespread impacts with negative systemic spillovers. Its effects can be detected via the financial sector's key performance indicators (KPIs) and a number of macroeconomic variables. Furthermore, this has an impact on financial literacy as well.

Fornari and Stracca (2013) analyse "financial shocks". They identify the phenomenon with the variable of the relative share price in the sector. They prove that this is highly correlated with financial sector's health and it is related to the financial intermediation process. An open question is, whether financial shocks are mainly demand shocks or rather supply shocks. We believe that both approaches are valid. Fornari and Stracca (2013) also find evidence for financial shocks affecting macroeconomic variables such as GDP and particularly investment. This can clearly be detected in the country cases of SEE. During a significant financial shock, the financial sectors' KPIs and macroeconomic variables went downward hand in hand, leading to a systemic crisis.

A relevant literature analyses the impact of confidence and news shocks. Blanchard et al. (2012) stresses that both the retail and the corporate segment continuously receive information on the future. This information is occasionally "news" but in other cases it is merely "noise". Financial decisions are often based on this. If the information turns out be reasonable news, the market gradually adjusts. However in cases of noise, the economy returns to the initial state. Related to this topic, during the shocks in SEE, the national and international authorities had a primary role via their communication and intervention in restoring public confidence.

Taking into account all these approaches, one should see that in order to consider the relevant "trauma factors" on SEE's financial literacy or behaviour, a different tool must be used. This is due to three main reasons: First

of all, the financial markets in SEE are less mature than in the EA or the EU. Furthermore, the analysed time period starts from the socialist times with its own characteristics. Last but not least, the available time series are somewhat limited. Taking all these into consideration, the paper focuses on the retail segments deposit stock. We underline those shocks which had impact on the deposit base and influenced the financial behaviour of the region.

1.2. FINANCIAL LITERACY

"Financial services can help drive development. They help people escape poverty by facilitating investments in their health, education, and businesses. And they make it easier to manage financial emergencies – such as a job loss or crop failure – that can push families into destitution." (Demirgüç-Kunt et al., 2018, 1) This quote helps highlight the most important role of financial literacy and financial integration on a micro-level. These factors can offer appropriate investment and lending opportunities, thus, it can also function as a safety net for individuals.

Based on this logic – in line with the information they receive – agents must be able to bring the most rational financial decisions for the short and long-term. The phrase 'financial literacy' has a wide range definition in literature. Hung et al. (2009) give a good overview of the various definitions, which nevertheless follow a common approach. Among them is the definition from Mandell (2007, 163–164): "The ability to evaluate the new and complex financial instruments and make informed judgments in both choice of instruments and extent of use that would be in their own best long-run interests." This definition reflects the bottom line of financial literacy. The agents should be able to understand the pros and cons, the potential gains and risks of the specific financial products. Furthermore, they should be able to plan for a longer time horizon, which also includes the products of insurance companies and pension funds. Klapper et al. (2012) prove that a higher level of financial literacy helps individuals to have greater availability of unspent income and a higher spending capacity. Furthermore, they find that financial literacy equips the individuals to deal with macroeconomic or income shocks. This can be particularly relevant during times of financial turmoil. Kefala (2010) highlights even the multilevel relevance of financial literacy. This implies that it is substantial not only for the individuals but also for the financial system. Namely, a low level of financial literacy increases the possibility of inappropriate risk return decisions; thus undermining the soundness and efficiency of the financial system.

If we add, that in a well-functioning market economy the financial system is a key player, the role of financial literacy rises to a higher level. Levine (1997) points out that the financial sector's core function stems from the fact that it helps to allocate resources in a more efficient way. This is due to five basic functions that the financial intermediaries fulfil. Namely, they improve risk management, allocate resources, monitor managers and exert corporate control, mobilise savings,

and facilitate the exchange of goods and services. These functions have an impact even on the pace of economic growth, though one should emphasise that the relation is bidirectional; the economic activity also influences the structure and quality of the financial structure (Levine, 1997). Based on this logic, the role of financial literacy rises to a macroeconomic level.

However, as financial products become more complex and sophisticated it requires a higher level of knowledge from the individuals and firms to understand the basics of the products. Choosing the most appropriate products and preparing long-term planning becomes even more challenging.[9] Nevertheless, the financial sector itself takes a major role in financial education. They are the actors that directly give advice to the clients. This becomes problematic, when the bonuses of the sector's employees are tied to the sales of particular products.

In connection with this topic, it is widely recognised that the financial literacy of the youth is fundamental, as they represent the future. But one should also emphasise that the youth are heavily influenced by the experience of the older generations. Even OECD (2017) stresses, that financial literacy is crucial throughout the whole life span of an individual. It helps financial well-being. Via this channel – on the mentioned macroeconomic level – it supports inclusive growth and a more resilient financial system, which relates to the resilience of a country's entire economy. Based on the results – where SEE countries are unfortunately not included – OECD calls for greater investments for improving the financial literacy of the youth. The document stresses the influence of parents, as they are the ones who transmit financial values, skills and habits to the younger generation. It is worth mentioning that OECD (2017) also highlights the importance of mathematical and reading skills for financial decisions. Furthermore, they emphasise that access to financial services helps one learn though experience. Due to the importance of youth certain evidence from SEE will be presented in a later section.

Stix (2013) – based on survey data from ten Central, East and South-East European countries – underlines that households have sizeable shares of their savings in cash in mattresses, due to the mistrust in banks, the experiences of banking crises or weak tax enforcement. This is particularly true for countries with "dollarized" economies, as the "safe" foreign currency functions to store its value. Furthermore, the phenomenon of holding savings in cash is rather relevant in poorer economies and cannot be explained by the fact of households are banked or unbanked. The paper will now review some of the shock factors that led to these characteristics in SEE.

[9] The primary aims of MiFID 2 (Markets in Financial Investments Directive) are to increase customer protection and to bolster competition within the financial sector.

2. RELEVANT SHOCKS IN SEE

2.1. SHOCKS: FROM SOCIALISM TO TRANSITION

The first major shock dates back to the last period of the socialist times and affects the country of the Socialist Federal Republic of (SFR) Yugoslavia. Credit institutions borrowed FX loans on the international financial market with sovereign guarantees. These loans financed projects, which were supported by the authorities. At the same time, the sum of FX deposits increased, as a result of the growing amount of remittances and incomes from tourism. A large amount of these FX deposits were redeposited in exchange for dinar credits at the national bank in Belgrade. The problem occurred in the 1980s when inflation gained momentum and the central bank's FX reserves started to decrease. Due to these challenges the dinar was often devalued. As a result of the monetary problems, the large amount of FX deposits that were transferred to the national bank became irretrievable or, in other words, became "frozen" (Barisitz, 2008). The compensation to households took many years and required major fiscal expenditures in all successor states. This case of "frozen" FX deposits can be considered as a "trauma", which undermined the confidence in the banking sector for a long period of time.

The next financial shock occurred during the years of transition. It is an interesting fact that despite Albania and the SFR Yugoslavia have built completely different socialist economic and financial systems their transitional challenges remained the same. Albania remained constantly loyal to the classical socialist system and gradually isolated itself from the rest of the world. Meanwhile, from the 1970s, the SFR Yugoslavia gradually shifted closer to a capitalist model but limited the market-oriented mechanisms by various administrative measures. This was particularly valid for the financial system. For this reason, the SFR Yugoslavia also lacked knowledge and experience regarding market mechanisms. Banks had limited or no knowledge of credit evaluation, risk management, international accounting, etc. Banks lacked experience in functioning in a market-oriented economy. All these imply that the successors of the two countries had to face similar transitional challenges. Adding to this, in the SFR Yugoslavia the transitional shock was coupled with a succession process, including devastating wars in most of the countries[10].

During this transition process, neither of the SEE countries could achieve macroeconomic stability in the long-term and certain systemic collapse occurred in all cases. Part of these could be attributed to the classical transitional shocks, like for instance the drop in the GDP, the high rate of inflation and unemployment.

[10] For more information on the two countries' economies, see Gligorov (1998), Kornai (1992), Lydall (1984) or Schnytzer (1982). For literature on the financial system, see Barisitz (2008), Cluniess-Ross–Sudar (1998), Gedeon (1987) or Lydall (1984).

These are elaborated by Kornai (2008) or Lavigne (1999). Besides the broad macroeconomic factors, the financial sector also faced certain meltdowns. Parts of these were general phenomenon and could be considered as an aftermath of existing bad loans (Keren–Ofer, 2003). However the institutional network was missing and banks were not able to function as intermediaries between savers and borrowers (Kornai, 1994). On top of this, in the SFR Yugoslavia the payment settlements system was separated from the banks (Mrak et al., eds., 2004)[11]. This structure implied further dedicated tasks during the transition period for the successor states of the SFR Yugoslavia. All in all, the various shocks in SEE – which occurred in multiple waves – required broad stability packages, while putting great pressure on fiscal authorities[12].

Now we highlight certain country cases that had a major impact on the financial system. Starting with Albania, large pyramid schemes collapsed in 1997, causing major turmoil in the country. According to estimations, the affected total liabilities reached almost 50% of the annual GDP (Šević ed., 2002, 28). People lost their savings, consumption dropped, real GDP fell by 11%, while inflation exceeded 33% (EBRD, Economic data). Foreign intervention was required for an extensive economic recovery program. The long lasting psychological effect on the population's financial behaviour still remains.

Croatia had to cope with two major bank crises. Following the first classical transitional one, deposits started to return to banks. However, due to the fierce competition leading to high deposit interest rates a large share of non-performing loans and the unfavourable international environment Croatia had to face a second major bank crisis in 1998. The rehabilitation has cost 32% of the GDP (Barisitz, 2008, 51), and led to a more cautious banking sector with a stronger supervisory authority (Barisitz, 2008).

Turning to FYR Macedonia, the banks in the country continued to finance loss-making enterprises, which was not a unique phenomenon in transitional countries. In FYR Macedonia this was coupled by debt-equity swaps, meaning that banks collected corporate shares. From 1995 policymakers took measures. The rehabilitation of the sector amounted to 42% of the GDP, with 12% just for the cleaning of bad loans from the balance sheets and 30% for the repayment of the already mentioned "frozen" FX deposits (Šević ed., 2002, 277).

Bosnia and Herzegovina holds a unique state structure with two entities – the Federation of Bosnia and Herzegovina, and the Serb entity of Republika Srpska – and a third region of the Brčko District. The banking system developed separately in the two entities. In both cases a certain delay could be detected due to the devastating war and the unclear state structure. The first moves were taken

[11] In practice, the internal payment system had been conducted through a state-level institution. This institution was responsible for all transactions within the country but also for the system of internal payment control and supervision.
[12] To see relevant statistics, see EBRD statistics or Transition Reports.

in the Federation in 1997 and in the next year in Republika Srpska. Insolvent banks were closed in 2000. Impaired assets and liabilities were transferred to the Ministry of Finance, incorporating a balance sheet cut by 80%. "Frozen" FX deposits amounted to 80% of total assets. Following the initial steps and first privatisations the gradual development of the banking sector started from the 2000s in both entities (Šević ed., 2002).

As for Serbia, we can speak of a kind of "lost decade", as the fundamental reforms started only in the 2000s after the fall of the Milošević regime. The first assessments and restructuring strategies were done in 2001 with the help of international organisations. Public confidence in the banking sector was very low. This could be explained not only by the case of the "frozen" FX deposits and the effects of war but also by various pyramid schemes. The level of this mistrust could be very well detected by the euro changeover in 2002. Namely the cash had to be deposited for conversion, so EUR 4 billion was paid in. Following the conversion, three-quarters of the deposits was withdrawn again (Barisitz, 2008). In the same year, steps were taken for the repayment of the "frozen" FX deposits, the banking system's restructuring was launched, certain banks were closed, write-offs took place, and privatisation started case-by-case but at a slow pace (Barisitz, 2008).

Regarding Montenegro, it gained its independence in 2006, so the term of "lost decade" was valid for its case as well. In the late 1990s, Montenegro also experienced the boom and bust of large pyramid schemes. This took the financial sector to the verge of a systemic meltdown, while ruining the public confidence further. The banking sector's assessment and consolidation started from 2001. This implies the same starting date as in the case of Serbia, but the sequencing was somewhat different. Certain banks were liquidated, others were nationalised, preparing them for privatisation or resolution (Barisitz, 2008). Montenegro established its Deposit Protection Fund the same year it gained its independence. From the mid-2000s the banking system stabilised both in Serbia and in Montenegro, while credit and deposit growth started to revive.

Last but not least, the case of Kosovo should be mentioned. Following the NATO bombing, the financial infrastructure was missing, regarding both the physical presence and the framework. This implies that the sector – including its supervisory and regulatory framework – had to be built from scratch. This process was conducted under the administration of the United Nations Mission in Kosovo and the guidance of international financial institutions (Barisitz, 2008). As a result Kosovo also holds a bank-based financial system, but the sector is more diverse. For example, many microfinance institutions have been established and the insurance sector holds a larger share compared to the regional average[13]. This cannot be attributed to a gradual organic development but rather to the artificial

[13] For relevant data, please see the statistics of the Central Bank of the Republic of Kosovo (https://bqk-kos.org/index.php?m=t&id=47).

building-up process. On the other hand, the product range of investment products can still be considered somewhat narrow. For instance, the establishment of an own stock exchange is still on the table. To sum up, the banking sector in the typically cash-based society of Kosovo started a swift development from the mid-2000s, though from a very low base.

It can be concluded that by the end of the transition period, in all country cases the stabilisation of the system took place after the banks were restructured by the new owners. The financial sector became bank-based with a dominantly foreign-owned – mainly EU headquartered – banks. The concentration also increased gradually, with the exception of Serbia, the five largest banks hold around 75% of the total assets (EBRD Transition Reports).

The dominance of foreign ownership generated many advantages; e.g., the transfer of know-how, international accounting and auditing standards, IT technology, managerial skills, risk management and loan monitoring techniques, relevant information, business network, product innovation, and market access to cheaper funding. It was crucial that foreign banks brought funding to SEE, which was typically poor in capital, and helped stabilise the sector. On the other hand, the risk of a negative spillover effect also needs to be mentioned, which became particularly important during the time of the global crisis. Still, the entrance of foreign banks had a huge impact on public trust, which was much needed in the region. Deposits started to flow into the banking sector.

Now we give an overview of the relevant features during the transition period. The development levels of the areas within the SFR Yugoslavia showed great differences. During the transition period this phenomenon became even more visible. Based on the relevant time series and literature, great heterogeneity could be detected among the countries of SEE. The reasons behind this can be put into four main groups:

- the initial development level and institutional system;
- the impacts of succession, military conflicts, embargos and sanctions;
- the effects of economic (including financial) shocks;
- the starting date, sequencing, duration and methods of the restructuring and stabilising policies.

The common features that negatively affected the retail clientele's deposit base during the transition period are the following:

- Periodically high or extreme level of (in case of Serbia even hyper) inflation, which was not covered by the real interest rate growth. This was partly offset by remittances, in certain cases the income from tourism or the support of international institutions. Still, the trauma of inflation pushed the client base to hold more stable currencies. In the case of SEE this incorporated the Deutsche Mark and later on euro deposits.
- During the dissolution of the SFR Yugoslavia, certain clients had to face the fact that the bank where they held their deposits became a legal entity of

a different country. Thus, the clients could obtain their deposits only after bilateral agreements between the relevant authorities. In addition, the unique payments settlements system, which has already been mentioned.
- In the case of a systemic or particular banking crisis the clientele became uncertain, as to whether they could regain their savings. This was particularly true if the deposit insurance companies had not yet been established, which was typical in most cases.[14]
- Almost all countries experienced the collapse of certain pyramid schemes. No matter if these were wide range – like in the case of Albania – or minor, they caused a general mistrust in the general financial system.

These facts all underpinned the two main characteristics of SEE; namely the distrust in the banking system and the large share of FX savings. On top of this, the lag of financial development – compared to new member states of the EU – have caused less diversification possibilities. This means that in most countries – with the exception of Croatia or Kosovo – there were no other investment possibilities other than bank deposits.

2.2. SHOCKS FOLLOWING THE TRANSITION PERIOD

Following the above discussed transition period, a rapid financial deepening[15] evolved in SEE. This could be attributed to the gradually returning confidence in the banking sector. Thus, bank deposits increased swiftly. On the other side of the balance sheet, rapid credit growth was recorded. The latter was particularly fuelled by household and mortgage lending. From the banks' point of view they had to cope with the pressure of market competition, which often went against the willingness of appropriate client assessment. Regulatory authorities didn't take measures to mitigate the pace of credit growth or their steps to curb the overall or particularly the FX loan growth had only temporary effects (EBRD, Transition reports).

An important feature is that both deposits and credits were FX dominated – with the exception of Kosovo and Montenegro where the euro is used as a sole legal tender. On the deposit side, this could be attributed to the already mentioned historical heritage forming client behaviour, higher real deposit interest rates, the one-off effect of the euro changeover, or the amount of remittances and the income of tourism. As for credits, the banks were funded by the parent banks usually in euro, and the banks themselves motivated the clientele to take FX loans irrespective of the applied exchange rate regimes.[16] Clients were motivated by

[14] One can check the deposit agencies' homepage for the date of establishment in the relevant countries.
[15] The level of financial deepening can be measured by various indicators. As a benchmark, we use the percentage of total financial assets per GDP.
[16] Kosovo and Montenegro use the euro as a sole legal tender, Bosnia and Herzegovina applied

lower interest rates or the expectation of appreciating domestic currencies. Overall, the FX risk was somewhat milder compared to that of the new member states of the EU, where the portion of owning FX deposits was/is much less typical. Still, a considerable systemic risk became present due to the fact that the borrowers did not cover the amount of loans, while there was a great maturity mismatch (Backé–Walko, 2006).

The rapid financial deepening took a sudden stop, when the optimism of the "decoupling story" ended, and the overwhelming negative effects reached SEE by the end of 2008. It is noteworthy that in case of Kosovo an almost one year lag could be recorded. These negative effects were a result of the strong trade and financial integration with the western European economies[17]. Floating exchange rates meant a further hazard in the case of widespread FX loans. On an international level the IMF and the EU intervened, while on a local level the monetary authorities took various measures, like for instance monetary policy rate cuts, reserve requirement easement, or other liquidity and prudential measures. The deposit insurance has been increased in almost all countries. Local authorities emphasised that based on the region's solid capital ratios, the system could be considered stable. Via the cooperation of the local and international actors the so-called "Vienna Initiative"[18] has been launched (EBRD, Transition reports).

Despite the applied actions, a widespread confidence shock took place. The swift pace of deposit growth stopped in SEE, also due to the increasing liquidity needs of the retail and corporate segment. In the case of Bosnia and Herzegovina and Montenegro certain withdrawals could be recorded. Nevertheless, large-scale deposit withdrawals were avoided in all countries. As for the strong correlation of macroeconomic figures, most of the countries had to face recession, which in the case of Croatia – as a unique case in the world – lasted for six consecutive years. Income growth dropped, the number of company defaults rose, future expectations deteriorated, while unemployment started to rise. As a next phase, the lagging indicator of non-performing loan (NPL) ratios started to increase due to these macroeconomic tendencies (EBRD, Transition reports).

The second shock wave of the EA unfolded in 2011, which caused a significant credit crunch in the EA itself. As a spillover effect, the deleveraging process unfolded in emerging Europe, including SEE countries[19]. As an answer, "Vienna

a euro-based currency board regime, FYR Macedonia has a de facto peg against the euro. In these cases the euro in considered as an anchor, and does not reflect the countries' development level. Croatia incorporates more risk with its tightly managed floating FX policy, while Serbia and Albania cover the largest risk with a managed or independent floating regime against the euro. For an overview on the effects of various FX regimes' during banking contagion, see Kutasi (2015).

[17] It is worth mentioning that SEE had no exposure to toxic assets and the "simple" product structure became rather advantageous. Still, general economic problems led to increasing NPL ratios.

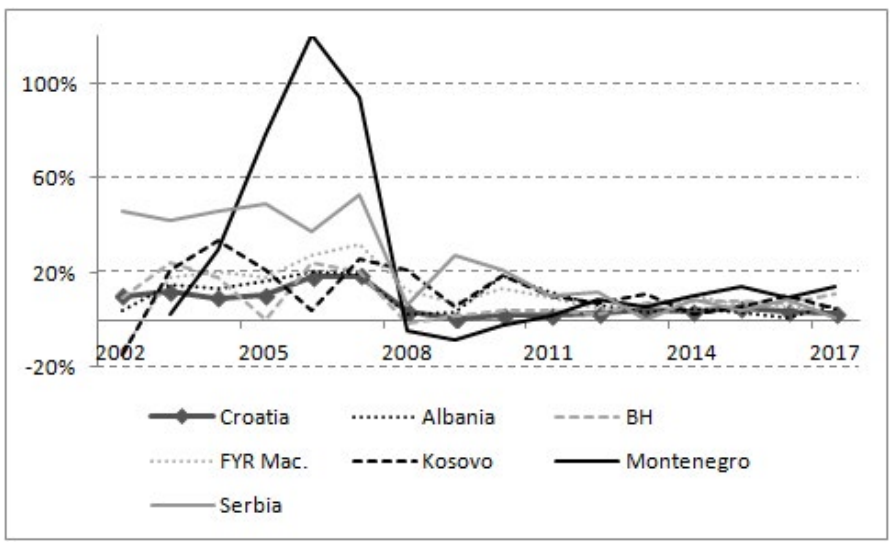
[18] To read more on the "Vienna Initiative" please visit the following homepage: http://vienna-initiative.com/.

[19] For relevant information and statistics please see the Vienna Initiative's Quarterly Deleveraging Monitors (http://vienna-initiative.com/type/quarterly-deleveraging-monitors/).

2.0" has been launched with the aim to minimise systemic risks in emerging Europe, and to bolster coordination among home and host authorities. Due to the international developments and the solutions for decreasing NPL levels, a certain level of credit crunch could be recorded in Albania, Croatia, Serbia and Montenegro. In the case of Croatia – between 2012 and 2017 – the amount of total credits decreased in every year with a dip of -6.17%[20] in 2012.

During this second wave no withdrawals have been observed on the deposit side. Nevertheless, the high growth rates of the pre-crisis period did not return, as the credit fuelled growth model collapsed. All in all, it was rather 2008 that started a new economic era. It even caused a shock effect in the banking sector, including its retail and corporate clientele, having another negative impact on long-term trust.

Figure 1 Change of total deposits, 2002–2017



Sources: Based on relevant central banks' statistics own calculations

Figure 1 reflects these latter episodes. To begin with, the drop of total deposits in the case of FYR Macedonia and Kosovo can be mainly attributed to ethnic insurgencies. Following this period even these countries recorded massive growth rates. Among the countries Montenegro showed extraordinary expansion. After the booming pre-crisis period, the largest drop was also recorded in this country, showing an extraordinary boom-bust cycle. Deposit withdrawals were recorded mainly in

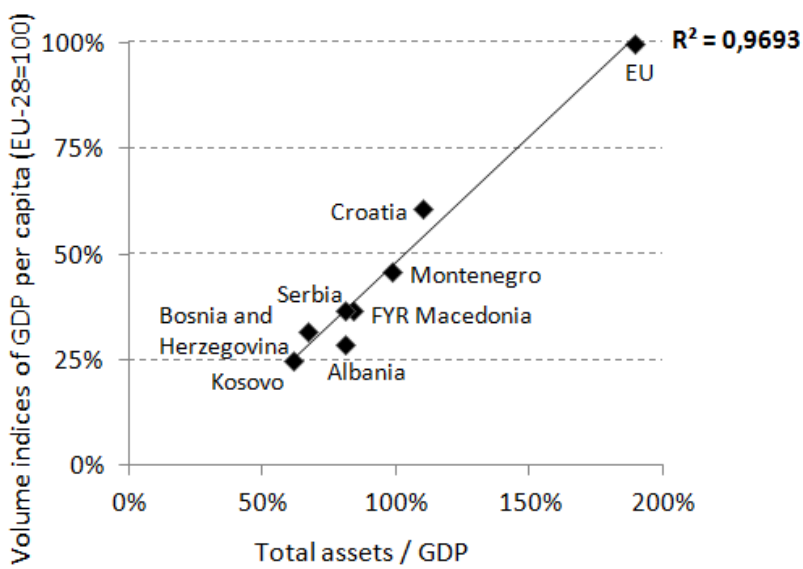
[20] Croatian National Bank: Statistical data, Consolidated balance sheet of OMFIs (http://www.hnb.hr/en/statistics/statistical-data/financial-sector/other-monetary-financial-institutions/consolidated-balance-sheet-of-omfis). For further statistics, please visit the relevant central banks' statistical database.

Montenegro, and a minor withdrawal in Bosnia and Herzegovina. Apart from these two cases, deposit growth remained positive but reflected lower growth rates compared to the pre-crisis levels. The second wave of the European crisis – starting from 2011 – did not have a massive impact on the deposit growth in SEE. This could be considered as a positive phenomenon. On the other hand, financial deepening still has ample space and the product range ought to be widened for the sake of diversification.

3. CONSEQUENCES ON THE CLIENTELE

Despite the booming pre-crisis period, the financial deepening remained very low in the region. As it has already been mentioned we measure financial deepening by the amount of total financial assets divided by the GDP. As demonstrated by the relevant literature, this figure shows a high correlation with the GDP levels. Figure 2 reflects this correlation; namely the link between the percentage of total financial assets per GDP and the level of GDP per capita. The numbers can be compared with the respective EU data thus regarding them as a benchmark for convergence. Figure 2's numbers reflect that Croatia is ahead in this convergence process, while Kosovo is far away even from the Croatian development level.

Figure 2 Total assets per GDP and GDP per capita, 2017



Sources: Based on relevant central banks' statistics and Eurostat, EBA own calculations

Based on the above elaborated shock effects, the inherited financial behaviour and the lagging development process, special conclusions can be drawn from the statistics of The World Bank's Findex Database. As there are no overall surveys on financial literacy for the region with the age group over 25, we will highlight certain underlying characteristics from this dataset. The data are comparable with the EA's numbers (see table 1), which should be considered as a certain benchmark.

EBRD's Transition Report 2017 stresses that the level of financial inclusion – which can reduce inequality of opportunities – depends on such factors as gender, age group, level of education and income, or living in rural areas. Financial inclusion can be assessed via provider-based and user-based indicators. As for the former, SEE is quite well covered regarding bank branches, while there is a further requirement regarding the number of ATMs. As for the latter, households have better access to credits. Regarding the corporate sector, the generally higher collateral requirements (compared to the new EU member states), the accounting standards, the judicial system or the governance are named as hindering factors (Murgasova et al., 2015).

Table 1's first column – percentage of bank accounts among the total population – can be treated as an indicator of financial inclusion. It can be seen, that in poorer countries the financial access is lower. In Albania it reaches merely 43%, while in Croatia it is 93%, almost reaching the EA's level. This figure decreased in the case of Serbia and Croatia between 2014 and 2017, but increased in all countries between 2011 and 2017 as a sign of growing financial inclusion.

As for the second column – the level of savings for starting a business – it shows a factor which mirrors entrepreneurial "appetite". This particular figure is quite low in the region, but even in the EA. As a negative and warning sign for policymakers, savings are low also at an older age. Fluctuations can be attributed to the change in the pension schemes or can be a consequence of recession. Generally, savings at financial institutions are low in SEE. This incorporates great risk for the clientele in cases of unexpected situations, as for instance unemployment, health problems or wage cuts. Funding can also be required for educational purposes. Overall, the low level of savings is a negative sign for financial literacy, but it also reflects the low level of income. All this leads to the conclusion that policymakers should motivate savings and the diversification of the available financial product range.

The percentage of debit and credit cards – columns 5 and 6 – can be seen as an indicator of financial sophistication. The number of debit cards increased in all countries between 2011 and 2017. So this tendency – likewise the level of usage – shows great similarity with the number of bank accounts. Credit cards can reflect client sophistication but it also depends on the particular banks' applied policies. The bank's managements should decide: Does the bank prepare a campaign for credit card sales and do they take the relevant risk?

The last four columns demonstrate certain borrowing habits. Though it is not an underlying financial figure, it is eye-catching that borrowing for health or medical purposes is the highest in the two poorest countries, stressing the importance of savings. Taking credit to start a business reflects both the entrepreneurial habits

and the banks' lending policy. It can be seen that this percentage was very low even in the EA in 2014 as a sign of risk avoidance. The same two sided approach should be used for the overall lending from financial institutions. So both the demand and supply side factors should be considered. The tendency of this figure shows a variety among the countries of SEE. Last but not least, the indicator for borrowing from family or friends should be observed. With the exception of Bosnia and Herzegovina it is much higher in the reviewed countries compared to the EA. On the one hand, the high numbers show that people don't trust banks, and they do not want to rely on their requirements. On the other hand, it can demonstrate the stricter lending policies of the financial institutions. In SEE, more often the former case dominates.

Table 1 Selected data on the financial habits, ages 25+

		Accounts	Saved to start, operate, or expand a farm or business, older adults	Saved for old age,older adults	Saved at a financial institution	Debit card ownership	Credit card ownership	Borrowed for health or medical purposes	Borrowed to start, operate, or expand a farm or business	Borrowed from a financial institution	Borrowed from family or friends
Albania	2011	29%			9%	21%	10%			8%	12%
Albania	2014	40%	7%	11%	8%	24%	6%	26%	5%	13%	45%
Albania	2017	43%	6%	9%	9%	29%	8%	23%	10%	10%	25%
B&H	2011	58%			7%	36%	13%			14%	15%
B&H	2014	56%	3%	12%	9%	37%	10%	4%	3%	16%	7%
B&H	2017	63%	8%	10%	10%	42%	11%	5%	18%	10%	8%
Croatia	2011	91%			13%	77%	37%			15%	18%
Croatia	2014	90%	7%	38%	29%	76%	41%	6%	4%	25%	25%
Croatia	2017	93%	11%	32%	39%	74%	40%	5%	11%	14%	16%
Kosovo	2011	48%			6%	31%	10%			8%	17%
Kosovo	2014	50%	8%	16%	8%	37%	15%	16%	4%	10%	17%
Kosovo	2017	59%	12%	15%	10%	43%	13%	21%	10%	13%	24%
FYR Mac.	2011	74%			9%	39%	19%			12%	23%
FYR Mac.	2014	77%	5%	16%	15%	58%	24%	9%	2%	15%	20%
FYR Mac.	2017	82%	9%	18%	19%	57%	19%	11%	12%	15%	21%
Montenegro	2011	56%			3%	26%	16%			24%	38%
Montenegro	2014	64%	3%	8%	6%	37%	17%	9%	4%	27%	22%
Montenegro	2017	74%	10%	12%	12%	40%	19%	9%	15%	18%	25%
Serbia	2011	68%			4%	47%	25%			14%	30%
Serbia	2014	84%	4%	14%	10%	58%	16%	5%	3%	10%	20%
Serbia	2017	77%	13%	20%	13%	64%	20%	12%	10%	13%	23%
Euro area	**2011**	**93%**			**41%**	**72%**	**40%**			**13%**	**6%**
Euro area	**2014**	**97%**	**8%**	**37%**	**47%**	**84%**	**44%**	**4%**	**3%**	**17%**	**12%**
Euro area	**2017**	**98%**	**10%**	**41%**	**52%**	**89%**	**49%**	**4%**	**27%**	**18%**	**11%**

Source: The World Bank Findex Database, 2017

Following the review of the age group of 25+ we now turn to the younger generation, who is supposed to influence the future. CYFI and EFSE DF (2017)[21] provide a comprehensive study on the financial behaviour and knowledge of children and youth between 10 and 24 years of age. It emphasises that around the age of seven

[21] They refer to SEE by including the following countries; Albania, Croatia, Kosovo, FYR Macedonia, Moldova, Montenegro and Serbia. This means that compared to our paper, Bosnia and Herzegovina is not included, while Moldova is added.

people start to form their financial behaviour. They find that financial literacy among the reviewed group is quite low. On the other hand, there are certain optimistic conclusions. Around 70% (CYFI–EFSE DF, 2017, 3) of the youth save a part of their money – via piggy banks, with parents or even at banks. As a further positive aspect, they show interest in receiving financial education at school and learning about money management, which is important for policymakers. Based on the region's past experience, it is not surprising that the attitudes towards financial institutions are generally not positive. This is particularly valid for the group older than 18. Even in the study it is underlined that this attitude is mainly based on the negative experiences within their social circles. Negative experiences are passed over. But even the role of the media is mentioned as a source of perceptions. Another finding is that youth whom have personal experience owning and using own bank accounts tend to be more familiar with money management and have their own saving habits. This involves better perceptions on the importance of savings, and a better knowledge on financial products, including formal financial education. Notwithstanding, significant differences can be detected based on age, gender and geographical location.

Individuals with parents holding a university degree show greater interest in financial education. Furthermore, youth from urban areas generally tend to save first and spend money only afterwards. Peer influence is also important. Not surprisingly, it is influential whether financial education is taught in school. Certain programs are available in all countries and intend to develop financial literacy. However it is questionable how many people are being reached. As a positive example, in Croatia certain elements of finance are integrated into a compulsory subject in both elementary and high schools. In Albania it is included as an elective subject. Time will show the effects. Still, the study highlights that most youth receive financial knowledge and information from their families. This is the reason why the reviewed shocks can still affect the younger generation. Table 2 gives an indication of the financial inclusion of the youth. It is obvious that it shows lower levels than in the case of the older age group (see table 1). Serbia and Croatia stand out regarding account ownership. In the latter case savings are also more frequent, though this indicator shows low levels. One of the main conclusions of the study is that "one of the big barriers to youth financial inclusion is the low level of trust in the financial sector. This barrier can only be addressed through a coordinated and joint effort between the public and private sectors aimed at increasing the stability of the financial sector and the confidence of the consumers." (CYFI–EFSE DF, 2017, 31)

Table 2 Percentage of youth accounts and savings at financial institutions, ages 15 –24, 2014

	Albania	Croatia	Kosovo	FYR. Mac.	Montenegro	Serbia
Youth account	30.0%	57.8%	41.1%	46.7%	41.3%	77.8%
Youth saved	7.2%	16.6%	5.3%	7.5%	2.9%	2.7%

Source: CYFI–EFSE DF, 2017, 7

4. CONCLUSION

The goal of the paper was to prove that from the socialist time period until the 2008 global crisis, various shock effects influenced the financial sector's clientele in SEE. During the overview, both common and country-specific shocks have been listed. Adding up these effects general characteristics can be outlined for the region. The negative impacts led to a "late coming" development process, a general mistrust of banks and a high share of euro usage.

With the help of the relevant literature and statistics, a multidisciplinary comparative analysis could be carried out. Both economic history and statistics from the respective institutions have been used for the work. In general, the focus was shifted to the retail segment's deposit base, but the currently available data on the clientele's behaviour have also been presented. If applicable, the data have been compared with the EU or EA statistics. The latter provides information on the current status of the convergence process. Based on the applied methodology the paper highlighted the most important factors which influenced the financial literacy and behaviour in SEE.

First of all, the paper highlighted that the role of financial literacy is essential in a well-functioning market economy. It is important for both the retail and the corprate segment. The financial sector helps to hold and diversify savings, and offers solutions for adverse circumstances. However the sector's relevance can be raised even to a macroeconomic level, as it supports the efficient allocation of savings and underpins GDP growth. These benefits are more relevant when the society has an appropriate level of financial literacy. This implies that agents should be able to understand and evaluate financial products, and make decisions based on their long-term interests. This also helps them use appropriate instruments in the case of adverse situations.

It can be concluded that the region of SEE has a bank-based financial system. The retail segment – likewise the corporate – is still highly "euroisationed", the trust in the banking sector is still somewhat unstable and savings are usually held via bank deposits or at home. Thus, a certain part of the society is absolutely not included to the financial sector. Nevertheless, the sector is gradually developing throughout the region. Croatia stands out with its relatively mature and diverse financial market, while other countries might follow. The youth's analyses also carry cautious optimism[22].

The reports and statistics, however, do not deal with the background of the relevant features. This paper showed – from the trauma of the frozen FX deposits

[22] The respective characteristics can be gathered from the relevant literature. See the EBRD's Transition reports, the ECB's Occasional Paper Series on "Financial stability assessment of EU candidate and potential candidate countries", the World Bank's Findex database, Demirgüç-Kunt et al. (2018) or CYFI–EFSE DF (2017).

until the latest global crisis – the main shock factors that formed the financial attitude in SEE. These included the dissolution of the SFR Yugoslavia's financial system, the transition shocks with extreme levels of inflation and bank crises, and the fall of large pyramid schemes.

As a consequence of the above-mentioned factors, the current level of financial maturity differs among the countries. Overall, there is a certain lag compared to the EU or EA average, as developing the necessary institutions and their background takes time. This general lag and the specific difference among the reviewed countries can be traced back to the initial conditions and the different development sequences during the transition period. The development path and approaches differed according to the political realities, and the social and cultural preferences (Murgasova et al., 2015). Other characteristics – for instance the level of "euroisation" – can also be connected to macroeconomic features, such as the level of remittances or tourism.

As for the general economy, the incomplete reform processes hold back the convergence to the EU. Achieving durable growth, curbing high unemployment rates and large current account deficits are crucial for the region (Murgasova et al., 2015). As for a solid economic and financial development in SEE, the society ought to be more inclusive and the enhancement of financial literacy would be required. This should involve rational long-term thinking. This goes hand in hand with the level of trust in the financial system, which depends on the banks themselves, and the supervisory and regulatory authorities. As a result of the global crisis, a new cross-border supervisory and regulatory architecture has been set, which affects the financial sector of SEE as well[23]. Nevertheless, the country-level structure has a primary role.

To sum up, the financial market can be considered shallow and narrow in SEE. Firstly, non-bank financial services need to be built from scratch in many country cases. Secondly, financial deepening has ample space compared for instance to the EU. The future holds various challenges for SEE: enforcing financial development within a solid economy, curbing further NPL rates, omitting the dangers of parent banks' deleveraging, avoiding the negative spillover effects of a stricter monetary policy, and coping with the potential hazards of digitalisation. Furthermore, more focus should be given to the domestic funding possibilities, while the range of investment products should be widened. The list could be continued depending on the individual countries. On the other hand, the clientele ought to develop financial literacy in order to prepare for potential micro or macro shocks, diversify risk and apply long-term planning. This process should be supported via education, which can take place in school, in a workplace or within a community. This dedicated education can help maintain stability on a longer term, especially if we turn to the younger generation.

[23] To read an overview on this topic, see Dakić (2014).

The conclusions for the authorities can be summarised as follows: Policymakers are responsible for creating a stable economic framework and institutional system. In addition, it is their duty to foster financial literacy. In order to reach the youth, the educational process should be built from a "school level". Furthermore, policymakers should motivate the growth and diversification of savings to underpin micro and macro level stability. These developments can be carried out via close cooperation between the public and private sectors. Due to the sector's ownership structure and its international integration, the public and private institutional cooperation must be extended to an international level.

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GÁBOR KOZMA – ERNŐ MOLNÁR

The role of industrial parks in the economic development of Debrecen

Abstract

In recent times, industrial parks have played a very important role in the development of the Hungarian economy, and in the spirit of the above, local governments have also paid special attention to these facilities. The purpose of this paper is to analyse the role of industrial parks in economic development in the case of a specific settlement; the city of Debrecen. The most important research findings are the followings: on the one hand, industrial parks have been an essential element of local economic development documents since the early 1990s; on the other hand, the companies operating in the industrial parks constitute an important base of the city's economy, a role which is also expected to remain in the future.

Keywords: Debrecen, industrial parks, economic development

INTRODUCTION

In recent decades, industrial parks have played a particularly important role in the economic development of Hungarian settlements. Local governments held that the creation of such facilities would significantly improve the attractiveness of the settlement for investors searching for new sites and would facilitate their settling there, and this would contribute, among other things, to an increase in local tax revenues and the reduction of unemployment.

The utilisation of potential opportunities, however, required very serious efforts in various aspects from local leaders. First of all, the areas concerned had to be designated in the development documents of the settlements (e.g. spatial development plan); secondly, the necessary infrastructure had to be developed; and thirdly, the facilities had to be suitable advertised and promoted. In this respect, significant differences could be observed between the settlements: while some places only reached the point where the relevant areas were designated, elsewhere the increasing demands made it necessary to expand industrial parks several times.

Giving precedence to the above, the purpose of this paper is to analyse the role played by industrial parks in the economic development efforts of Debrecen, the second largest city of Hungary. The study will review the appearance

of industrial parks in the various settlement and economic development documents and analyse the role that companies operating in industrial parks play in the economic life of those settlements. For a better understanding of the topic, however, it was found necessary to define the concept of the industrial park, and therefore, this will be the topic of the first longer chapter of this paper.

In our research, a variety of databases were used. In addition to reviewing the literature regarding the topic, we have also examined the development documents of Debrecen after the change of the political regime, engaged in the collection of data in the industrial parks, and compared the results to the data available in Creditreform Céginformáció company information database. Our analyses will concentrate, in the majority of the cases, on facilities with the official title of Industrial Park. In our paper we use the expression "industrial park" written with small initial letters when we speak generally about a property for economic development purposes. However, the official names as well as the objects possessing the title in Hungary are written with large initial letters.

1. SOME THEORETICAL ISSUES CONCERNING INDUSTRIAL PARKS

The concept of industrial parks is (fundamentally) possible from two aspects: we can analyse the academic position, or we can examine what the relevant provisions of law consider industrial parks.

In recent decades, researchers of local economic development (e.g. Kozma, 2002; Kecskés–Kovács, 2015) and the tools of regional policy (Rechnitzer, 2002) have approached the issue of industrial parks from a variety of perspectives. On the one hand, they try to make a list of all the "elements" that are conditions of considering a facility as an industrial park (Lengyel et al., 2002; Rakusz, 2000):

- the ownership of the area is well-established, and the basic infrastructure is clearly defined in technical terms;
- the park has an "owner" that provides services for the entities settling there on a business basis;
- companies settling in the park can use the infrastructure of the park and the available services at favourable prices;
- there are value-creating activities (not only industrial activities) pursued within the park.

On the other hand, they differentiated a variety of industrial park types and defined their specific features, as well as the related advantages and disadvantages. In terms of their location/way of establishment, we can differentiate brownfield and greenfield industrial parks (Grasselli, 1996; Kiss, 2013); however, Nikodémus (2002) extended this dichotomy and placed Hungarian facilities in six groups:

- fully greenfield industrial parks (e.g. Győr Industrial Park, Hatvan Industrial Park and Tiszaújváros Industrial Park);
- parks that integrated businesses that had previously operated on the area with extensive greenfield areas (e.g. Esztergom Industrial Park, Orosháza Industrial Park and Szentgotthárd Industrial Park);
- earlier military facilities with significant greenfield areas (e.g. Pápa Industrial Park);
- former industrial areas, mainly with businesses that moved in and with vacant industrial buildings (e.g. DIGÉP – Diósgyőr Industrial Park, Ózd Industrial Park, VIDEOTON Industrial Park in Székesfehérvár);
- agricultural-type industrial parks (e.g. Regional Industrial Park in Pacsa, Homokhát Regional Agro-Industrial Science and Technology Park in Mórahalom);
- industrial parks formed from logistical centres (e.g. Harbour Industrial Park in Budapest).

Another approach is based on the activities pursued in the industrial parks, where the following categories were differentiated (Benko, 1992; Kullmann, 2000; Rakusz, 2000):

- science parks,
- technology parks,
- commercial parks,
- innovation centres,
- traditional industrial parks.

The third group of academic examinations of industrial parks also surveyed the broader environment of these facilities, and analysed, among other things, their link with the network of transportation infrastructure (Kiss–Tiner, 2012), their function in regional competitiveness (Lux, 2013), their role generating advantages for the agglomerations (Faragó–Lux, 2014), as well as the system of relationships between the facilities and the individual sectors of the economy (Lukács, 2013; Molnár, 2013).

As outlined in the Introduction, the formation of business-purpose properties by having the necessary infrastructure and serving the needs of economic operators constituted a very important element of the economic development activities of Hungarian local governments at the time of the political transformation of the country. At the same time, various types of initiatives also raised significant problems (the issue emerged, for example, which settlements could receive subsidies from the central budget for such purposes), and therefore, from the mid-1990s, the national government strove to settle the situation by way of provisions of law.

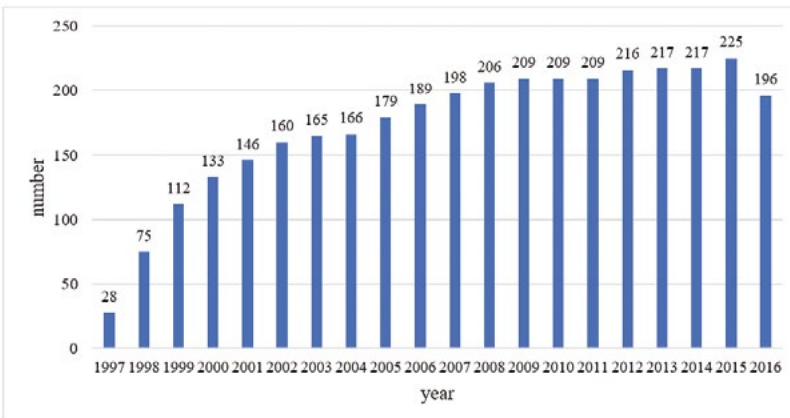
The starting point was Government Decree 185/1996 (XII. 11.), which set forth that the title of Industrial Park had to be obtained first, and it was only in possession of the title that the grants available for the construction of infrastructure could be applied for. Based on this reason, in the past 20 years, several ministerial and

government decrees have been promulgated that regulated the conditions of awarding the title of Industrial Park in details. On the one hand, the provisions of law concerned had certain common elements pertaining to, among other things, the types of applicants (local governments or their associations, business companies) and the document to be prepared (feasibility study). On the other hand, it could be observed that the rules became gradually stricter, with the most important change: from 2007 only such facilities may receive the title of Industrial Park where at least 5 companies employing a total of 100 people operate.

At the same time, a definition of industrial park in Hungarian laws was only introduced in the 2010s: on the one hand, pursuant to the 2013 amendment of Act XXI of 1996 on Regional Development and Regional Planning (Act CCXVI of 2013), an industrial park is "an organisation engaged in general industrial and spatial development, having the necessary infrastructure, engaging in development, production and service providing activities, aiming at innovation, which has been awarded the title 'Industrial Park'." The 2015 amendment of the above act (Act CLXXXVI of 2015), however, already used a different approach, and put the emphasis on the real estate aspect of industrial parks when defining them as "areas with the necessary infrastructure provided, where companies in the production and processing industries, as well as those striving for innovation can be found".

If we examine the number of facilities having the title of Industrial Park (Figure 1), we can observe a significant increase until the second half of first decade of the millennium: their number initially increased by 35–30 each year, and then from the middle of the decade by 8–10 annually. In recent years, however, a stagnating trend was rather characteristic, and in 2015/16, due to the non-performance of obligations undertaken, a significant number of titles were actually revoked.

Figure 1 The change in the number of facilities having the title of Industrial Park between 1998 and 2016



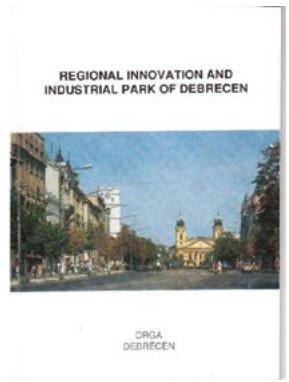
Source: own collection relying on governmental degrees

2. THE ROLE OF INDUSTRIAL PARKS IN THE ECONOMIC DEVELOPMENT OF DEBRECEN

As a result of the political transformation of the country, a significant backdrop occurred also in the economy of Debrecen. Therefore, it is not surprising that in Government Decision no. 1086/1993 (X. 26.) on the short- and medium-term development tasks of Hajdú-Bihar County, the creation of the Debrecen Innovation and Industrial Park – in addition to a number of other development needs (e.g. reviewing the possibility of the civilian use of the airport, the starting of the regional labour force development and training centre) – was also considered to be an important task. In Debrecen's Urban Policy Programme, accepted in 1996, which was the city's first document dealing with settlement development, one of the tasks formulated also included "making the city attractive to foreign direct investments, facilitating the better utilisation of the technical and intellectual infrastructure", even though industrial parks are not mentioned among the specific steps of the programme.

At the same time, the Debrecen Regional Economic Development Foundation, established in 1992 and coordinating the activities of Debrecen in the field of economic development in the 1990s, took steps for the development of the facilities in two areas. On the one hand, it conceived industrial parks as the last unit of the Economic Development System, a concept developed in 1996 and consisting of elements building on each other (e.g. business incubator, entrepreneurs' park), in the form of a real property providing sites for companies engaged in large-scale mass production of goods. On the other hand, in the 1990s, the organisation issued several publications (Figure 2) informing potential investors about the industrial parks proposed to be developed in the city.

Figure 2 Publications from 1994 and 1995, advertising the industrial parks to be developed in Debrecen



Source: DRGA 1994, Grasseli–Láng, 1995

The first complex official documents of Debrecen dealing with the issue of economic development were prepared in the millennium. A study of these materials reveals that they consist of two/three levels, from which the lowest level (operational task/operational activity) dealt with industrial parks (Table 1). Based on a comparison of the individual documents, we can draw a number of important conclusions:

- as we move forward in time, there is a continuously increasing specificity of the locations, which is fundamentally due to the fact that from the second half of the first decade in the 2000s, there has been a more accurate perception of industrial properties of which further development has become necessary;
- in all documents, the need for the infrastructure development to be implemented in the Southern Industrial Park played an important role, which has two reasons behind this: on the one hand, due to the excellent location of the area from the aspect of logistics (the proximity of the airport), it has always been considered natural that developments would take place here, on the other hand, the preparatory investments necessary for the utilisation (the construction of the public road and physical infrastructure) could not be started for a long time – due to the high costs – thus, the necessity of these constituted an important part of all materials;
- the importance of developments related to logistics has been emphasised in all development materials, which can be primarily explained by the excellent transportation characteristics of certain parts of Debrecen (e.g. the airport and the bypassing roads);
- in the 2010s, as a new element, the improvement of accessibility appeared in the case of two industrial parks; although these facilities were nearly 100% full, poor accessibility constituted a serious obstacle to their normal operation (for example, the University of Debrecen, Science and Technology Innovation Park is still only accessible through a housing estate).

Table 1 Appearance of industrial parks in the development documents of Debrecen

	Strategic programme/ priority/medium-term thematic objective/ partial objective	Operational programme/ measure	Operational task/operational activity
A (2000)	Strengthening the competitiveness of the production sector	Investment promotion	- More conceptual formulation of industrial parks - Development of physical infrastructure - Development of business services
	Strengthening the logistical and transit roles	Logistics development based on the airport	Designation and development of the areas
		Logistics development based on railway/public roads	Designation and development of the areas
B (2003)	Economic development	Developing the competitiveness of the production sector	Infrastructural development of industrial parks and sites suitable for industrial activities
		Strengthening the logistical and transit role	Development of the logistical facilities and organisational frameworks
C (2006)	Providing the conditions necessary for more efficient economic development	Infrastructural development satisfying the requirements of the economy	- The construction of the infrastructure of the Southern Industrial Park - The expansion of the Debrecen Regional Innovation Science and Technology Park - Infrastructural expansion of the University of Debrecen, Science and Technology Innovation Park - The improvement of the standard of services offered by logistical centres - The expansion of the of the Western Industrial Park
D (2007)	Infrastructural development satisfying the requirements of the economy	-	- The construction of the infrastructure of the Southern Industrial Park - The expansion of the Debrecen Regional Innovation Science and Technology Park - The improvement of the standard of services offered by logistical centres
E (2014)	Infrastructural development satisfying the requirements of internationally competitive economy, creating an environment that is supportive of economic operators	-	- Infrastructural development of the Southern Industrial Park - The improvement of the accessibility of the Debrecen Regional Innovation Science and Technology Park and the University of Debrecen, Science and Technology Innovation Park - The logistical-purpose development of Debrecen Airport

A – the Economic Development Concept of the Municipality of Debrecen (2000); B – the Operational Development Programme of the Municipality of Debrecen for 2004-2006; C – the Strategic and Operational Programme for the Developments of the Municipality of Debrecen between 2007 and 2013; D – the Integrated Urban Development Strategy of the Municipality of Debrecen (2007); E – the Urban Development Concept of the Municipality of Debrecen for 2014-2020 (2014)

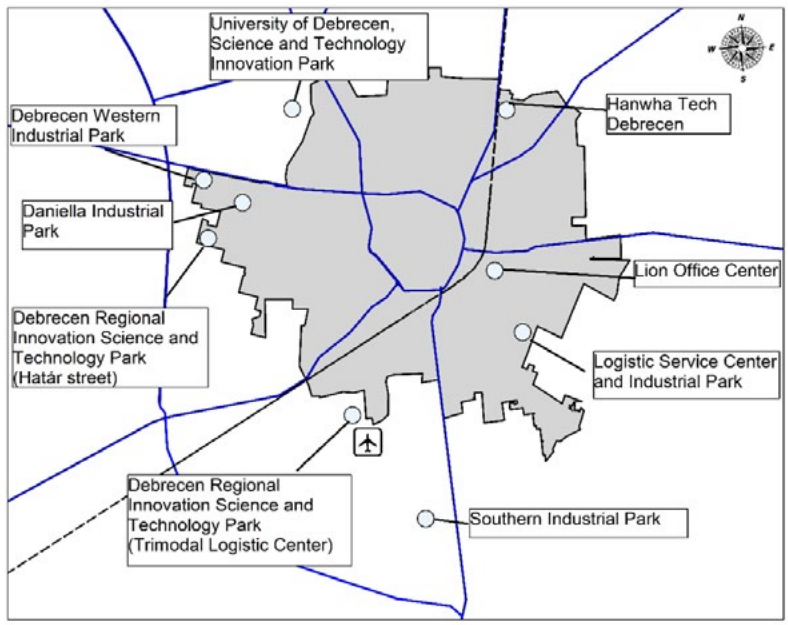
Source: VÁTI–Euro-Régió Ház 2000; Excellence 2003; Euro-Régió Ház 2006, 2007; Euro-Régió Ház–INNOVA 2014

3. THE ROLE OF INDUSTRIAL PARKS IN THE ECONOMY OF DEBRECEN

In recent decades, the organisations engaged in the field of real estate development (local government, business associations) established several *areas suitable for investment* in Debrecen: in the publication titled "Why Debrecen – Economy, Investment, Innovation" (2015), designed to promote investment opportunities in the city, for example, nine such areas (Figure 3) were listed. From these facilities five can be officially considered as Industrial Parks: the Debrecen Regional Innovation Science and Technology Park received its title in 1997, University of Debrecen, Science and Technology Innovation Park (its original name was Debrecen Agricultural-Industrial Park and it was awarded the title of Science and Technology Park in 2016) and Logistical Service Centre and Industrial Park in 2000, while the Western Industrial Park in 2001 (the first three were greenfield, while the last a brownfield industrial park, established on the area of the former factory for prefabricated concrete buildings blocks). The original name of the first one was Debrecen Regional and Innovation Industrial Park and it was awarded the title of Science and Technology Park in 2015. In parallel with this change the company operating it increased its area and currently this Park consists of two parts: one of them is situated in Határ street (its development was started in 1997) and the second part is situated near the airport (its name is Trimodal Logistic Centre).

From the other four properties, the Daniella Industrial Park (on the area of the former Beloiannisz Telecommunication Equipment Plant), the Hanwha Tech Debrecen (on the area of the former Hungarian Roller Bearings Factory) and the Lion Office Center (on the area of the former tobacco factory) does not reach the required minimum size (property of 10 hectares, plus an additional 10 hectares of development area), and therefore, their owners did not apply for the title. The construction of the infrastructure at Southern Industrial Park, an industrial park of much larger size than the previous ones, as well as the settling of companies in the park only started a few years ago, and as a result, the company managing the park was not able to satisfy the required conditions for a long time.

Figure 3 Areas suitable for investment in Debrecen in mid 2010s



Source: own work relying on EDC (2015)

By analysing the data of the large, medium-sized and potentially medium-sized enterprises operating in facilities with the title of Industrial Park and having a relatively larger headcount (employing at least 20 people), we can find significant differences between them (Table 2). In terms of its economic potential, the Debrecen Regional Innovation Science and Technology Park (in Határ street) stands out, which owes its outstanding role primarily to its size (the area of the facility increased from the original 40 to 135 hectares). This is the park which was already home to 45 companies in 2016[1] where the largest number of large, medium-sized and potentially medium-sized enterprises operate. Thanks to its size – employing 5000 people – it has a considerable role/relevance in the local economy. Furthermore, on the basis of the distribution of the employees between various sectors, this is the only park with a true industrial profile, where the representatives of metalworking and the machine industry (e.g. FAG Magyarország Kft.), as well as the electronics industry (e.g. National Instruments Europe Kft.) dominate, but the pharmaceutical industry, which has a long tradition in the city, is also represented by a significant company (Richter Gedeon Nyrt.).

[1] Bulik Péter: Az ország egyik legjobb ipari parkja a debreceni – videóval http://www.dehir.hu/debrecen/fontos-szakmai-cimet-nyert-a-hatar-uti-ipari-park/2016/02/05/ Retrieved: 10.12.2018.

Table 2 The most important characteristics of companies located in facilities in Debrecen having the title of Industrial Park and employing more than 20 persons, May 2018

	Number of firms	Number of employees
Debrecen Regional Innovation Science and Technology Park	23 (19[1]+4[2])	4 941 (4789[1]+162[2])
University of Debrecen, Science and Technology Innovation Park	1	1400
Logistic Service Center and Industrial Park	5	1011
Debrecen Western Industrial Park	12	784
Total	41	8 146

1 – Határ street, 2 – Trimodal Logistic Centre
Source: own collection and Creditreform Céginformáció company information database

If we take it into consideration that, on the basis of the census of 2011, the number of locally employed people in Debrecen is around 96 thousand, then the approximately 8–9 thousand people in total who are employed by companies operating at the Industrial Parks definitely represent less than 10% in the local economy. We can receive a more nuanced picture if we narrow our analyses to the companies. Companies operating in Industrial Parks account for nearly 10% of the local companies concerned (Table 3); at the same time, it can be clearly observed that this proportion is higher among larger enterprises. (This is especially true for units employing more than 500 people – with IT Services Hungary Kft. also taken into consideration, this proportion would be as high as 33.3%.) What is primarily behind this phenomenon is that a significant portion of the enterprises in the size category concerned (e.g. National Instruments Europe Kft., FAG Magyarország Kft.) already appeared in Debrecen in the new millennium, and the satisfaction of their needs (e.g. plots of suitable size, high standard of infrastructure) was only possible in the newly formed Industrial Parks.

Considering the future status of industrial parks, we can conclude that they will continue to play a significant role in the city's economic life. As proof of this statement we could mention that some of the larger-volume job-creating investments announced in Debrecen between 2016 and 2018 (about 1/3 in terms of employee headcount) will also be realised in facilities with the title of industrial parks (Table 4).

Table 3 The weight of locally headquartered companies employing more than 20 people and operating in facilities with the title of Industrial Park among local companies of different size categories, 2018*

	Number of locally headquartered companies operating in industrial parks	Total number of companies having their registered seat in Debrecen	Proportion of companies operating in industrial parks (%)
20-49 employees	13	244	5.3
50-249 employees	15	116	12.9
250-499 employees	3	14	21.4
Over 500 employees	3	11	27.3
Total	34	385	8.9

* – the difference from the figures in Table 3 is due to the fact that, in order to ensure comparability with the municipal data, we only took into consideration companies having their registered seats in Debrecen, as a result of which certain companies (e.g. IT Services Hungary Kft.) fell outside of our scope of examination.
Source: own collection and Creditreform Céginformáció company information database

Table 4 New investments announced between 2016 and 2018 resulting in additional employment of at least 100 employees, as well as their appearance in Industrial Parks

Name of firms	Number of new employees	Economic sector	Location
BMW	1000	automotive industry	North-western Economic Area
FAG Magyarország	510	mechanical engineering	Debrecen Regional Innovation Science and Technology Park
Krones	500	mechanical engineering	Southern Industrial Park
Continental	450	electronics	Southern Industrial Park
Flowserve	400	shared service centre	Lion Office Center (later Agora Office Debrecen)
Thyssenkrupp	250	automotive industry	University of Debrecen, Science and Technology Innovation Park
National Instruments	210	electronics, shared service centre	Debrecen Regional Innovation Science and Technology Park
EPAM	200	shared service centre	Forest Office Debrecen

Transcosmos	150	shared service centre	Debrecen Regional Innovation Science and Technology Park
Diehl Aircabin	150	mechanical engineering	Forest Office Debrecen
Richter	125	pharmaceutical industry	Debrecen Regional Innovation Science and Technology Park
Intertanker	120	automotive industry	Debrecen Regional Innovation Science and Technology Park
Alföldi Tej	110	food industry	Köntösgát street
British Telecom	100	shared service centre	City Centre
IT Services	100	shared service centre	Lion Office Center

Source: relying on data of EDC Debrecen

4. CONCLUSION

Our paper investigated the role of industrial parks in the economic development of Debrecen, Hungary's second largest city. The most important findings of the study could be summarised as follows. Firstly, industrial parks were important constituting elements of the city development documents: basically, they were regarded as the flagships of Debrecen's economic revival. In that spirit, improving the endowments offered by them was always an important goal: both always present – everlasting – tasks (e.g. the extension of their area and the development of their infrastructure) as well as new problems waiting for solution (e.g. the improvement of their accessibility) arose in this framework. These objects played a very important role in the development of the local competitiveness: the newly arriving firms (e.g. National Instruments, Richter Gedeon) or the larger companies no longer able to expand their earlier sites (e.g. FAG, IT Services) during their search for possible sites regarded the Industrial Parks as easy solutions – unlike the old industrial areas located at the south-eastern part of Debrecen – due to their good accessibility, the lack of environmental problems and spatial limitations posed by the existing building stock. (This statement – with limitations – is also valid for the medium-sized companies, although they have a broader range of choices based on the existing old properties.)

Secondly, comparing the objects officially possessing the Industrial Park title to the park categories presented in the theoretical part of our article we cannot identify clear tendencies. The University of Debrecen Science and Technology

Innovation Park as well as the Határ street site of the Debrecen Regional Innovation Science and Technology Park can be regarded as fully greenfield objects, while the Debrecen Western Industrial Park can be categorized as an earlier (brownfield) industrial area representing the opposite extremity. The Logistic Service Centre and Industrial Park belongs to the type of industrial parks grown out of logistic centres, while the other site of the Debrecen Regional Innovation Science and Technology Park located next to the airport (Trimodal Logistic Centre) constitutes a special case of the properties established on a former military area but containing also significant greenfield parts. The sectoral specialisation of the Industrial Parks can be observed only in some cases: the site of the Debrecen Regional Innovation Science and Technology Park located in Határ street is dominated by manufacturing, in the Debrecen Western Industrial Park mostly enterprises dealing with trade can be found, while in the case of the Logistic Service Centre and Industrial Park as well as the Trimodal Logistic Centre at the airport transport and warehousing are the main activities. Two objects (Debrecen Regional Innovation Science and Technology Park, University of Debrecen Science and Technology Innovation Park) have the title of "Science and Technology Park", but their situation is quite peculiar. Despite the definitions accepted internationally, the practical implementation of innovations and R&D results developed by the university is very limited in these parks and the relationship with the higher education institution means mostly ensuring the labour force needed by the firms (the only exception is Richter Gedeon).

Thirdly, the enterprises functioning at the Industrial Parks are very important actors of the local economy (which is especially true for the firms employing a larger number of people), and this situation – considering the already announced expansion plans – is likely remain in the next 4–5 years. The supportive measures of the local government regarding Industrial Parks can be identified in two contexts: the improvement of their accessibility by investing into the transport infrastructure and the support of their territorial expansion by changing the regulation. In the far future, the situation of the new southern industrial park as well as the developments related to the BMW-investment can be regarded as crucial factors. In the first case the main question is whether it is important for the local government that the property have the title of "Industrial Park": considering the current situation and the present legal conditions the real opportunity for submitting an application will open up in 3–4 years. While in the case of the BMW the new economic area planned north of the plant covering approximately 100 hectares can also be an important element of the local economic development.

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LÁSZLÓ JUHÁSZ

Overview of industry 4.0 tools for cost-benefit analysis

Abstract

The Fourth Industrial Revolution, which was formulated by the German Government in 2012, designated the high digitalization of production processes as the industrial innovation strategy for the next decades. However, in the fifth year following the announcement of this digital revolution, there have been few signs of this in the Hungarian economy, which is closely connected to the German economy. One of the reasons for this is that industrial actors are unaware of the benefits of digitalization and do not have any information on what kind of charges are incurred during these projects. This issue is covered in this article. Different tools of Industry 4.0 are discussed from the point of view of the concrete benefits that a production company can gain from them and the costs incurred from them.

Keywords: Industry 4.0, Fourth Industrial Revolution, tools of Industry 4.0, cost-benefit analysis

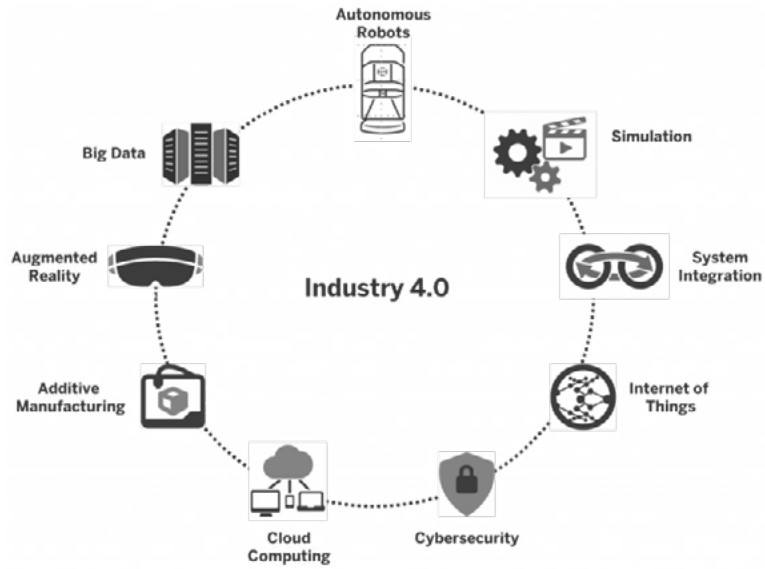
INTRODUCTION

The demographic, economic and technological changes in the world and in Europe have led the German industrial actors to announce a new industrial revolution in the 2010s (Kagermann, 2015). This revolution was named Industry 4.0, which became the European Union's major industry and production innovation strategy (International Electrotechnical Commission, 2015). As a member of the European Union and as a significant partner of the German economy, the Hungarian economy's main innovation direction will be Industry 4.0 and intensive digitalisation.

The general goal of the Fourth Industrial Revolution is to increase productivity and efficiency (Thames–Schaefer, 2016). There are six basic principles related to Industry 4.0 (Hermann et al., 2015; Kagermann, 2015): collaboration between the physical and virtual world, real-time operational capacity, virtualization of manufacturing processes, decentralization of the management system, service orientation, and high modularity.

There have been nine technologies related to these guidelines (Figure 1). These technologies include the Internet of Things, Simulation, Big Data Analysis, Cloud Computing, System Integration, Augmented Reality, Cooperative Robots, Additive Manufacturing, and Cyber Security.

Figure 1 Technologies of the Fourth Industrial Revolution



Source: Design for Industry 4.0, The University of British Columbia

Industry 4.0 innovation investments are far more than standard technological developments. The Fourth Industrial Revolution has an impact on the entire production process, with its tools the actual model of the value chain and the structure of the information network are changed, but the exact consequences are still relatively unclear. More and more publications are emerging about the practical implementation of these technologies, but there is very little information regarding their costs. It is particularly important to know the cost of these implementation projects not only because of the return on investment, but also from the point of view of what changes can be expected in the value chain.

In this article, the focus is on the issue of what are the benefits of the various technologies of Industry 4.0 for a company and what costs are incurred during their application. This article is not designed to produce a concrete, comprehensive impact study but rather to pay attention to the cost aspects for a company decision maker when using the various technologies. In the following chapters, the benefits, and the expected costs are discussed, then a specific cost accounting example is mentioned for each technology.

The cyber security aspect is a "concomitant" of other technologies due to increased digitization. Companies should pay careful attention to the design and configuration of intellectual property associated with manufacturing (Sadeghi et

al., 2015). In addition, a highly important aspect of a production organization is the high availability of IT systems. Various hardware and software companies take special care to ensure that their products are equipped with security and authentication features (Dahad, 2018), but each Industry 4.0 technology needs to keep an eye on security considerations (Ashibani–Mahmoud, 2017). These are in many cases approaching system design factors in which it is difficult access their costs, and we do not specifically mention them in each technology.

We must also mention the necessity of the network connection. One of the root causes of the Fourth Industrial Revolution is the high-speed, relatively low-cost network systems. They are highly scalable, with low response time, wireless and high-speed connections. The speed and availability of the network at an industrial level can greatly influence the benefits of each technology ("Internet of Things," 2016). With regards to the details of the technologies we did not count separately the network capacity and its hidden cost.

In the cost side analysis, the sustainability aspect must be mentioned as well. More and more companies aim to reduce the environmental burden. Certain technological solutions may be conducive to the company's performance and profitability but cause excessive environmental pollution (such spares made from 3D printing) in the entire manufacturing process. We do not specifically mention this in the analysis, but sustainability issues can be important strategic considerations in the long run.

Due to the author's deeper knowledge in the Hungarian industrial environment and the publication is primarily intended for Hungarian industrialists, in the cost calculation examples the costs are also shown in HUF.[1] The cost of the energy was based on the corporate price valid from 1 January 2017 in Hungary ("Current prices - Business - E.ON," 2018). The average Hungarian wages were considered in the calculation of the labour costs ("Salaries in Information Technology field," 2018).

1. INTERNET OF THINGS, SIMULATION AND INTEGRATION

1.1. BENEFITS

Using the Internet of Things technology, various physical quantities of the manufacturing processes are measured with smart tools and, if necessary, modifications can be made in the system with these tools. In practice, this is accomplished by placing smart, uniquely identifiable sensors and executors in certain places in the production environment. With the continuous operation of the sensors a constant and accurate digital image of the production processes is calculated.

[1] We calculated 320 HUF=1 EUR, 275 HUF = 1 USD and 1.13 USD = 1 EUR for the exchange rate.

Data from devices can be integrated into a common system so that we can get a true picture of the performance of the production equipment or manufacturing processes. Using this data, it is easy to find out what are the failures and the bottlenecks in the manufacturing process and how to use the available resources more efficiently. The technology makes it possible that the production process is customized for the product and the environment, and it is constantly looking for optimal settings. Consequently, their application can increase the company's manufacturing efficiency.

Another advantage is that intelligent sensors can be used to create a digital twin pair of manufacturing equipment. The further life span of these devices can be simulated (Jia et al., 2015). This eliminates and prevents certain machine malfunctions. In addition, a greater automation level can be achieved with the Internet of Things, which also increases the average production performance.

In connection with the Internet of Things, we need to mention another segment of Industry 4.0, that is system integration. Benefits of the Internet of Things cannot really be exploited until the company is not connected to a common IT system (Bischoff et al., 2015). In regards to the Fourth Industrial Revolution, there are three types of system integration (Figure 2). One such technique is vertical integration, which is understood to mean an IT link between a company's departments (VDI/VDE-GMA and Zentralverband Elektrotechnik- und Elektronikindustrie e.V., 2015). Another technique is product life cycle integration. From this aspect the whole life of one product is followed from its initial raw material state all the way to scrap (Stock–Seliger, 2016). A further technique is horizontal integration, which is the knowledge, information and resource sharing of the different actors in the supply chain (VDI/VDE-GMA and Zentralverband Elektrotechnik- und Elektronikindustrie e.V., 2015).

Figure 2 Horizontal and vertical integration of the Internet of Things

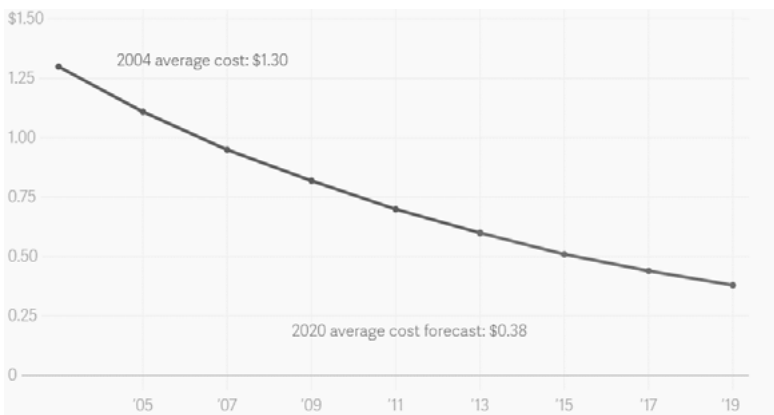
Source: Gehrke et al., 2015

1.2. COSTS

The most important costs of the Internet of Things are the specific hardware, software deployment and employee wages.

The most basic costs of hardware deployment are the various smart sensors and executors (Mital et al., 2018). Their price depends significantly on the type and conditions of the usage of the technology. The trends show that with the spread of technology the price of these devices has generally declined sharply in recent years, and this process will be typical in the near future (Figure 3) ("The average cost of IoT sensors is falling," 2016).

Figure 3 The average cost of IoT sensors over the last decade



Source: The average cost of IoT sensors is falling, 2016

Additional hardware costs are part of signal processing systems, and are also dependent on their complexity (from a few hundred to thousands of dollars ("IoT Gateways," 2018)). In addition, a mass storage is needed that is capable of storing data from the sensors and the controlling logics. An IT cloud is becoming more and more commonly used as the storage system for this. The benefits and costs of the cloud computing are explained in detail in part 3. Generally, the prices of these hardware solutions are showing a decreasing trend lately.

On the software side it is necessary to have a well-designed system that stores the signals in a proper structure in the databases. In addition, an application that evaluates and displays stored data to users is essential. Of course experts with relevant experience are needed to build and operate these systems.

System integration must be considered, so it is necessary that the entire company and other companies in the supply chain are included in a common information system. The cost of this consists of diverse hidden costs beyond the hardware and software costs (such as network expansion and security costs).

This high level of integration leads to a new level of standardization and information sharing between companies.

1.3. EXAMPLE

The costs of the Industrial Internet of Things can be very varied depending on the portion and the depth of the production is plant to implement. To illustrate the costs we will consider a small project related to the Internet of Things as an example (Parra et al., 2018).

This example shows a pilot project in the area of agriculture. Smart wireless sensors (WSNs) monitor the water quality and fish behaviour in aquaculture tanks during the feeding process. The monitored parameters are the water temperature, conductivity, turbidity, the presence of an oil layer over the water, the illumination of the tank state, the presence of the worker and the fish's behaviour. The data management application must be prepared by a skilled expert. In contrast to the project we must count the salary of the programmer too.

These devices could send the monitored data to an IT cloud. The specific costs of the cloud are discussed in the next section. The system stores the data for a longer term and it can retrieve measurement results for several months. Of course, the analogy of this project can be applied to a manufacturing environment with similar hardware and software solutions.

Sensors (temperature, conductivity, etc.) costs: 47.44 EUR = 54 USD (15 490 HUF)

Node costs: 40.22 EUR = 45.5 USD (13 000 HUF)

The software deployment requires approximately 80 hours programming time: 1000 USD (285 000 HUF)

Cost of Internet of Things pilot project: 1099.5 USD (313 500 HUF)

2. BIG DATA ANALYSIS

2.1. BENEFITS

With Big Data Analysis in the case of manufacturing firms right conclusions are expected to be drawn from such data which significantly exceeds human and standard processing capabilities. In addition, the data is very large, varied and it must be quickly processed (Hilbert, 2016).

The Big Data Analysis can save a lot of time, since fast and reliable data can be obtained from the economic operators. In this way, current and future market trends can be determined, which can be a competitive advantage to your competitors (Chen et al., 2014).

The Big Data concept can be adapted to the manufacturing environment as well. In that field the status of the manufacturing machines and processes can be used

as input data. In this way a very reliable picture of production on the operating level can be calculated. The weaknesses of the system can be chosen, and the future failure of each item can be determined. Hence, the whole manufacturing process will be significantly more controlled.

2.2. COSTS

The application of Big Data Analysis requires large amounts of accurate and reliable data as input elements. If the object of the analysis is the production data, the easiest way for data acquisition is to use the Internet of Things. The cost of these data collection systems is detailed in the previous chapter. Other data sources may include information from the integrated processes of partner companies and data from the market.

The Big Data Analysis uses large volumes of data that cannot be handled using the standard data-processing systems. These data volumes can efficiently be stored and processed only with a distributed system, such as the Hadoop ("What is Hadoop?," 2018) file storage, MapReduce programming framework, and HiveQL programming. With these systems the operation of cheaper hardware can be linked to each other, and that can significantly reduce the cost of handling data even in petabyte sizes. The biggest advantage is that these are often open source systems, thus, the investment costs are mostly only hardware stocks and staff wages. Furthermore, they can run a processing process parallel to clusters, so even large data sets can be quickly processed. In addition, it is flexible and scalable, therefore, the system is appropriate in the case that there is a change in the company and there is an expansion of its tasks (ATKearney, 2013). For the design, preparation and use of this entire infrastructure a high-skilled workforce is required.

2.3. EXAMPLE

The main costs of a realised project of the Big Data Analysis in industry is presented below (Winter et al., 2013). The aim of the authors is to compare the traditional data storage technology from a cost side to the technology which supports the distributed processing of large datasets.

The authors list the following costs arising from the Hadoop Big Data technology:

- Cost of procurement and development of the system
- Cost of maintenance and support of the system
- Cost of storage and power consumption for storage computers

The study's conclusion based on American wages and a five-year cost horizon is the following:

Data set: 500 TB
System cost: 1.4 million USD
Administration: 0.8 million USD

Application development: 7.2 million USD
Full cost: 9.4 million USD

That is, a large-scale 500-terabyte of data for a 5-year-long Big Data Analysis requires 9.4 million USD. This means roughly 1 million HUF per terabyte per year. This is approximately one third of the traditional data storage method, according to the study.

3. CLOUD COMPUTING

3.1. BENEFITS

Using an IT cloud means that a company does not manage its data and services using its own dedicated hardware but it deposits the data on the devices of an external service provider. The operating details of the IT service are separated from the user, they are accessible on a network through the internet (Kim, 2009).

There are different types of IT clouds (Kim, 2009). They have in common that the user company does not need to incur hardware investments from the building of a local data centre, and so it is relieved of the overhead costs of these systems. On this basis, maintenance of the IT system in the whole company becomes simpler and the IT department can be reduced.

Clouds can be scaled in an extremely flexible way. You can easily add more computing and storage capacity, which, with a long-term or a temporary increase or decrease in the company's IT system, can lead to cost savings (Xu, 2012). The user company only has to pay the expense of its actual demand. For this reason IT cloud services are highly recommended for small and medium-sized companies as they can have a high-capacity IT system like large companies but they do not have to pay the one-off investment cost, rather only the fee of the data they use.

Members of the company can quickly and easily access the company's data and services wherever they are; a server computer and internet connection are the only requirements. It is the so-called 'cloud experience' when a user sees that they can 'connect to anybody, at anytime and anywhere', to this end a more efficient flow of corporate information can emerge.

3.2. COSTS

Companies often use IT clouds as outsourcing services. There are numerous cloud computing companies on the market that offer various customized services. The price of these services is primarily determined by the type of cloud service (software, platform or infrastructure service) you want to use. Another major factor influencing the price is the size of the used capacity (for example computing capacity or storage space).

In addition, other components also affect how much the service costs, for instance, the geographic location of the cloud, or the amount of time (full-time or partial) the company wants to use it. In the latter case, the company only pays on-demand. Other factors that influence the cost are the prospect of future capacity reductions or expansion and that of the relocation of the company ("Google Cloud Platform Pricing Calculator | Google Cloud Platform," 2018).

3.3. EXAMPLE

To calculate the cost of the IT cloud, the author uses the Career Portal on Rightscale Cloud Computing Solutions and then compared the prices to those of the best-known service providers (Google, IBM, Amazon and Microsoft) ("RightScale Cloud Management," 2018). The author checked offers for standard, high-memory and high-capacity processors.

The fees of these service providers widely vary (Table 1). With high-capacity processor, high memory and local SSD storage, Microsoft Azure is the most affordable with its 683 USD (188 000 HUF) annual price.

Table 1 Fees of IT Cloud Services

VM Type US Linux	AWS 1Y RI Annual	Google 1Y CUD Annual	Azure 1Y RI Annual	IBM Monthly + 30% off Annual
Standard 2 vCPU w Local SSD	$867	$884	$508	$764
Standard 2 vCPU no Local disk	$622	$524	$508	$624
Highmen 2 vCPU w Local SSD	$946	$1,013	$683	$998
Highmen 2 vCPU no Local SSD	$850	$653	$683	$998
Highcpu 2 vCPU w Local SSD	$666	$751	$543	$418
Highcpu 2 vCPU no Local SSD	$543	$391	$543	$418

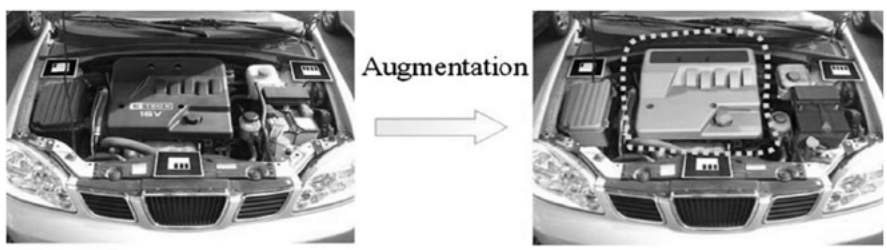
Source: "RightScale Cloud Management," 2018

4. AUGMENTED REALITY

4.1. BENEFITS

Augmented Reality can display a variety of predefined virtual models in the real environment at specific locations (Figure 4) (Lima et al., 2017). Its technology can be excellently used for various educational activities, as it helps the spatial thinking. Di Serio et al. (Di Serio et al., 2013) have shown that it has a positive impact on learning motivation. For this reason, this technology can make it easier and faster to learn the practical part of some types of educational activities, since it associates extra information with the real environment. The user can examine certain models and objects in all directions, just as they would a normal three-dimensional object. This extra information is mostly explanations (e.g., identifying raw materials) or some instructions (e.g., an assembly step).

Figure 4 Application of Augmented Reality



Source: Lee–Rhee, 2008

With the use of Augmented Reality, maintenance tasks, like tasks for repair and inspection, can also be carried out ("Augmented Reality applications accelerate motor-vehicle repairs and support technical trainings," 2018). These can be realised in the same way as installation operations. The system points to the object in which the repair is to be carried out or that needs to be checked. Thus, even a less-qualified worker can fulfil tasks that require deep system- and device-knowledge.

Further use of the system is in the prototype production. In construction or design engineering it can be very helpful to see the model in the environment and surroundings before it is actually built.

4.2. COSTS

To use Augmented Reality a mobile platform (tablet, smartphone) or a headset display (e.g., Microsoft HoloLens ("Microsoft HoloLens," 2018) is needed. The headset devices, due to their high price and low reliability, are not so widespread yet in the industrial environment. Meanwhile, high-speed tablets are affordable even for relatively small companies.

The library packages for augmented reality applications are open-source, or they are relatively low in price (e.g., $ 99 / month ("Vuforia Augmented Reality SDK," 2018)) that a medium-sized company can easily afford them. These library packages can be implemented at a relatively low-price ("Products - Unity," 2018) that allows for a development environment that can produce one's own software. The programming environment and the library packages require high-level of competence and experience.

In the market, serious efforts (Zappar, 2018) have been made to be able to use the technology of Augmented Reality without any deeper programming skills. In this way, the user can provide the relevant information on a graphical interface. However, in industrial environments, tasks with Augmented Reality can be extremely varied, so specialised situations in your own development environment is necessary. For this reason a professional who is responsible for preparing and maintaining the right applications is vital for the company.

4.3. EXAMPLE

To use Augmented Reality high-performance tablets, licenses for the programs, and the payroll of a professional programmer were calculated.

4 high performance tablet prices ("iPad Pro," 2018): 4 x 800 USD = 3,200 USD (880 000 HUF)
Price of a programming computer: 2,000 USD (550 000 HUF)
Programming environment license fee ("Products - Unity," 2018): 125 USD/ month (32,500 HUF/month)
Programming license fee ("Vuforia Augmented Reality SDK," 2018): 99 USD/ month = (26 000 HUF/month)
Full time programmer: gross 2,200 USD/month (600 000 HUF/month)
One-off expenses: 5,200 USD (1 430 000 HUF)
Cost per month: 2,424 USD (666 500 HUF)

5. COOPERATIVE ROBOTS

5.1. BENEFITS

Cooperative robots (cobots) can combine the flexibility of working with human beings and the robustness of robots. Unlike industrial robots, the cooperative robots do not perform a fully automated operation that is separated from human labour but become an integral part of human work (Figure 5). They can take on the repetitive, burdensome and dangerous part of work (Morioka–Sakakibara, 2010). In addition, they can also relieve the human workforce, which then can be transferred to a less automated field in the factory.

Figure 5 Production environment of industrial robots (left) and cobots (right)

Source: Kagermann et al., 2011

Being easily reprogrammed, cobots are extremely flexible. With them high-quality and high-performance can be achieved even in small quantities of manufacturing. Thus, economic production can be ensured almost independently of the number of units ("GyártásTrend - Szintet lépett az ipar 4.0," 2018).

5.2. COSTS

The price of a cobot is about 1.5 times of the industrial robot with similar parameters (Bélanger-Barrette, 2018). However, the comparison is not entirely appropriate, as it is possible to use a cobot for completely different tasks. For this reason there is a much cheaper version of the cobots, which can be used for simpler, lesser-duty jobs ("Low-cost cobot resurfaces after two years of development - Drives and Controls Magazine," 2018). An additional cost is the tooling of cobots, which is considerably cheaper compared to industrial robots. Furthermore, they can be added to the enterprise's IT system without any excessively high costs

because manufacturers develop their tools in line with Industry 4.0's expectations, and falling within the Internet of Things.

To be able to use the device properly, it is necessary to program the cobot. According to the manufacturers and other different users, these robots are much easier to set up for the right task. After a short manual training with the help of a graphical user interface they can be reprogrammed without any deep specific knowledge or experience ("Robot or cobot," 2018; Conrad, 2017).

5.3. EXAMPLE

When calculating the full cost of the application of a cobot only the investment and operating costs of the equipment is taken account. Since it is easy to handle, it is not needed to employ a specific programmer for this task.

Cost of Cooperative Robot ("CobotsGuide," 2018) including tooling, transport and training: 70,000 USD (19 million HUF) (approximately).
The maintenance cost is 1,000 USD (275 000 HUF) per year.
Machine running costs, which operate throughout the year: 3,490 USD (960 000 HUF)
One-off expenses: 70,000 USD (19 000 000 HUF)
Annual cost: 4,490 USD (1 235 000 HUF)

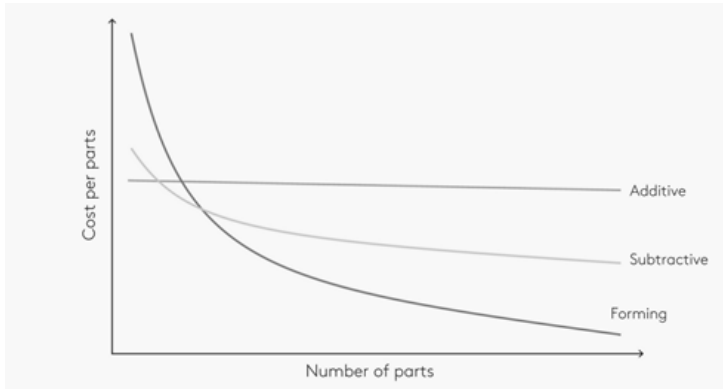
6. ADDITIVE MANUFACTURING

6.1. BENEFITS

Additive manufacturing is a relatively new production method. Unlike traditional methods of subtractive manufacturing, which remove materials in order to make the finished product, additive production equipment produces the finished product from a powdered raw material by adding it layer to layer until the product is totally finished ("3D Printing vs CNC Machining," 2018).

With additive manufacturing technologies the specific production cost of a product does not depend on the number of pieces, in contrast CNC machining and shaping processes the cost decreases in line with the increase of the pieces (Figure 6) ("Innovation in Creation," 2016). Thus, additive manufacturing technologies are primarily cost-effective for prototypes or for a smaller quantity of items. In accordance with Industry 4.0 standards 3D printers can economically produce completely unique products. The principal reason is that there is no product-specific tooling used in this technology. Furthermore, it is easier to achieve JIT (just-in-time), always on-demand production, and there is no large inventory.

Figure 6 Comparison of various manufacturing methods' costs over number of parts

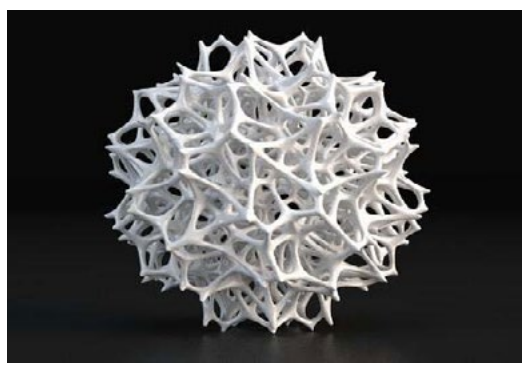


Source: "Innovation in Creation," 2016

Compared to traditional production time, additive production time is relatively high. However, on the other hand, it is needed to take into account that with additive technologies all components can be produced 'under one roof' (Thomas–Gilbert, 2014). Therefore, there may be fewer actors in the supply chain, which reduces the vulnerability of the manufacturing process. Hence, transport costs and time, i.e., total lead-time and the total cost of the series can be reduced.

Furthermore, with 3D printers it is possible to economically produce complicated-shaped geometric models and assemblies that conventional production cannot handle (Figure 7).

Figure 7 Complicated-shaped part produced by a 3D printer



Source: Benaroya et al., 2013

In addition, 3D printing may open a new chapter of support and supply with regards to products because in the future users could exchange their product or print a new one in their home. Thus, transport and storage costs of the manufacturing companies could cease.

6.2. COSTS

The primary costs related to additive technology are the following: the costs of the machine and that of the raw material, overheads and programming fees.

The price of a 3D printer with additive technology is very variable, for industrial use it can cost from $2000 to $750,000, depending on the specifications, similar to a traditional CNC machine ("3D Printer Price - Stratasys 3D Printers," 2012) ("The Best Industrial 3D Printers," 2018). The manufacturers nearly always annex the software for the 3D printer. Nevertheless, experts are predicting a steady decline in the price of printers due to the widespread use of this technology ("Innovation in Creation," 2016).

The cost of the raw materials used for this technology, however, significantly differ from the ones in traditional methods. They are approximately ten times more expensive than those used for traditional production technologies (Atzeni–Salmi, 2012). For this reason, several methods have taken on priority status in 3D printing that can reduce the amount of raw material, such as the proportional reduction of the model size [56] or the substitution of the solid shapes to net (Kroll–Buchris, 2018).

An additional cost is the overhead costs of the equipment. The final energy consumption of the equipment using additive technology per finished product depends greatly on the compactness of the volume of the finished product. At low compactness / cavity ratio, it is the additive technology that has high rates, and in contrast it is the conventional CNC production which consumes less energy per product (Morrow et al., 2007). The production time of 3D printers is relatively high compared to other technologies; it may take up to several hours to produce a simple model.

In the additive manufacturing technology, the programmer's labour also needs to be taken into account. In a manufacturer environment, CAD models of the products are usually already available but they must be reconstructed for the additive manufacturing technology and technological settings must be also carried out. For these tasks, -high-qualified, well-experienced technicians are required. It is difficult to estimate the time and cost of this operation, it depends on the complexity of the product, the user's experience of this technology, and that of the specific manufacturing machine.

6.3. EXAMPLE

To illustrate the cost of additive production, the expenditure side of the preparation of an average product is shown. These expenditures are the followings: the

cost of the manufacturing machine and that of the raw material, the overheads and the programming fees.

A manufacturing company's medium-sized, reliable 3D printer with high quality and speed data for industrial use with approximately 20 percent tooling, transportation and training costs:

- plastic (FDM technology, ABS material): 42,000 USD ("Dimension 1200 Reviews & Ratings," 2018) (11 500 000 HUF)
- metal (SLS technology, complete set): 144,000 USD (Metal, 2018) (40 000 000 Ft)

An additional 1,000 USD (275 000 HUF) is required annually for the maintenance.

Approximate preparation cost for a general model of 60x60x60 millimetres:

- ABS: 6.8 USD (1 850 HUF)
- Metal: 373 USD (102 500 HUF)

Production cost (ABS printing)

One-off expenses: 41,800 USD (11 500 000 HUF)
Annual cost: 1,000 USD (275 000 HUF)
Cost per piece: 6.8 USD (1 850 HUF)

Preparation cost (Metal printing)

One-off expenses: 144,000 USD (40 000 000 HUF)
Annual cost: 1,000 USD (275 000 HUF)
Cost per piece: 373 USD (102 500 HUF)

7. CONCLUSION

Economic actors believe that the Fourth Industrial Revolution shows the path of development in the near future. The new industrial revolution has an impact on all manufacturing processes and in the value chain there is a need for new types of networking and information sharing. New technologies are also introduced into the production environment in connection with the revolution. These technologies include the Internet of Things, Simulation, Big Data Analysis, Cloud Computing, System Integration, Augmented Reality, Cooperative Robots, Additive Manufacturing, and Cyber Security. The success of the dissemination of these technologies in a country can be mostly defined by the joint innovation activity of government, universities and the industry.

As the objective of the study, considering the Hungarian situation, was for the government to assess the importance of the fourth industrial revolution and its potential impact on the state economy, this occurred right on time. In 2016 it adopted the direction of industrial development with the Irinyi Plan in which industrial digitalization plays a major role. The so-called Irinyi II Venture Capital

Fund was published in 2017, which supports the local small and medium sized companies to improve the efficiency and digitization efforts related to Industry 4.0. In addition, it also finances more information hubs (for example the National Technology Platform). The major universities function as knowledge centres and they opened more information centres like the Industry 4.0 Technology Center at the Budapest University of Technology and Economics. They provide support to industrial companies in common projects.

Corporate engagement is still missing; since the announcement of the Fourth Industrial Revolution more years have passed and there is little practical implementation in domestic industrial companies. The explanation for this is relatively complex. One reason might be the lack of skilled workers in the sector, the other is the fear of cyber attacks but perhaps the main reason is that its exact consequences for the companies' budget and the whole economy at the moment are uncertain.

The decision makers at a company need to be aware of the applicability of these various technologies of the Fourth Industrial Revolution before starting their investment. In this article these technologies have been demonstrated, the expected benefits of each technology have been detailed, and it has been shown how cost-effective they are. With regards to technologies it can be generally stated that the prevalent trend is that their prices are constantly decreasing, their performance and reliability are rising, and they are increasingly accessible to a wider range of users.

These technologies can be useful on their own but it would be worth considering how these technologies would be used jointly by a manufacturing company or the entire national economy, if horizontal and vertical integration would be achieved in the entire value chain of a product. This requires further research and deeper analysis.

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SZABOLCS MORVAY

The area of Győr in the light of economic and social aspects –spatial relationship analysis

Abstract

The roles of cities are steadily growing in value. Additionally, over the past decade some changes can be detected in urban governance. In the early 1990s in Western Europe the macro-regional governance – as a new way of governance – already came into focus and the cooperation among the city and its suburban settlements, regional coordination, spatial planning at a regional level and macro-regional institutional organisations support the city regions. Thus, as the subject of this study, city regions or metropolitan areas are presented, the definition of which includes their agglomeration and the adjacent settlements. What methods are suitable to research the division of functions among settlements? What benefits are to be gained from facilitating their harmonisation? What role does a central settlement play in its agglomeration and what is its responsibility in the full provision of the missing functions in the case of small settlements and villages with deficiencies? In this study some additional scientific information will be provided to enable these questions to be answered. Taking Győr and its agglomeration as the object of the study and processing data collected from an empirical research allocated by the VIDGY (Vehicle Industrial District in Győr) research, the method of spatial relationship analysis is used.

Keywords: city region, agglomeration, spatial relationship analysis, Győr, trajectories

INTRODUCTION

The roles of cities are becoming more and more valued. Additionally, over the past decade some changes can be detected in urban governance. Although polycentric urban development and regional development models based on urban networks were not unknown previously, in recent years increasingly detailed versions recognize the beneficial effects of cities and their agglomeration on the development of the regions (Pálné Kovács, 2008). In the early 1990s in Western Europe the macro-regional governance – as a new way of governance – already emerged and cooperation between the city and its suburban settlements, regional coordination, spatial planning at regional level and macro-regional institutional organisations supporting the city regions. After the Keynesian-Fordian period the macro-regional governance reform considers, along with attracting external capital

investment into the region, increasing territorial competitiveness and development as a fundamental goal (Brenner, 2003). Nowadays the most striking forms of agglomerations are the super-agglomerations or urban regions which have appeared worldwide over the past couple of decades featured by characteristics such as a complex inner structure including several urban centres, extensive suburban areas, hinterland areas of wide scope providing space for scattered settlements (Hall, 2001).

These urban regions are the "locomotives" of the national economies – in which they are situated – and these are the venues of the dense mass of interconnected economic activities, typically characterised by high-level productivity due to their jointly generated agglomeration economy and their innovative potentials. In various developed countries the main metropolitan areas grow faster than other areas, even in the countries which seemed to return to the non-metropolitan growth patterns and systems (Forstall, 1993).

Despite the fact that cities are the privileged platforms of economic growth – by means of capital intensive infrastructure and benefits of economies of scale – regional agglomerations have also contributed to the process of enhancing growth: the growth and expansion of industrial clusters, the reduction in shipping, transport and communication costs and a number of other factors influence the economic recovery of the metropolitan area (Scott–Storper, 2003).

Therefore, as the subject of this study, city regions or metropolitan areas are presented, the definition of which includes their agglomeration and the adjacent settlements, since none of the cities can be found in space structure in isolation, completely cut off from the neighbourhood without any connection to it. Instead they constitute an integral part of them with their sphere of action expanded over the "City Gates" and their involvement in settlement network and its central location. However, it is not only the central location which deserves special attention, but managing it together with the adjacent settlements favourable synergies - originated from their interconnection - can be experienced. Such synergies may be the division of functions within the urban region, resource flows in the agglomeration or efficiency mechanisms.

What methods are suitable to research the division of functions among settlements? What benefits are to be gained from facilitating their harmonisation? What role does a central settlement play in its agglomeration and what is its responsibility in the full provision of the missing functions in the case of small settlements and villages with deficiencies? In this study some additional scientific information will be provided to enable these questions to be answered. Taking Győr and its agglomeration as the object of this study and processing data collected from an empirical research allocated by the VIDGY (Vehicle Industrial District in Győr) research, the method of spatial relationship analysis is used. However, due to the large number of settlements, analysing the entire agglomeration would impose a huge task, so the data of the 11 settlements located in the immediate "settlement-ring" round Győr

was calculated with, since the common features of their closeness and their direct linkages to the central area allow them to be handled together and to be separated from the more remote settlements in the agglomeration. In the VIDGY research the mayors of these settlements answered trajectory related questions affecting their inhabitants, the mayor of a small settlement being the person who has the appropriate knowledge of its residents' habits, family relationships and activity in economy and business. Therefore, the data will most likely provide a precise picture about the usual trajectories, albeit with possible individual derogations.

The structure of study is built as follows: I show the functional urban region in general, its role and its features in the spatial structure, the next chapter deals with the method of the spatial relations analysis. The empirical chapters contain the introduction of methodology, the examined settlements and finally the functions, which generate the spatial trajectories, and itself the concrete spatial trajectories. The conclusion chapter draws the final consequences.

1. DEVELOPMENT AND ROLE OF URBAN REGION IN SPATIAL STRUCTURE

City region, urban region, functional urban region, metropolitan area and agglomeration. The above listed definitions mark spatial categories and in several documents they are applied as interchangeable synonyms. In documents dealing with territorial development and in literature they are well-defined and approved, but slight differences can occur regarding the criteria and the indicators which help identify the borders of the given agglomeration. Specifying the most important elements among the supposingly well-known definitions we can state that a city region is a combination of settlements where you can find a central - more developed - city and the surrounding settlements which are linked to that central part based on certain functions (Tóth–Schuchmann, 2010).

In the 1990s it was a common phenomenon that the population grew not in the central, but the adjacent settlements. From the central area the inhabitants migrated to the settlements in the agglomeration area, in the same way as those coming from other areas. The aforementioned functional linkage articulates in "leaving" the jobs in the centre, since most workplaces of the active population in the agglomeration can be found in the central settlement. In addition, numerous functions and needs, such as education, healthcare, commerce, financial services or cultural activities, link the inhabitants of the adjacent settlements to the city. Creating the necessary links among the settlements is ensured by various network infrastructure systems like transport, power supply and public water supply (Kovács–Tóth, 2003).

The city and its environment as a spatial structural unit have not been used for the first time for settlement demarcation. The concept of city region

has been dealt with for two generations. Further key factors from the attributes of city region need to be added to the previously mentioned definition elements. The central city creates a network relationship with the adjacent settlements, in which rivalry does not occur; moreover, any further development of the developed city will be beneficial to the rest of the settlements. It should be mentioned that resource flow (e.g. labour force) does not only happen towards the central city. Examples include that the missing functions in the "outer area" can be found in the centre and this can guarantee their supply for the inhabitants of the adjacent settlements. Furthermore, spatial specialisation is feasible when a settlement provides a certain service by itself throughout the whole urban region (Faragó, 2006).

Nowadays metropolitan areas are the territorial engines of the economic growth in Europe (Fekete, 2017a). The internal elements of the operation of a city region such as the cooperative systems of cities and their agglomerations and the allocation of tasks and functions among the settlements in a metropolitan area and economic governance must be highlighted.

Along with the strengthening of central functions, these days urban governance also means economic governance, the creation of cooperation that occurs among economic, scientific and civil societies and this governance-type cooperation can be observed especially in automotive regions, such as Győr. Cooperation exists in various forms and it affects the development of economy through numerous means. Among others, the local governments may give help to the companies, forming the conditions of settling down, developing them or supporting the research and development activities of the companies. However, the companies also make commitments by taking over some public service tasks from the local government. It can also occur – as in Ingolstadt, the twin city of Győr – that the local government sets up a company for economic development to enhance economic attractiveness with services like providing information, being involved in the marketing of economic areas and facilitating interaction between companies. Universities and other higher education institutions have also managed to find interfaces with both the companies and the government, and even civil organizations are given room in the processes of economic development (Fekete, 2017b; 2014a).

Urban cohesion – as the well-established function-supplying mechanism of the city and the adjacent settlements – is the responsibility of urban policy. This means, on the one hand, the harmonisation of urban and rural services, prioritising strategic planning over traditional urban planning, ensuring their participation in the planning and taking the goals concerning sustainability and environment into account. From this point of view, we can talk about integrative urban policy, which can be found quite frequently in the centre of discussions among experts on urban development (Pieterse, 2004).

On the other hand, urban development policy unfolds with great difficulty in Hungary, although the demand for managing the urban network as a unit

or the importance of the effects that economic development competitiveness has on its wider environment has already been articulated. In the European Union the importance of the relations among cities/towns, the creation of their cooperative networks and developing common regional spatial strategies are better represented. The EU offers all of these factors by applying an integrated approach, i.e. the problems of urban areas should be managed by a coherent approach. This requires local partnerships, applying governance and creating networks (Somlyódyné Pfeil, 2006).

Thus it can be stated that it is worth governing centre cities together with their agglomeration area and not on their own, since the active residential trajectories between the centre and its agglomeration can be continuously observed as well as their spillover effects. A possible way of urban governance may be the horizontal cooperation of the administrative units, their partnership or the creation of any type of contractual relationship. In Europe some local governments have already united in several places. The new urban policy attempts to improve not only the modernisation and the efficiency of the administrative structure, but it can contribute to the increase of the competitiveness of the cities (Somlyódyné Pfeil, 2008).

Consequently, from functional and regional development aspects the management of the central city and its adjacent settlements as a whole can be articulated as an urban policy goal by the policymakers and operators forming the actual urban policy. Two factors can be primarily highlighted as the constituents of unity: one is the redundancy of functions in the centre, which makes the adjacent settlements link to the central area, the other is the municipal specialisation within the urban region, from which division of functions may result.

The cities are obliged to work out their concepts for the future and their urban strategies, an obligation which is a legislative and administrative task; moreover, it is a fundamental step of the process of conscious development in cities. The strategic documents of Győr – Integrated Urban Development Strategy, The Sustainability Program of Győr, Integrated Settlement Development Strategy, Settlement Development Concept – include the importance of the relationship between the city and its environment, urban region cohesion, the central role of the City of Győr and its attraction to the adjacent settlements, its intention to strengthen, its ambitions and actions. The Integrated Urban Development Strategy (IUDS) formulates that beside the inhabitants of the City of Győr, it also indicates it ensures a high level of living conditions for the residents of its agglomeration area. It takes a central role in several functions like quality higher education, vocational training, adult education, the creation of the research & development infrastructure, being a cultural centre and urban technological base, public transport and renewable energy sources. The Sustainability Program intends to position Győr in the region as its centre, the Integrated Spatial Development Strategy (ISDS) and the Settlement Development Concept (SDC) endeavour to create a diverse urban economy and they

consider Győr as a regional centre. These strategic goals have remained basically unchanged over the past years (Fekete, 2014b), and the increase of economic competitiveness, the exploitation of the human capital potential, strengthening tourism, sports and culture or urban strategy planning all prove the act of thinking in an urban region and the strengthening of the central functions in Győr.

The function surplus of the centre can have a dual meaning. On the one hand, it may involve function deficiencies in the adjacent settlements, which can represent both real and simple efficiency problems, since the economical operation of certain public services requires a minimum threshold. On the other hand, the central area is to be prepared to satisfy the needs of not just its own residents, but of those from the adjacent – even as many as 40–50 – settlements as well. To discuss this type questions, it is strictly necessary to carry out a function analysis.

In the meantime, it is not mandatory for the central area to take responsibility for all the functions because the previously mentioned division of functions in the urban region can lead to greater efficiency and generate synergy effects, and last but not least, aspects of competitiveness can be interpreted for the whole urban region, not just the city centre itself. It is conceivable that besides the central area there is a smaller settlement within the urban region which bears the comparative advantage (well-known concept in economy) of an activity, function or even sector (e.g. tourism) over the other settlements of the urban region, and taking advantage of it can generate beneficial effects on the whole urban region. However, even in this case it is necessary to assess the potentials of the urban region, the existence of the conditions of performing functions, uncovering the comparative advantages, learning about inter-settlement linkages and all of these examined per settlement.

Spatial relationship analysis, as it is well-known in professional circles, is a perfectly suitable method to carry out the outlined analysis.

2. SPATIAL RELATIONSHIP ANALYSIS

It was already mentioned that movements among settlements by their inhabitants can be detected in the urban region due to usage of certain functions, not their own settlement, but in other settlements, mainly in the central area of the urban region. Thus trajectories are formed in the settlement network, which develops a well-defined spatial usages and network of linkages. Spatial relations analysis studies exactly these, i.e. the system of relations among the settlements, the key linkage points and the hierarchic system of the settlement network and the directions of attraction (Szörényiné Kukorelli, 2011).

So the study observes the spatial trajectory of the population among the settlements and reveals the incidental surplus or lack of functions in a settlement. It is essential to note during the spatial relations analysis how closed a settlement is, how large the attraction force of the centre is and how the

centralisation of the settlement or the cohesion of the settlement and its agglomeration is evolving. In the case of having the same settlement as the starting and ending point of the trajectory, spatial relations analysis calls it an internal spatial trajectory. In other cases, when the trajectory ends in another settlement but is still within its area, it is called an intraregional spatial trajectory; however, when the trajectory is targeted outside the research area it is named an outbound spatial trajectory. Inbound trajectories are the ones departing from a settlement outside the research area but ending at a settlement within the research area. Trajectories are created and generated by functions and needs including even trajectories linked to public administration, consumer shopping patterns, availing of traditional and financial services, early-years childcare, public education, healthcare, cultural and recreational activities or visiting friends and family. These are all functions that create a trajectory due to the fact that at the residential settlement you cannot always find a solution to satisfy your needs, e.g. not every settlement provides financial services or is abundant in cultural programmes (Szörényiné Kukorelli, 2007).

In the meantime, spatial relations analysis is suitable for examining economic relations, their research and preparing economic analyses, in which case shipping, transport, communication and several other economic aspects are the functions through which the development of trajectories can be observed (Gerle, 1974).

These types of analyses are necessary since regarding trajectories we can never assume that the current state entirely corresponds to the situation ten or so years ago. Furthermore, building time as a fundamental factor into the spatial relations analyses may be put into consideration. Although spatial relations analyses refer to a given time or period of time, we need to know that changes occur in the long run so the researchers must continue taking consecutive examinations after the research. The differences between the pre- and post-transitional eras are good examples. Until the early 90s Hungary was run by a public administration system which strengthened the hierarchical relations; school districts, agricultural cooperative centres and medical centres in the districts were clearly defined and they affected the paths of residents. Meanwhile, after the democratic transition, the stringent regulations became less strict and the previous "seat of joint councils" and the scope of other functions ceased to exist making spatial activities freer and more available for the population. New functions appeared, affected by the inflow of foreign capital, retail shops sprang up like mushrooms in larger and smaller settlements, self-employed workers appeared in business, trajectories commenced among settlements and international relationships emerged. Settlements gained autonomy, consumer behaviour changed and mobility was helped by the increased amount of car usage (Szörényiné Kukorelli, 2011).

So, spatial relations analysis – by unfolding spatial nodes, mapping settlements in some way related to each other, taking stock of functions, describing residential trajectories in the closure process of the urban region as a unit area and in having a better understanding of the strengths and weaknesses of the urban region – is a

fundamental method for analysis. In addition, it may contribute to the improvement of the competitiveness of the urban region, efficient public administration, function organisation and division.

3. SPATIAL RELATIONS ANALYSIS OF THE CITY OF GYŐR AND ITS REGION

3.1. METHODOLOGY

Having outlined the theoretical framework of the urban region and the method of a possible analysis, henceforward I endeavour to present a piece of particular research carried out in real life. Research titled Vehicle Industrial District in Győr, VIDGY in short, was recently carried out. Yet the expression 'region' refers to the fact that not only the central city receives attention, but both the local governor and the research team think in terms of city regions and urban regions. A subtopic of the study intended to define the spatial force of Győr, or in other words the closure of the urban region. Additionally, the spatial relations analysis of Győr and its region was also carried out in this research project. Principally, the data and information were collected by means of a questionnaire within a radius of 50 km inquiring about the primary, secondary and tertiary trajectories of the population of Győr and its region. The important question of the research was that if the residents of the examined settlements cannot use a service in their own residential settlement - because there is none there -, which other areas they travel to satisfy their needs. In the 190 completed questionnaires (190 settlements) the questions were put on trajectories generated by the following functions (Szörényiné Kukorelli, 2014):

- spatial trajectories of shopping regarding various goods,
- spatial trajectories of retail financial services,
- the name of the settlement providing banking and insurance services for the local government,
- markets visited for sales and purchase of goods by the public,
- spatial trajectories of nursery, primary, secondary and higher education,
- spatial trajectories of healthcare and social services,
- spatial trajectories of culture and leisure activities,
- spatial trajectories of moving in and out, commuting,
- spatial trajectories of cross-border relations.

The following table (Table 1) contains a list of the settlements of local labour system of Győr.

Table 1 Settlements of local labour system of Győr

Abda	Bakonyszentkirály	Csém	Fehértó	Hegyeshalom	Lébény	Nagyacsád	Rábacsanak	Sopronnémeti	Vanyola
Acsalag	Bakonyszentlászló	Csesznek	Feketeerdő	Himod	Levél	Nagybajcs	Rábacsécsény	Sür	Várbalog
Ácsteszér	Bakonyszombathely	Csetény	Felpéc	Hövej	Lipót	Nagydém	Rábakecöl	Szany	Várkesző
Adásztevel	Bakonyszücs	Csikvánd	Fenyőfő	Ikrény	Lovászpatona	Nagyigmánd	Rábapordány	Szerecseny	Vásárosfalu
Agyagosszergény	Bakonytamási	Csót	Gecse	Jánossomorja	Maglóca	Nagyszentjános	Rábapatona	Szil	Vaszar
Árpás	Bana	Darnózseli	Gic	Jobaháza	Magyargencs	Nagytevel	Rábasebes	Szilsárkány	Vének
Ásványráró	Barbacs	Dénesfa	Gönyű	Kajárpéc	Magyarkeresztúr	Nemesgörzsöny	Rábaszentandrás	Takácsi	Veszkény
Ászár	Bársonyos	Dör	Gyarmat	Károlyháza	Malomsok	Nyalka	Rábaszentmihály	Táp	Veszprémvarsány
Bábolna	Béb	Dunakiliti	Győr	Kemeneshőgyész	Marcaltő	Nyúl	Rábaszentmiklós	Tápszentmiklós	Vitnyéd
Babót	Beled	Dunar	Gyömöre	Kemenesszentpéter	Máriakálnok	Osli	Rábatamási	Tarjánpuszta	Zsebeháza
Bágyogszovát	Bezenye	Dunaremete	Győrasszonyfa	Kimle	Markotabödöge	Öttevény	Rábcakapi	Tárkány	
Bakonybánk	Bezi	Dunaszeg	Győrladamér	Kisbabot	Mecsér	Páli	Rajka	Tárnokréti	
Bakonybél	Bodonhely	Dunaszentpál	Győrság	Kisbajcs	Mérges	Pannonhalma	Ravazd	Tényő	
Bakonygyirót	Bogyoszló	Dunasziget	Győrsövényháza	Kisbodak	Mezőlak	Pápateszér	Réde	Tét	
Bakonykoppány	Bőny	Écs	Győrszemere	Kisfalud	Mezőörs	Pásztori	Répceszemere	Töltéstava	
Bakonyoszlop	Börcs	Edve	Győrújbarát	Kisigmánd	Mihályi	Pázmándfalu	Rétalap	Ugod	
Bakonypéterd	Bősárkány	Egyed	Győrújfalu	Kóny	Mocsa	Pér	Románd	Újrónafő	
Bakonyság	Cakóháza	Egyházaskesző	Győrzámoly	Koroncó	Mórichida	Poroz	Sikátor	Vadosfa	
Bakonysárkány	Cirák	Enese	Halászi	Kunsziget	Mosonszentmiklós	Potyond	Sobor	Vág	
Bakonyszentiván	Csatka	Farád	Hédervár	Lázi	Mosonszolnok	Püski	Sokorópátka	Vámosszabadi	

Source: Edited by the author based on the database of VIDGY project

3.2. RESULTS

Based on the compiled database, the researchers analysed the region by the functions, i.e. how the spatial relations of all the functions are outlined, their distribution and dispersion, which settlement is the most important centre concerning the given function and which settlements are subcentres.

The analysis could also be started from the point of view of the settlements, namely to analyse the settlements one by one based on their functions, summarizing their deficits or their specialities, identifying their main functions, and to what extent they are linked to the central settlement, Győr – in our case. Since 190 settlements should be analysed, it would mean an extremely detailed study, plus their one-by-one description would exceed the length of a monograph. On the other hand, the method deserves a try to formulate a pattern based on which even a smaller closure regarding an administrative question could assist the decision-makers with relevant information or the settlement itself can be provided with a pattern to help its own analysis.

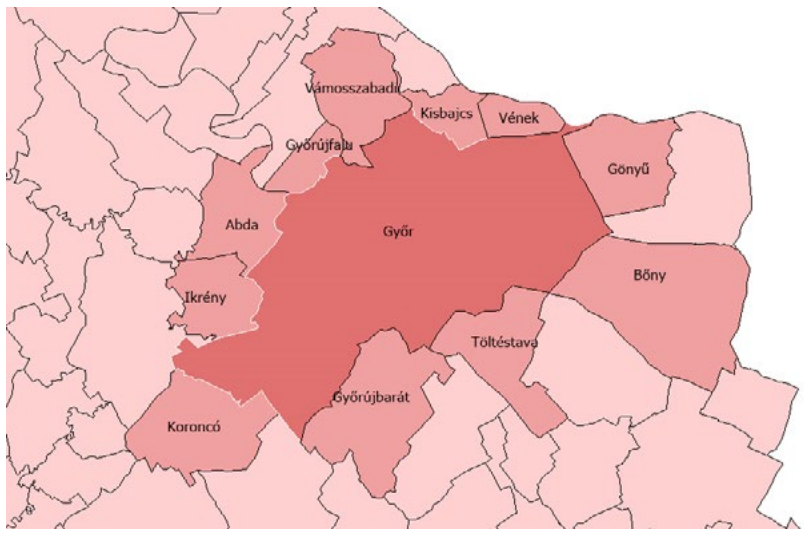
Function distribution and dispersion in the territorial hierarchy are influenced by the distance from the central area, including that based on the distance from the central city measured in kms, the impacts of functions, their intensity and necessity in the given settlement can be drawn like a scale. For instance, if a settlement is situated 30 km away from Győr, the less important functions (groceries) are not so influential for that particular settlement (just like a wifi signal weakens when as you move further away). But then the existence of this particular function at the given settlement or in its neighbourhood is necessary.

Consequently, the distance from the central area function is an organizing force. It is advisable to prepare a scale which marks the distances from the central area on the basis of the intensity of the functions. For example, the settlements belonging to a distance range of 0–15 km greatly benefit from all the services of the central area; however, it may lead to addiction and complacency, consequently causing the residents to be constantly on the move. The next range of the scale may be the distance between 15 and 30 km. How are the used functions and trajectories re-organised in this case? The ranges of the scale can be continued up to the boundaries of the agglomeration although this task is not the subject of this analysis.

The empirical element of this study is the first range of the above described distance scale, i.e. the analysis of the settlements within 15 km. Using the database provided by the previously mentioned VIDGY research, the focus is on the inner circle of the agglomeration of Győr – the settlements within 15 km and the study of their spatial relations, functions and roles in the urban region. The 11 examined settlements – as immediate neighbours of Győr – are all not situated at a distance of 15 km, some of them are located closer and two of them – Bőny and Gönyű – slightly farther (17 km) from Győr, but this fact will not influence the interpretability of the first range concerning distance – as a criterion – in the agglomeration. Since further examinations of the other ranges would exceed the

limits of a study and this inner ring due to its special position –its closeness to the central area –deserves a separate examination. It attempts to answer questions like: To what extent do the inhabitants of the researched settlements rely on Győr concerning functions and services? How influential is Győr on the neighbouring settlements? How strong is its hierarchy? Are there functions in the inner circle of Győr's agglomeration which are performed unaided?

Figure 1 The inner circle of Győr's agglomeration



Source: Edited by the Author

As Figure 1 shows, the inner circle of the agglomeration of Győr as a central area can be marked and the examined settlements are the following: Győrújbarát, Töltéstava, Bőny, Gönyű, Vének, Kisbajcs, Vámosszabadi, Győrújfalu, Abda, Ikrény, Koroncó.

In Table 2 general data can be seen like legal status, settlement size, number of population and the distance from the central area – Győr. Regarding their legal status, all the settlements are villages, but a further distinction can be made based on the number of residents. Based on the legal definition valid in Hungary you can deduct from the table that villages can be further divided into the category of small villages (population of 500–999) and micro villages (population under 200). Vének is to be considered a micro village with its population of 166 people and Kisbajcs a small village with 886 residents. On the basis of the population data, Győrújbarát emerges from the rest of the villages, with its 6401 inhabitants as the most densely populated village. Gönyű and Abda have over 3000 residents. Bőny and Koroncó can be considered as another group slightly exceeding the number of 2000 inhabitants. Meanwhile, Vámosszabadi, Ikrény, Töltéstava and Győrújfalu

are villages of about 1500 people. Due to the fact that the number of the population highly influences the inventory of functions per settlement, it is an essential factor of the analysis. Their distance from Győr are in the range of 6 and 17 km.

Table 2 General data of the examined settlements

Settlement	Territory (hectar)	Population	Legal Status	Distance from Győr (km)
Abda	1903	3117	village	9124
Bőny	5042	2151	village	17465
Gönyű	2172	3049	village	16469
Győrújbarát	3361	6401	village	9631
Győrújfalu	737	1758	village	6292
Ikrény	1558	1826	village	10541
Kisbajcs	875	886	village	9517
Koroncó	2691	2074	village	14676
Töltéstava	820	1465	village	10874
Vámosszabadi	2237	1659	village	10638
Vének	715	166	village	15999

Source: Edited by the Author based on the data by HCSO[1]

From now on the focus is on groups of functions and various scope of functions in the settlements will be discussed. Trajectories caused by the demands for the functions are included in the tables; namely, which settlements are chosen to consume certain services by the residents of the settlements and whether the particular function can be found locally, and where exactly the given service is searched secondarily. The first of these types of function groups is trade provision presented in Table 3.

Table 3 Trade provision in the inner circle of Győr's agglomeration

Functions	Food		Clothing		Durables	Supermarket
Settlement	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**1.site**
Abda	locally		locally		Győr	Győr
Bőny	locally		Győr		locally	Győr
Gönyű	locally	Győr	locally	Győr	Győr	Győr

[1] Registry of Hungarian Toponyms, 1st Jan, 2015 Hungarian Central Statistical Office,www.tavolsag.hu

Győrújbarát	locally	Győr	Győr		Győr	Győr
Győrújfalu	locally	Győr	Győr		Győr	Győr
Ikrény	locally		Győr		Győr	Győr
Kisbajcs	locally		Győr		Győr	Győr
Koroncó	locally		Győr		Győr	Győr
Töltéstava	locally		Győr		Győr	locally
Vámosszabadi	locally		Nagy-bajcs		Győr	Győr
Vének	locally		Győr		Győr	Győr

Source: Edited by the author based on the VIDGY questionnaire for the public

The table lists the trajectories generated by the demand for food, clothes and durables in a household and supermarkets. The table clearly shows that all the settlements can satisfy their needs for staple foods locally, but the people living in Győrújfalu, Gönyű and Győrújbarát count on Győr as well. Based on the data of the table, it can be seen that clothing, durables and supermarkets are situated only in the central area; consequently, to satisfy these demands the residents are constantly forced to travel to Győr. Some exemptions appear in the "inventory": in Gönyű and Abda you can purchase clothing, and the residents of Vámosszabadi visit Nagybajcs to buy clothes – probably from the part of the village that is in the immediate neighbourhood with Nagybajcs and can be found a larger distance from Győr. In Bőny you can buy durables and there is a supermarket in Töltéstava – run by SPAR. It is noteworthy that the services which can be found in the abovementioned settlements are not consumed by the other neighbour settlements; their residents find Győr preferable, so the central area has a monopolistic impact.

The following group of functions includes a supply on hospitality showing the locations of confectioneries, restaurants, pubs and cafés in Table 4. Except Vének, you can find a confectionery in each settlement. Although the residents of Vének could visit Kisbajcs for this purpose, they have marked Győr as their

destination. In parallel, Koroncó, Győrújfalu and Győrújbarát also rely on Győr - but only as a secondary choice regarding confectioneries.

Table 4 Functions of hospitality services in the inner circle of Győr's agglomeration

Functions	Confectionery		Restaurant		Pub		Café	
Settlement	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**2.site**
Abda	locally		locally		locally		Győr	
Bőny	locally		locally		Győr		Győr	
Gönyű	locally		locally	Győr	locally		Győr	
Győrújbarát	locally	Győr	locally	Győr	locally	Győr	Győr	
Győrújfalu	locally	Győr	locally	Győr	locally	Győr	Győr	
Ikrény	locally		Győr		locally		Győr	
Kisbajcs	locally		Győr		locally		Győr	
Koroncó	locally	Győr	locally	Győr	locally	Győr	locally	Győr
Töltéstava	locally		Győr		locally		Győr	
Vámosszabadi	locally		Győr		locally		locally	
Vének	Győr		Győr		Győr		Győr	

Source: Edited by the Author based on the VIDGY questionnaire for the public

Regarding restaurants, the question seems to be more complex. At several of the settlements – Kisbajcs, Vének, Töltéstava, Vámosszabadi, Ikrény – there is no restaurant to be found. But an intriguing fact should be highlighted here: namely, that all of the settlements indicated Győr as their destination, even though more of the settlements could be an alternative. Even the settlements with restaurants consider the ones in Győr as a secondary option. However, it is noteworthy that whilst the current study examines outbound trajectories, some inbound trajectories can be observed. The traditional restaurants of the rural area are perfect examples. For example, a restaurant called Fehér Akác in Pér (a settlement which does not belong to the inner circle of the agglomeration because it links to Győr only with a small territory, and it lies between Bőny and Töltéstava) that attracts customers from Győr due its high quality. In addition, the Pierre confectionery (the most outstanding French-style confectionery of the region) in Nagybajcs is a gravitational force and path for the residents of Győr. Quite surprisingly, it turned out that even small settlements are capable of offering exquisite and special products at such a high level that they attract consumers and guests from big cities to consume their services.

Returning to the backbone of the analysis, the functions of pubs and cafés are still to be discussed. It can be stated that pubs are better represented among the local people in the settlements and meanwhile, cafés in great numbers are to be found in Győr.

Table 5 presents the financial services for the public. As can be detected from the table, all the settlements – except Vének and Bőny – have a post office in the research area. Inhabitants of Vének travel to Kisbajcs, while those from Bőny go to Győr to use postal services. Since the before mentioned Vének is the only micro village and Kisbajcs is its neighbour settlement, Győr cannot have a gravitational force regarding this function. On the contrary, the inhabitants of Bőny prefer the post offices in Győr. Numerous settlements do not own ATM machines and their residents target Győr, but the local people in Kisbajcs and Vének mark Nagybajcs as a secondary trajectory. Except Kisbajcs, Vének and Győrújfalu, bank account management is provided in all the settlements – the residents of the three villages and of Koroncó and Győrújbarát use these banking services in Győr.

Table 5 Public financial services in the inner circle of Győr's agglomeration

Functions	**Post Office**		**ATM machine**		**Account Management**		**Borrowings, investment**		**Insurance**	
Settlement	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**2.site**
Abda	locally		locally		locally		locally		locally	
Bőny	Győr		locally		locally		locally		locally	
Gönyű	locally		locally		locally		locally	Győr	locally	
Győrújbarát	locally	Győr	locally	Győr	locally	Győr	Győr		Győr	
Győrújfalu	locally	Győr	Győr		Győr		Győr		Győr	
Ikrény	locally		locally		locally		locally		locally	
Kisbajcs	locally		Győr	Nagy-bajcs	Győr		Győr	Nagy-bajcs	locally	
Koroncó	locally		locally	Győr	locally	Győr	locally	Győr	locally	Győr
Töltéstava	locally		locally		locally		locally		locally	
Vámosszabadi	locally		Győr		locally		Győr		locally	
Vének	Kis-bajcs		Győr	Nagy-bajcs	Győr		Győr	Nagy-bajcs	Győr	

Source: Edited by the Author based on the VIDGY questionnaire for the public

Borrowings, investments and insurance are more complex procedures, though quite many of the settlements provide an opportunity for that, and where these services are not available Győr is preferred. Regarding Kisbajcs and Vének, Nagybajcs is a secondary trajectory.

From Table 6 it is evident that Győr has a huge role in all layers of education from infant nursery to higher education However, the trajectories not targeting Győr deserve some extra attention. Parents in Kisbajcs take their young

ones primarily to Nagybajcs, the neighbouring settlement and Győr can only be a secondary trajectory. Surprisingly, the inhabitants of Abda choose Győr, while the local people of Ikrény the infant nursery of Abda.

Table 6 Educational functions in the inner circle of Győr's agglomeration

Functions	Infant Nursery		Nursery		Primary School		Lower Secondary School		Secondary School	Tertiary Education	
Settlement	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**1.site**	**2.site**
Abda	Győr		Győr		Kunsziget	Győr	Kunsziget	Győr	Győr	Győr	Budapest
Bőny	Győr		Győr		Győr		Győr		Győr	Győr	Budapest
Gönyű	Győr		locally		Győr		Győr		Győr	Győr	Budapest
Győrújbarát	Győr		Győr		Győr		Győr		Győr	Győr	Budapest
Győrújfalu	Győr	Győrzámoly	Győr		Győr		Győr	Győrzámoly	Győr	Győr	Budapest
Ikrény	Abda	Győr	locally		Győr		Győr		Győr	Győr	Szombathely
Kisbajcs	Nagybajcs	Győr	Győr		Győr		Győr		Győr	Győr	Budapest
Koroncó	Győr		Győr		Győr		Győr		Győr	Győr	Budapest
Töltéstava	Győr		Győr		Győr		Győr	locally	Győr	Győr	Budapest
Vámosszabadi	Győr		locally		Kisbajcs		Kisbajcs		Győr	Győr	Budapest
Vének	Győr		Kisbajcs	Győr	Kisbajcs	Győr	Kisbajcs	Győr	Győr	Győr	Budapest

Source: Edited by the Author based on the VIDGY questionnaire for the public

Ikrény, Vámosszabadi, Gönyű and Kisbajcs also run a nursery school. The local people of Vének choose Kisbajcs, while the residents of Kisbajcs prefer Győr when they decide upon nursery schools. Only Kisbajcs can be an alternative to Győr's primary and lower secondary school education for the inhabitants of the research area. Additionally, some residents in Abda register their children primarily in Kunsziget. A significant number of dwellers in Vámosszabadi choose the primary school in Kisbajcs. Concerning secondary education Győr is targeted unambiguously, and young adults also choose Győr primarily for their tertiary education, but the universities of Budapest appear as secondary trajectories and Szombathely for the students coming from Ikrény.

Table 7 presents the field of healthcare functions, in which case the situation is slightly more complex. A General Practitioner and a District Nurse can be found in

all the settlements. However, there are no pharmacies in a number of settlements like Kisbajcs, Vének, Vámosszabadi and Győrújbarát. The residents of settlements without a pharmacy targeted Győr unanimously when they need the service. The same can be stated regarding paediatricians and dentists: if they provide services locally, the residents avail themselves of them; if there are no such services, people primarily target Győr primarily. The people of Győrújfalu would primarily go to Győrzámoly and secondarily target at Győr when they need dental care. Rábapatona and Nagybajcs are alternatives for the residents of Vámosszabadi and Koroncó. Since higher-level healthcare services such as consultations with a specialist, ambulance and hospitals can be found only in Győr as the spatial trajectories of the residents in the research area target the central area.

Table 7 Healthcare functions in the inner circle of Győr's agglomeration

Functions	**General Practitioner**		**Pharmacy**	**Pediatrician**	**District-Nurse**	**Dentist**		**Consultations with a specialist, Hospital, Ambulance**
Settlement	**1.site**	**2.site**	**1.site**	**1.site**	**1.site**	**1.site**	**2.site**	**1.site**
Abda	locally		locally	Győr	locally	Győr		Győr
Bőny	locally		locally	Győr	locally	Győr		Győr
Gönyű	locally		locally	Győr	locally	locally		Győr
Győrújbarát	locally	Ménfőcsanak	Győr	locally	locally	locally	Győr	Győr
Győrújfalu	locally		locally	locally	locally	Győrzámoly	Győr	Győr
Ikrény	locally		locally	locally	locally	locally		Győr
Kisbajcs	locally		Győr	Győr	locally	Győr		Győr
Koroncó	locally		locally	locally	locally	Győr	Rábapatona	Győr
Töltéstava	locally		locally	locally	locally	locally		Győr
Vámosszabadi	locally		Győr	Győr	locally	Győr	Nagybajcs	Győr
Vének	locally		Győr	Győr	locally	Győr		Győr

Source: Edited by the Author based on the VIDGY questionnaire for the public

As for cultural programmes – Table 8 –, the structure provides a clear picture considering entertainment facilities like the theatre, the cinema or concerts. A total hegemony of Győr can be tracked with two exceptions i.e. the people of Bőny and Győrújbarát also visit the theatres of Budapest. Except for Abda, all the settlements operate a library. A large number of the settlements organizes festivals, but naturally it is the festivals of Győr that are well represented,

although the residents of Győrújbarát also target the Sziget Festival and Volt Festival in Sopron in the summer. Even Rábaszentmihály and Dunaszeg were marked due to their festival programmes by Koroncó and Kisbajcs. Various cultural events occur in all settlements and Győr is not preferred by the residents of the research area.

Table 8 Cultural programmes in the inner circle of Győr's agglomeration

Functions	**Theatre**		**Cinema**	**Concert**	**Library**		**Festival**		**Cultural Events**	
Settlement	**1.site**	**2.site**	**1.site**	**1.site**	**1.site**	**2.site**	**1.site**	**2.site**	**1.site**	**2.site**
Abda	Győr		Győr	Győr	Győr		Győr		locally	
Bőny	Győr	Budapest	Győr	Győr	locally		locally		locally	
Gönyű	Győr		Győr	Győr	locally		locally		locally	
Győrújbarát	Győr	Budapest	Győr	Győr	locally	Győr	locally	Győr Sziget Sopron	locally	Győr
Győrújfalu	Győr		Győr	Győr	locally	Győr	Győr	Budapest	Győr	
Ikrény	Győr		Győr	Győr	locally		Győr		locally	
Kisbajcs	Győr		Győr	Győr	locally		Győr	Dunaszeg	locally	
Koroncó	Győr		Győr	Győr	locally	Győr	locally	Rábaszentmihály	locally	Győr
Töltéstava	Győr		Győr	Győr	locally		locally		locally	
Vámosszabadi	Győr		Győr	Győr	locally		locally		locally	
Vének	Győr		Győr	Győr	locally	Győr	Győr		locally	

Source: Edited by the Author based on the VIDGY questionnaire for the public

4. CONCLUSION

The goal of study was to explore the functions set of Győr and its surrounding settlements, including deficiency, specificities, and the spatial trajectories in the region, which are generated by several functions. Based on existing database (Vehicle Industrial District Research in Győr) I took "inventory" the spatial trajectories of residents of the examined settlements, so I created a structured framework and a "map" of functions and trajectories.

Knowing the scope of functions of all the settlements is a sine qua non of implementing both integrated and good governance. This is a huge task to deliver since a

city is always surrounded by numerous smaller settlements in the spatial structure in Hungary. The national demographic tendencies are well-known. We learn about ageing settlements, ineffectual local governments, lack of resources and function deficits. On the other hand, it seems fair to bind certain functions to the economies of scale. During the spatial relations analysis, it became evident that the population of the settlements of the agglomeration satisfied in all their needs, even if the relevant functions cannot be found in their own settlement. The functions are dispersed all over the urban region, not just the central area dominates them. Due to this fact, different paths and trajectories of the public can be observed, which is generated by the fact that the various functions appear in different settlements. There are small settlements which can provide particular services for other small settlements. However, there are many examples of the city demanding a certain function from a smaller settlement. As a matter of fact, we can state that the population realized long ago that they do not need to insist on their residence and to confine themselves to one place but necessity formed trajectories and paths perpetuate new linkages with other settlements and solve function-related problems.

It could be noted in the inner circle of Győr's agglomeration that the central area has an incredibly strong role concerning functions and the adjacent settlements satisfy most of their needs in Győr. In the meantime, less powerful functions can be found in the settlements of the research area, although we found that the bigger volume the functions have, the stronger the role of Győr is. The settlements target Győr as a primary trajectory even when the required service is available at the neighbour settlement; however, we have seen an example to the contrary as well. Education, healthcare or high culture give Győr a more prominent role among the settlements. In this case, it should be highlighted that it is a huge advantage of the inner circle of the research area to be located maximum 17 km away from the central area, since if we continued our study by examining the farther settlements, we would face a similar picture just with a greater use of means of transport. Thus it can be stated that the inhabitants of the inner circle are the biggest beneficiaries of the function supply of the central area and the advantage originated from the distance serves a type of relief. Although the movement of labour were not displayed separately in the table, it was evidently marked by the residents of the settlements in the research area as their workplace.

The further research of the unfolded ranges of the scale regarding the distance of the settlements from the central area is another exciting research topic. Nevertheless, it can be stated that governance shall harmonise, treat and organise the functions of settlements and the city and its region shall be treated as a unity, learning from the residents, whose evolved spatial trajectories and paths were highlighted by the spatial relations analysis in the current study.

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PETRA PLATZ

Lessons drawn from co-branding with a lovemark. Results of an experimental research

Abstract

The purpose of this study is to discover the impact of lovemarks on consumers' product assessment related to co-branding. As exploratory research, it describes the characteristics of lovebrands, which factors are necessary to be a lovebrand and further on what the consumer's first reaction is to a co-branded product, which is new in the market. The main research question is whether lovebrands have any influence on product evaluation regarding a co-branded product. An online simulation was conducted, which was completed by 250 participants from which 235 valid responses have been collected. The questionnaire was evaluated within the SPSS program. The empirical results support the idea that co-branding is beneficial for the now-to-the market product during the product launch phase.

Keywords: lovebrand[1], lovemark, co-branding, marketing strategy, experimental research design

INTRODUCTION

In recent years, brands and brand policy have gained considerable value for companies. According to Fournier (2007, 18) "We have entered what may be called the Golden Age of Brands." Brands are everywhere and always present in our lives, in the morning when one is eating branded yogurt. The significance and also the number of brands are constantly increasing (Albert et al., 2008) – so as the competition on the market. A prior aim of the brand policy is to build a strong brand with high brand awareness and a unique brand image. (Papp-Váry, 2014), which ensures a sustainably stable position for the company in the consumers' mind, as well as on the market. Beyond this general statement, there are several cases, where the success of brand management is crucial for survival. For example, the introduction of a new product or entering into new markets is expensive and quite risky because of the intense competition which leads to a situation where the companies are trying to find other alternatives to decrease the risk. Co-branding is a perfect strategy to decrease the possibility of failure.

[1] The terms lovemark and lovebrand can be used interchangeably.

In the case of brand partnership, both parties automatically have the opportunity to gain the interest of each other's market. According to Chia-Lin (2014), it means co-branding is able to generate a higher number of sales for both sides. Another huge practical benefit of co-branding is that the costs are divided between the participants. This study is modelling a situation via an experiment, where an existing manufacturer brand and a familiar lovebrand launch a new, co-branded product.

The theoretical problem statement of this study is that, originally, the expression "lovebrand" is not an academic term but comes from the business sphere. For this reason this paper is going to focus on the relation between lovebrands and co-branding on a higher academic level. The aim of economic sciences would be to predict the firms' prospects in the future; however the success of cooperation in the business area is not predictable. In the case of two weak brands cooperating no outstanding success can be guaranteed. Given two strong brands, especially if one of them is a lovebrand, the likelihood of success rises significantly (Giudice, 2011). Hence, besides the experimental research, the theoretical purpose of this study is to revise the recent literature in the research areas of lovebrands and co-branding.

The author expects from the empirical research to test whether there is a positive influence of lovebrands on consumer brand perception in case of co-branding of a manufacturer brand and a lovebrand.

1. MANUFACTURER BRAND PLUS LOVEBRAND EQUALS CO-BRANDING. A LITERATURE OVERVIEW

1.1. VARIETY OF CO-BRANDING TERMS

The previous literature identified numerous different forms of cooperative activity, such as co-marketing, ingredient branding, joint-sale promotion, advertising alliance, and product bundling. Co-marketing is a short-to-long term tactic, working horizontally. The aim of co-branding is to offer a complementary product to improve their market position. An example is when two pizza makers contribute to producing several co-branded pizzas.

The term ingredient branding can also be called vertical branding in the sense that this partnership is formed on the different level of the value chain (Hemig, 2008). Among personal computers "Intel Inside" is a famous example of ingredient branding where a component of the product is branded as a separate entity. One of the biggest advantages of using this marketing strategy is that the branded ingredient adds more value to the parent company. Joint – sales promotion represents a cooperation when two or more companies join together for sales growth bringing competitive advantages by sharing markets,

values and sales revenue. In this kind of partnership, the firms mostly create a new entity (e.g. Bacardi Rum with Coca-Cola). Advertising alliance is a strategic marketing partnership between two or more brands which are simultaneously mentioned in one promotional campaign, but there is no collaboration in terms of production. (e.g., Kellogg's cereals and Tropicana fruit juice etc. [Samu et al., 1999]). Product bundling represents a single package consisting of two or more products with one total price (Guiltinan, 1987). This partnership is based on the idea that the grouped package offers more value to consumers than the individual items, for example, when a travel agency offers a holiday package including a flight ticket and a city tour guide.

The main reason to use brand alliance strategies is that the collaboration can strengthen the parent brand and according to Charter, Peattie, and Polosky (2002) the combination with a well-known brand has a positive effect on the product evaluation of the co-branded product.

1.2. THE SOUL OF CO-BRANDING

Co-branding has been used in marketing literature with similar concepts such as brand partnership, brand alliance, joint branding, co-marketing and brand bundling (Woodside et al., 2009) where two or more organizations come together to combine their power to produce a combined unique product to achieve a higher level of success and higher brand awareness (Washburn, 2000). Strategic brand alliance as a marketing method helps companies to survive in a consumer market with a significant number of competitors and by using co-branding, firms can also improve their market position. The most used form of strategic brand alliance is co-branding. Co-branding is a specific strategic alliance which provides benefits for both the participating organizations and consumers. Blacket and Boad (1999, 7) define co-branding as the following: "Co-branding is a form of co-operation between two or more brands with significant customer recognition, in which the participants' brand-names are retained. It is usually of medium to long-term duration and the net value creation potential is too low to justify setting up a new brand and/or legal joint venture."

Recent marketplace examples include Milka´s chocolate bar with Oreo cookie pieces, Jacobs latte macchiato with Oreo cookie flavouring or Ritter Sport with Smarties pieces. The success of any brand alliance depends on the selected partner and association that the consumer has with the involved brand. A brand itself represents a set of promises which means brands own a unique positioning in the mind of the consumer and define a set of expectations. Selecting the right partner, product and market are necessary parts of successful cooperation. This art of collaboration is to establish "distinctive products with distinctive differentiation".

According to Keller´s (2008) theory, co-branding is able to increase the awareness of the lesser known brands. Having a better-known brand appear on the package of the product can serve as an endorsement from the created name.

Therefore, based on previous research, it can be stated that brand alliance has an impact on consumer buying behaviour because the consumer transfers their confidence and assurance of the original brand onto the newly created product. Elyas and Yacoub's (2013) theory says that the success of co-branding may be evaluated by measuring a co-branded product´s value. For this evaluation two effects of co-brand can be used: synergy effect, and positive spill-over effect. In this case synergy effect means that "the alliance´s aggregated brand value is greater than the value of each partner´s individual brand value. The other effect is the positive spill-over effect: the value of the alliance is greater for each partner than without the alliance. In this research, in the case of a no-name brand pudding co-allied with a lovebrand, the presence of the lovebrand's logo on the pudding package obtain a positive effect on sales. It can be expected that building a brand alliance with a well-known brand will create a higher number of sales.

1.3 OVERVIEW OF THE LOVEMARK CONCEPT

A brand is more than just a name, logo or package; it is much more present in the head and in the heart of the consumer. Lovebrands always represent and provide something special which renders the product in the eyes of the customers much more valuable against the competitors. Brands include features which show the characteristic of the company. Thanks to the brands, consumers can easily find the product they need. Customers know that by choosing a lovebrand the expected quality and value will be guaranteed. A well-known brand can help to a company to acquire new consumers and keep them loyal. Marc Gobé, chairman and chief executive of Desgrippes Gobe, New York and author of Emotional Branding, writes that connecting a brand to a consumer on an emotional level is one of the most powerful strategic assets of a firm. He believes that companies have to "make an effort to ensure the values communicated to the consumers are consistent with their internal values." (Foster, 2006). In the past, it was enough to produce a brand which is irreplaceable from the consumer point of view but today in this saturated market, firms are trying to create irresistible goods which will emotionally connect their consumers to the brand.

This suggests that the easiest way to get in touch with people is to act on their emotions. The essence of the lovebrand argument is based on the fact that human beings are powered by emotions rather than reason and also the decision making process is influenced by emotions. The brand should appeal to the consumers' emotions by giving them love.

Before researching lovemark, it is necessary to understand what the definition of a lovemark is. Lovemark occurs when a brand becomes not irreplaceable, but irresistible. The concept of lovemark is relatively new to the business vocabulary. Kevin Roberts states that the fundamental difference between them is that brands fulfil consumer needs, whereas lovemarks fulfill their desire. Lovemarks attract the consumer on emotional reasons "infused with

mystery, sensuality, and intimacy, and that you recognize immediately as having some kind of iconic place in your heart" (Roberts, 2004, 148). He believes, that the main goal of a competitive company should be to become a lovemark – which means "to be loved and to be respected." If a company can achieve a strong bond between the consumer and the brand it can lead to a long-term relationship with consumers.

Roberts in his book focuses on lovemarks which he defines as the following: "super-evolved brands that make a deep connection with consumers, great brands that inspire loyalty beyond reason." "Lovemarks are brands, events, and experiences that people passionately love." "Lovemarks reach your heart as well as your mind, creating an intimate, emotional connection that you just can't live without." (Roberts, 2006, 15) All the other brands are chosen based on price, features, and benefits. There are several examples of lovebrands around us: Coca-Cola, Apple, Lego, Nutella – just to mention a few of them. A Lovebrand is not owned by the producer, manufacturer or the distributor, it is owned by the people who love it. Kevin Roberts and his team have established a website to collect all the brands which could be a lovemark. Milka was also chosen as a lovemark. According to Roberts view, lovemarks are the combination of high brand love and high respect. The "Love/Respect Axis" is developed by Kevin Roberts to help companies figure out how much consumers love and how much they respect their brand. A more detailed review of Kevin Roberts' lovemark concept is written and published by Platz (2016). There are several products and brands on the market which have only "low love and low respect". These products like sugar, eggs or even butter have reached no emotional connection between consumers and brands, but they are needed in everyday life. Such products are easily replaceable. On the other hand, there are products which are popular only for a short period of time. Trends are good examples; one day everybody talks about a certain product but a few days later it has already been forgotten. This occurs mostly in the world of fashion and technology. If your brand is high loved and high respected by the consumer, it means you are a Lovemark. As was mentioned before Lovemarks create an emotional bond between the consumer and the brand and make the consumer feel passionate about them. Milka and Mc Donald's are some examples. Even though these companies provide different products and have a different target group, they could reach their consumers' hearts by using the most important aspects of lovemarks: mystery, sensuality, and intimacy. Consumers are emotional people which is why emotional branding is a more durable marketing strategy. On the other hand, we are living in a world where you have to surprise your consumer by bringing them innovative ideas and products.

2. RESEARCH QUESTION, DESIGN AND SAMPLE

The goal of the empirical research was to support the idea that co-branding with a lovebrand has a positive effect on the non-lovebrand participant, and, at the same time, it does not have any negative effects on the evaluation of the lovebrand itself. The core of the survey was to make the respondents choose and evaluate a hypothetic co-branded pudding: chocolate flavoured Milka-Bakoma pudding. Milka represents the lovebrand. Bakoma represents a non-lovebrand. Within this choice experiment, respondents were asked 12 questions related to the research objectives of the study and also 4 demographic questions to be able to characterize the population. The data collection happened in the autumn of 2017. The respondents were pudding consumers, who knew both involved brands. The author considered Milka as lovebrand, as the official lovamarks.com website lists Milka as a lovebrand and as a manufacturer brand Bakoma was chosen for the same reason: it is not registered as a lovebrand on the official site of lovemarks.com. The author supposes that becoming a lovebrand depends on a company's strategy – or intentions –, which requires efforts and certain internal arrangements and actions; if a company defines itself as a lovebrand, acts as a lovebrand, then they should be considered as a lovebrand, from the researcher's aspect. Measuring "lovebrandness" from the consumer side would be methodologically problematic as well, because no valid scale, nor proper tool for such measurement has been developed yet. Consequently, based on the secondary data, the research has been done in the sense that Milka is a lovebrand and Bakoma is not.

2.1 DATA COLLECTION AND MEASUREMENT

This study mainly focuses on a positive influence of a Lovebrand on consumers' brand perception; furthermore, to gather information on pudding consumption habits. Therefore, the quantitative approach was the major method applied in this study.

For data collection, an online questionnaire was used. A survey with the desired amount of 250 participants was designed in SoSci Survey (SoSci Survey, 2017) and respondents were searched for on Amazon's Mechanical Turk (MTurk) (Amazon, 2017). The questionnaire was designed in soscisurvey (SoSci Survey, 2017) and the type of questions included multiple choice questions, checkbox questions with more than one answer, Likert scale questions and closed questions. Using an online survey seemed ideal to achieve the goal, as it is the most efficient and most convenient way to reach international respondents. The survey was designed to avoid robot answers with an included captcha available on SoSci Survey, whilst the completion of the survey was supervised with a hidden variable that was to be found at the end of the survey. In cases where participants did not manage to correctly type in the captcha or the given code at the end of the survey, their responses were considered as invalid. The questionnaire was distrib-

uted in English. Before the distribution of the online survey, it was pre-tested by five volunteers to check the time needed to fill out the questionnaire. According to their recommendations, some of the questions were modified for better understanding. The final questionnaire included 12 questions (excluding demographic questions) regarding pudding consumption habits and openness to try new products. After the assessment of the completed surveys, 235 of them proved to be valid, whilst 15 of them were excluded from further analysis, due to incomplete code and/or captcha. The interpretation of the survey results will start with a univariate data analysis, where the participants' demographic characteristics and consumption habits will be discussed.

2.2 DEMOGRAPHIC DESCRIPTION OF THE SAMPLE

Demographic data were reported by the survey participants. From the total number of 235 valid survey respondents, 149 were men, whilst 86 of them were women. This equals a percentage of 63.4% of men and a 36.6% ratio of women among the participants. The standard deviation measured in this variable was 0,483. From the total of 235 valid survey responses, only one participant belonged to the age group of 18-year-olds and younger, whilst 4 of them stated that they were 65 or older. The most dominant age group is between 25 and 34 which represents almost 57% of the responses, whilst 17.4% of them were between 35 and 44. The standard deviation of this variable is 1.047, which is considerably higher than was observed in the case of gender. Looking at the age distribution, it is not a surprise that the majority of the respondents (95 participants) are currently studying at college/ university or have already gained a degree. From the total of 235 valid survey response, only one person has lower qualifications than a secondary school degree, whilst four of them have a doctorate degree. The standard deviation of this variable is 1.421. From the total of 235 valid survey responses, only 14 participants belonged to the income group of "over $100.000, whilst 53 of them have less than $20.000 income.

3. RESULTS

The first part dealt with the distribution of pudding consumption – seen as entrance criteria. More than the half (128 participants, which is 54.4%) of the 235 valid survey responses said, that they "usually buy and also consume pudding". 14.5% of the participants said that they usually buy but don't consume pudding; for example, mothers may belong in this category, because they buy pudding as a dessert for their children, but they themselves are not pudding consumers. 14.9% responded that they don't buy but usually consume pudding. On the other hand, only 16.2% (38 persons) of the respondents neither buy nor consume pudding, so their answers were excluded.

The second part focused on the willingness of the trial of the co-branded product. From the total of 235 valid survey responses, 80.9% of the respondents said that they are open to new products, whilst 46.4% (109 participants) of the participants always keep tabs on product offers. Investigating the willingness of trial, the majority of the survey responses 69.8% (164 participants) said that "I like trying out new brands"; however only 26.8% said that if they see some new products on the shelves, they will buy them. Moreover, the responses show that in the case of trying out a new product, the price has a more important role than the brand of the product. Basically, the vast majority of the respondents were open for a trial.

The third part investigated brand awareness. In this part of the questionnaire, the respondents were asked to select from among 4 pudding brands the ones they know. The respondents were able to choose multiple options. The most known brand was "Danone" because from the total of 235 valid survey responses, 142 participants, which is 60.4%, said they know this brand. The awareness of "Bakoma" is the lowest because only 14% of the respondents were familiar with this brand. The standard deviation in the case of the brand "Danone" was the highest among the variables. This result suggests that in case of a repetition of such an experiment, focusing on co-branding with a lovebrand from another perspective, Danone would be an ideal representative of the lovebrand within its category "pudding". In our case, on the pudding market, the theoretical new test product's (Bakoma-Milka chocolate pudding) lovebrand component comes from another market, from the chocolate market.

The next theme is the consumption rate. According to its reputation, it is no surprise that only 33 people out of 235 knew Bakoma, and only 11.5% said that they had already consumed "Bakoma" pudding. It means that the Bakoma was the least known pudding (among Danone, Zott, Dr. Oetker, Landliebe, Nestlé). This is a good component from our aspect, as Bakoma-Milka chocolate pudding can be considered as a real new product on the market. The answer also strengthens the belief that the brand Bakoma needs more brand awareness. So for them, co-branding with any well-known brand would be a fruitful step.

In the next part of the survey, two products were shown and the participants were asked to choose which one is more likeable for them. On the packaging of both products, the brand name "Bakoma" was visible. The only one difference between the products, that one of them is a co-branded product with the Lovemark, Milka and the Milka Logo is marked on it. From the total number of 235 valid survey respondents, 125 stated that they found the co-branded product more likable, which is only 15 people more than who chose the normal "Bakoma" product. The standard deviation of this variable is 0.500.

In the next section, the participants were asked to state what their reaction to the co-branded Milka product is on a Likert scale from "very negative" to "very positive". 122 participants said that the first reaction was "somewhat positive", 118 participants chose "rather likely" to try out. Moreover, also 118 partici-

pants said “rather likely” to buy the product if it would be available on the market. Their arithmetic mean is 3.87, whilst having a median of 4.00. Surprisingly, there was only one person who states that the first reaction of the co-branded product was “very negative”. The minority of the respondents, only a small percentage (2.6%) said that they would prefer not to try out the product; furthermore, 3% of the sample would not buy the product at all. Additionally, the participants were asked whether they would buy a Milka product for friends or not. It was no wonder that the majority of the survey respondents (75.7%) said “yes”, whilst only 24.3% said “no”.

4. FINDINGS AND CONCLUSIONS

Even though Bakoma is available internationally, also on the European or even on the American market, there were 196 participants in the sample (83,4% of the 235 respondents in the survey) who neither knew nor had consumed Bakoma pudding. The reason why the majority of the participants said that they had never heard of Bakoma could be that this brand is not a well-known brand. The pudding market is saturated, meaning that there are thousands of products available on the shelves. Furthermore, the majority of consumers are task oriented meaning that they do not want to spend time browsing the enormous amount of alternatives available in a certain product category. They avoid the consuming process of information search and evaluation, rather choosing the products they buy on a regular basis, than switching to a still unknown brand. Another possibility would be that the consumer makes the purchase decision based on information gathered in the past (e.g. the brand was recommended by a friend or it was shown in an advertising campaign). Buying a brand that they like simplifies the purchase process and lowers the possibility of disappointment because the consumer knows exactly what he or she is getting. A chi-square test for association was conducted between Bakoma brand-awareness and consumption. The significance score of chi-square was 0.000 (<0,05) therefore, there was a statistically significant association present between these two variables. Cramer’s V score measured the association strength between the present two variables, which was 0.661; the association strength was moderate between the brand knowledge and consumption of Bakoma puddings.

In order to answer the research question, the relationship between the participants’ picture preference and their first reaction to the Milka product will be analysed. The independent variable is the respondents’ product preference, while the dependent variable will be their first reaction to the Milka product. Since the independent variable has only two categories, a t-test can be conducted to see whether there is a statistically significant difference in the first reaction of those who chose Bakoma and those who chose the Bakoma-Milka product. According to the group statistics (presented in the boxplot below), the first reaction means those participants who preferred the Bakoma product was

3.84; however, in the case of those respondents who favoured the Milka-Bakoma pudding, this mean score was 0.332 higher (3.84). The standard deviation of the two mean scores differed in the two groups: in the case of Bakoma-favouring participants, it was 0.862, while with respondents who chose the Bakoma-Milka product, it was lower (0,681). This indicates that the first reaction response of those who favoured the Milka-Bakoma product was more consistent than those who chose the Bakoma one. According to the results of the conducted independent samples t-test, the described mean difference (0.332) the first reaction between respondents who preferred the Bakoma and the Milka-Bakoma product was significantly different with a p score of 0.001. It means that there is a very high probability the participants with a positive first reaction would try out and later on buy the Bakoma pudding with the taste of Milka chocolate.

As was previously clearly identified, the goal of this research was to study if there is any influence of lovemarks on consumer product assessment in the case of co-branding. The aim was to discover to what extent consumer can attach towards certain lovebrands and how lovebrands can influence the product assessment of a co-branded product. The results of the survey predict that consumers show significantly higher trying and later on buying intention when a lovebrand appeared on a certain product. In this study, the brand Milka was used as a lovemark. This means that proper communication between the company and the consumer on an emotional level is the core of success in emotional marketing. Therefore, it can be concluded, that regarding the case of the co-branded Bakoma pudding, the lovebrand Milka had a positive influence on respondents' product evaluation.

5. RECOMMENDATIONS

With growing competition in the world of brands, marketers should seek marketing opportunities to be able to maintain their position or even to raise their position on the market. To achieve their goal companies should try to create a strong relationship with their consumers on an emotional level. As was noted earlier, there is a lack of literature in the field of analysing the impact of lovemarks on consumers' product evaluation in the case of co-branding. The author believes that this article provides beneficial information for the companies, who want to raise their status on the market. Generally, this research gives a wide range of information about customers' product evaluation related to a lovebrand, which would contribute to the success of many companies. It would certainly be worth conducting future research on the influence of lovemarks on consumers' product assessment regarding co-branding.

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ADRIENN DERNÓCZY-POLYÁK – VERONIKA KELLER

Segmenting Generation Y based on TFEQ and DEBQ for clustering

Abstract

Investigating the youth, especially members of Generation Y, is a challenge for theoretical and practical researchers, too. An epidemic of the 21st century is overweight and obesity, which is a consequence of inappropriate eating habits and a sedentary lifestyle. Overweight and obesity is a serious problem for young people, since the ratio of obese young people (below 35) is constantly increasing in the developed regions of the world. In an empirical research 589 adults under 35 were questioned. The aim of the research was to segment Generation Y based on their eating behaviour measured on TFEQ (16 items) and DEBQ (33 items). Relying on the results of TFEQ 16 (386 people) three main consumer groups can be distinguished, namely functional eaters (49.2%), Carpe diem and YOLO (31.1%) and emotional eaters (19.7%). The authors identified almost the same groups in the case of DEBQ (154 people), where they distinguished functional (45.5%), emotional (13.6%), conscious (20.8%) and delighted eaters (20.1%). Clustering people based on their eating behaviour is useful for food producers, restaurants and diet experts to offer a special products for young people belonging to Generation Y.

Keywords: DEBQ (Dutch Eating Behaviour Questionnaire), Generation Y, eating styles, segmentation, TFEQ (Three Factor Eating Questionnaire)

INTRODUCTION

Analysing the customer behaviour of generations is a current topic of marketing researchers. Each generation has unique expectations, experiences, generational history, lifestyles, values and demographics that influence their buying behaviours (Williams–Page, 2010). Members of a generation were born in the same time that is why they share the same experiences, adventures and values. (Törőcsik, 2011, 175) Investigating the youth, especially members of Generation Y, is a challenge for theoretical and practical researchers, too, since they represent an essential consumer group worldwide. What is more they will determine the behaviour and shopping habits of the future generation.

Overweight and obesity is an epidemic that appears in the developed countries of the world but also in developing countries. This phenomenon can be explained by inappropriate eating habits and sedentary lifestyle. Relying on

statistical data overweight and obesity is a serious problem for young people, since the ratio of obese young people (below 35) is constantly increasing in the developed regions of the world. Investigating eating styles and habits is an important topic all over the world. Considering the national health survey of KSH (Central Statistical Office) from 2014 (European Health Interview Survey, 2014) Generation Y follows an unhealthier lifestyle than older generations. The majority (96%) of population over 15 eats fruits and vegetables daily. Two thirds of the population eat fruits and vegetables more times in a day, 72% of females and 62% of males. 79% of people over 65 and 60% of the youngest people (between 15 and 17 years old) eat fresh fruit and vegetables regularly and more often. Hence there is a strong correlation between eating styles and obesity so it is worth to look at the BMI indices over generations. The ratio of obese and overweight people in Generation Y (age between 18 and 34) is the following: 39.3% in the case of males and 23.4% in the case of females, however, the survey found that women underestimate their weight and overestimate their height, because the establishment of body mass index was based on self-declaration. Underweight is more typical for women (11%) than for men (2.9%). Considering tendencies a slight drop among young men and a slight increase among young women could be observed over the 21st century.

The analysis of the relation between obesity and eating habits were mainly published in psychological and sociological studies both in international and in domestic literature. A relatively few scientific publications deal with the management of BMI and eating styles from a marketing viewpoint. The aim of present research is to segment Generation Y based on their eating behaviour measured in the shorter version of Three Factor Eating Questionnaire including 16 items and on the Dutch Eating Behaviour Questionnaire. Since the two scales are measuring almost the same eating styles we are interested in whether the same consumer groups can be identified or not.

1. THEORETICAL BACKGROUND

Distinguishing each generation is not so obvious since different researchers use different age categories. Multi-generational marketing is a popular topic in national marketing literature (Törőcsik, 2011). This study is focusing on the eating behaviour of Generation Y, born between 1980 and 1994 and are currently aged between 23 and 37. Considering the most up-to-date statistical data (http://www.ksh.hu/interaktiv/korfak/orszag.html) the population of Hungary is 9 830 485 people (100%) and the ratio of Generation Y is 19.13% (1 880 291 people). It can be said that this generation makes up one fifth of the whole population.

In Hungary psychologist Tari (2010) dealt with Generation Y in more detail. According to her these youths have been socialised in the world of computer and internet that is why they are better informed than their parents or older bosses. Success, professional career and money are the most important things

for them since they know that these are the values in the world of consumption. They are longing for safety in this hard and self-confident world and they create the illusion and adventure of belonging and society. They mainly use the internet and social media, blogs or online games that are based on networks for socialisation. Considering their consumer behaviour they live for the day ("carpe diem") and they spend a lot of money, saving is not important for them. They are looking for unique products but at the same time they are sensitive to social problems. Hedonism and adventure are important factors when they go shopping and they are looking for special and prestige products. They are interested in fashion and music (Williams–Page, 2010). They travel a lot and have gained huge experience from the world; they are culturally open to different nations, they are happy to try out dishes from different cultures. They prefer try out a new restaurant than buy a new pair of shoes. They are interested in festivals offering culinary pleasures more than music events or concerts (http://corporate.univision.com/2014/12/millennials-the-foodie-generation/). They are emotional and sensitive people and this may have an effect on their eating behaviour. The British ELIOR research institute published a report on the eating preferences of Generation Y in 2015. They are late eaters, they skip breakfast and prefer a mid-morning snack and for lunch they choose easy-access, high-quality fast-food solutions since they think "the easier the better". They follow hectic lives and like snacking so emotional eating is typical for them. Millennials are the members of the digitally connected generation. They like sharing their eating-out experience on social media tools. The majority of Generation Y claims they eat or at least intend to eat healthy food however their food choices would suggest otherwise. They prefer home cooking and plan to eat out less in the future. "They tend to serve up the same meals they order in restaurants." (https://www.eliorgroup.com/press/press-releases/generation-y-and-their-meals-new-eating-habits-18-30-year-olds)

More international quantitative studies have proved the unhealthy eating behaviour of the youth. Lee and his co-authors (2006) compared the eating behaviours of Korean university students and their parents in a complex empirical study. They identified the preferred dishes of the two generations and analysed the calorie intake. They found that young people follow a western style diet (fast food, frozen and canned food) and they consume more fat than their parents. All in all they follow a more unhealthy diet, which increases the risk of overweight and obesity. A Greek study highlighted that young students living alone and leading their own household have more unhealthy diet than those who live together with their parents (Papadakia et al., 2007).

More studies analysed the eating behaviour of generation Y in Malaysia (Kavitha et al., 2011; Pawan et al., 2014; Ying et al., 2013). The food preferences of generation Y are determined by intrinsic (health, perceptive attractiveness, price) and extrinsic (mood, comfort, similarity) factors (Kavitha et al., 2011). Intrinsic factors have higher impact on food choice than extrinsic ones. The authors high-

lighted that the knowledge of a healthy lifestyle of generation Y is much deeper than their actual behaviour. The research of IFIC (International Information Council) came to the same conclusion. Millennials recognize the importance of eating healthfully but all admit they do not always eat as healthfully as they would like. "The Millennial generation has poor health habits, including inactivity and poor nutrition, which contribute to the early development of overweight and obesity." (Barkin et al., 2010, 240) They prefer red meats and fried foods and don't consume enough fruit or vegetables. Millennials lack time and money but they are social, so they obtain digital or online information on nutrition. This generation likes eating out more than any other (older) generations. They are adventurous in trying new foods and places with their unique eating habits (Pawan et al., 2014). The authors conducted a quantitative study and questioned 310 Malaysian youths age ranging between 16 to 33 years old. The authors identified factors influence to dine out: (1) social eating behaviour, (2) price and value, (3) healthy choice, (4) convenience, (5) emotional eating. They found that emotions affect the amount of eating, eating more in a bad mood, comfort, snacking in the case of boredom, association between food and success, and dining out in the case one is upset. Ying and his co-authors (2013) identified how Malaysian Generation Y made the decision when they purchased healthy fast food. Their results showed that quality of service, eating behaviour and consumer lifestyle are the most important factors. The youth look at the freshness and quality of the products when they want to choose a fast food. Due to the rapid increase in diseases such as high blood pressure, heart attacks and obesity, consumers look for other varieties of fast food, such as soups, salads and any other healthy dishes.

Psychologists have developed more measuring methods for the analysis of obese people and individuals with normal body weight: latent obesity survey (Pudel et. al., 1975), eating attitudes test (Garner–Garnfinkel, 1979), restraint scale (Herman–Polivy, 1980). In the present study the authors deal with the Three Factor Eating Questionnaire (TFEQ) developed by Stunkard and Messick (1985) and the Dutch Eating Behaviour Questionnaire (DEBQ) containing 33 items and elaborated on by van Strien and her colleagues in 1986. In the domestic literature mainly the TFEQ – Three Factor Eating Questionnaire – was used by psychologists and marketing experts (Czeglédi–Urbán, 2010; Szabó et al., 2014). In previous research the Hungarian adaptation possibilities of TFEQ 16, TFEQ 20 and the DEBQ were analysed (Dernóczy-Polyák–Keller, 2015). Szabó et al. (2014) examined the health behaviour on a nationally representative sample of 1000 people from the Hungarian adult population. Based on the TFEQ 18 and the 'Body Attitude Test' they executed the determination of factor structure, and then they conducted cluster analysis and they classified the Hungarian population into five consumer groups. They distinguished 'uncontrolled emotional eaters', 'tense dissatisfied people', 'unconcerned people', 'overweight impulsive eaters' and 'conscious eaters'. This segmentation could be really useful to food producers and experts working on the field of health management since they could

target their audience with special unique products or services. For example 'overweight impulsive eaters' (13%) would like to lose weight but they can be characterised by emotional and uncontrolled eating. 20% of the population belong to the group 'conscious eaters' and they are the most important target audience of healthy food. They are not emotional eaters and have high income they can afford premium category products.

2. THE EMPIRICAL RESEARCH

The aim of this complex research is to segment the Hungarian youth belonging to Generation Y based on the previously introduced TFEQ 16 and DEBQ scales and to identify homogenous consumer groups based on the results of factor analysis, the original factor structure, and characterize them based on some important dimensions. The following research questions were defined: Is it possible to segment customers of Generation Y based on the TFEQ 16 and DEBQ scale? Is it possible to distinguish the same consumer groups?

Relying on the literature review the assumption is that people can be classified into homogeneous customer groups and they can be definitely profiled. Moreover we assume that Hungarian customers can be classified based on the formerly identified Hungarian eating styles, namely emotional, cognitive control eating and uncontrolled eating. The properly defined segments are a competitive advantage for companies.

2.1. MEASUREMENT AND SPECIFICATION OF SCALES

To examine eating styles the TFEQ 16 and the original DEBQ (Ercsey et al., 2015) were used. The 16 item questionnaire contained three scales measuring emotional eating (6 items e.g., 'When I feel anxious, I find myself eating.'), cognitive control eating (3 items e.g., 'I do not eat some foods because they make me fat.'), and uncontrolled eating (7 items e.g., 'When I see a delicious food or I can smell it, I find it very difficult to keep from eating, even if I have just finished a meal.') on a four point Likert scale.

The 33-item questionnaire contained three scales measuring emotional eating (13 items e.g., 'Desire to eat when you are emotionally upset'), restrained eating (10 items e.g., 'Eat less than usual in the following days when you have eaten too much'), and external eating (10 items e.g., 'It is difficult to resist delicious food'). Response categories ranged from 1 'totally agree' and 4 'totally disagree'.

2.2. SAMPLE DESIGN AND SAMPLING

To answer the research question the authors chose a single cross-sectional research method. The authors used the quota sampling design. They planned to follow

proportional sampling based on gender (50% of males and 50% of females). The empirical research was conducted in March 2015. The researchers used the self-reported online and PAPI method. Students and the authors themselves participated in the process of questioning. Finally 589 people, specifically 393 with TFEQ 16 and 196 with the DEBQ could be reached with the survey and were willing to fulfil the whole questionnaire. The ratio of males (49.4%) and females (50.6%) was almost equal in the case of TFEQ 16. However in the case of DEBQ the ratio of females and males was 60% to 40%. The sample was not a representative one that is why the authors would like to emphasise that this study is an exploratory one.

2.3. STRATEGY FOR DATA ANALYSIS

The data analysis was conducted with the help of SPSS 23.0 software. The research question was tested with multivariate statistical analysis. To test the research questions the authors used the method of cluster analysis, especially the method of Ward's hierarchical cluster analysis, namely the agglomerative clustering (Malhotra, 2010). Since the aim was to emphasize the main differences we used square Euclidean distance to measure the distances. After investigating the pre-conditions, the researchers considered different cluster solutions, but finally they decided to apply the three cluster solution. In the next step they considered these three clusters as nominal variables.

3. RESULTS

The simple mathematical means of items belonging to one factor that is belonging to one eating style (Hair et al., 2005) were the bases of cluster analysis. Since this type of multivariate analysis is really sensitive to outstanding values (Malhotra, 2010) the first step was to identify these respondents. Excluding missing values 386 and 154 respondents were analysed. Ward's agglomerative clustering was used and the square Euclidean distance was considered. Relying on the results of the Elbow criterion and agglomeration schedule the three cluster solution was chosen in the case of TFEQ 16. In the case of DEBQ four segments were distiguished. Count and frequency in the case of TFEQ 16 clusters are the following: 1st cluster 190 people (49.2%), 2nd cluster 120 people (31.1%) and the 3rd cluster 76 people (19.7%). Count and frequency in the case of TFEQ 16 clusters are the following: 1st cluster 190 people (49.2%), 2nd cluster 120 people (31.1%) and the 3rd cluster 76 people (19.7%). Count and frequency in the case of DEBQ clusters are the following: 1st cluster 70 people (35.7%), 2nd cluster 21 people (10.7%) 3rd cluster 32 people (16.3%), and the 4th cluster 31 people (15.8%).

In order to make a typology for the different clusters the analysis of the means is necessary. The method of one-way ANOVA was used to check the category means of eating styles in the case of each cluster and significant differences. There are

significant differences between groups in the case of all variables. To test the homogeneity of variables Post-Hoc tests (Dunnett T3 and LSD) were conducted. Relying on the results there are statistically significant differences among variables.

Based on the results it can be stated that there are distinguished groups belonging to a special cluster on the basis of the examined eating styles. Thus it is possible to distinguish homogeneous consumer groups based on TFEQ 16 and DEBQ.

3.1. TYPOLOGY OF CLUSTERS

To characterise each cluster based on their eating styles the mean of original factor items were considered. In the first group of young people none of the eating behaviours are true for the respondents. They are not influenced by any of the eating styles. They are *functional eaters* and they represent 49.2% of the sample. They eat to live and consider eating as a basic need and the researchers suppose that they can be influenced by rational reasons when it comes to food choice.

In the second group (31.1%) there are people who can be characterized by uncontrolled eating, however emotional and cognitive control eating is not typical at all for them. They live for the day and do not care about the consequences. They are hedonic their motto is *Carpe Diem*, and they can be referred to as *YOLO* (**Y**ou **O**nly **L**ive **O**nce).

People in the third cluster (19.7%) eat due to negative feelings and can be characterized by uncontrolled eating. They eat due to negative feelings and food is a kind of bonus for them. They are the *emotional eaters*. The profiling of each cluster based on TFEQ 16 is summarised in table 1.

Table 1 Typology of each cluster based on TFEQ 16, n=386

		Functional eaters	**Carpe Diem and YOLO**	**Emotional eaters**
Size	(%)	49.2	31.1	19.7
Emotional eating	mean STD	3.6868 0.3895	2.8375 0.5096	1.9386 0.5563
Cognitive control	mean STD	3.0333 0.9095	2.7472 0.7633	2.3772 0.8766
Uncontrolled eating	mean STD	3.2511 0.4390	2.4333 0.4739	1.9192 0.4788

Source: Own research

In the first group of young people none of the eating behaviours are true for the respondents. They are not influenced by any of the eating styles. They are functional eaters and they represent 45.5% of the sample. This group of people could be identified with the TFEQ method.

In the second group (13.6%) people eat due to negative feelings and can be characterised by external eating. They eat due to negative feelings and food is a kind of bonus for them. Emotional eaters also appeared with a similar ratio in the TFEQ method.

The third group of youths (20.8%) are conscious because they can be characterized by restrained eating habits. They take care of food intake and controlling weight is an important factor for them. This group of people could not be identified with TFEQ clustering.

People in the fourth cluster (20.1%) refuse restrained eating and they can be influenced by external factors such as the smell and the taste of food. They are the *delighted eaters*. The profiling of each cluster based on the DEBQ is summarised in table 2.

Table 2 Typology of each cluster based on DEBQ, n=154

		Functional eaters	**Emotional eaters**	**Conscious eaters**	**Delighted eaters**
Size	(%)	45.5	13.6	20.8	20.1
Emotional eating	mean STD	2.2846 0.3920	1.5458 0.471	3.4928 0,41944	3.4615 0.45854
Restrained eating	mean STD	2.4386 0.3979	3.0000 0.6410	2.2469 0.4641	3.5129 0.3989
External eating	mean STD	2.5817 0.2981	1.7963 0.2683	3.1476 0.3305	2.7527 0.5643

Source: Own research

Summing up the results of the empirical research the authors define that Millennials can be grouped into homogeneous groups based on their eating styles. With the use of TFEQ 16 three groups of people (1) functional eaters, (2) Carpe Diem and YOLO, (3) and emotional eaters can be distinguished. Based on DEBQ scale four groups of youths could be identified: (1) functional, (2) emotional, (3) conscious and (4) delighted eaters. Functional eaters could be distinguished in the case of both scales and they make up the majority of Millennials. They cannot be characterised by any of the investigated eating styles. Emotional eaters could be identified in both scales. These are the youths who eat due to negative emotions. In the case of TFEQ 16 we could not identify the group who can be characterized by cognitive controlled eating style. However in the case of DEBQ almost one fifth of the sample belongs to the conscious eaters' category. They put an emphasis on eating and consider weight concerns an important factor when it comes to eating. Finally there are people who can be characterised by uncontrolled eating in the case of TFEQ and external eating who eat due to external stimulus in the case of DEBQ. We called them Carpe Diem and YOLO since they are hedonic and love eating without paying attention to calorie intake. Delighted eaters are also one

fifth of the DEBQ sample ad they cannot stand stimuli to their senses (smell, taste, vision). They have to eat when they see or smell something delicious and they do not think of the consequences.

4. DISCUSSION

The TFEQ and DEBQ scales are measuring eating styles especially emotional eating, cognitive control or restrained and uncontrolled or external eating habits (Stunkard–Messick, 1985, Karlsson et al., 2000; van Strien et al., 1986). The scales are widely used by researchers specialized in psychology, sociology and social studies (Harden et al., 2009; Lesdéma et al., 2012). However measuring eating style is a popular and very up-to-date topic in the 21st century only a few studies focused on the segmentation of customers based on their eating styles (Szabó et al., 2014). Investigating the youth, especially members of Generation Y is a challenge for theoretical and practical researchers, too, since they represent an essential consumer group worldwide (Kavitha et al., 2011, Ying et al., 2013). More national (Czeglédi–Urbán, 2010; Czeglédi et al., 2011) and international (Lesdéma et al., 2012; Nurkkala et al., 2015) studies have investigated the eating behaviour of the youth based on TFEQ and DEBQ.

In this study the researchers segmented Hungarian young people based on their eating styles. Based on TFEQ 16 three groups of customers can be distinguished, namely functional eaters (49.2%), Carpe Diem and YOLO (31.1%) and emotional eaters (19.7%). Based on DEBQ four groups of customers can be distinguished, namely functional eaters (45.5%), emotional eaters (13.6%), conscious eaters (20.8%) and delighted eaters (20.1%). Functional eaters consider eating as a basic need. They are the target of traditional marketing activities, however prevention (avoiding weight-gain) is an important factor. Emotional eaters eat due to negative feelings and can be characterized by uncontrolled or external eating. Carpe Diem and YOLO and delighted eaters are hedonic and they can be influenced by external stimuli such as the appearance, smell and taste of food. More international quantitative studies have proved the unhealthy eating behaviour of the youth (Lee et al., 2006; Papadakia et al., 2007). However the BMI of the respondents was not investigated in the paper the Millennial generation has poor health habits, including inactivity and poor development, which contribute to the early development of overweight and obesity (IFIC, ELIOR). Using the DEBQ scale for segmentation a new group of youths appeared namely the conscious eaters. They can be characterized by restrained eating habits and avoiding weight gain is an important aspect of their lives.

5. CONCLUSION

Segmenting customers based on their eating styles are really useful for restaurants and dieticians since they can plan their assortment based on customers' needs or plan a personal diet. Classifying customers based on their eating habits can mean a competitive advantage for companies because they can offer differentiated products or services for the different customer groups. Considering overweight and obesity the emotional and uncontrolled eating style is the most dangerous. These two eating styles are typical for Carpe Diem and YOLO or delighted eaters and emotional eaters. They represent 50.8% in the case of TFEQ and 33.6% in the case of DEBQ of Millennials. They should be a target audience of social marketing campaigns and convinced to eat and snack more healthy (not so calorie rich) food and eating is a kind of pleasure, however healthier alternatives, even of fast food do exist. Of course other alternative forms of happiness and reward should be emphasised for them such as adventures or sports, physical activity, not just eating. To make a healthy lifestyle (eating habits and physical activity) more popular and decrease the number of overweight and obese people is a global goal. We believe that social media campaigns would be effective in educating the young generation and highlight the risks of unhealthy eating styles.

The present work is not without limitations. First of all the non-representative sample has to be mentioned. The sample was slightly biased in terms of age. The authors mainly concentrated on younger members of Generation Y. Participants were recruited on social media platforms and university students were overrepresented in this sample. The generalizability of the present findings to other samples needs to be assessed. Second, it should be mentioned that self-reported behaviour might be subject to tendencies of socially desirable answering patterns.

In the future the authors plan to profile each cluster based on demographics. This study was only an exploratory one and we focused on the measurement of eating styles. In order to verify this quantitative research the authors plan to extend the research and conduct a qualitative research, especially depth interviews or mini-focus groups. However they would like to conduct another quantitative research concentrating on the youth. The researchers plan is to investigate the eating attitude and behaviour of Generation Z since former studies (Williams–Page, 2010; Böröndi-Fülöp, 2012) and WHO statistics highlighted the ratio of overweight and obese people are continuously increasing among the youth. In domestic literature Böröndi-Fülöp (2012) analysed the behaviour regarding health of primary and secondary school pupils. Relying on her results it is worth concentrating on that generation and planning more up-to-date research. It is also worth comparing the eating styles of the youth and their parents, since eating behaviour is formed in childhood under the influence of parents and traditional cuisine (Lovrenović et al., 2015).

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HENRIETTA SZÉPNÉ VARGA – ILDIKÓ BALATONI

Exploring the background conditions for playing sports of pre-school children

Abstract

The objective of kindergarten education is to satisfy the psychosomatic needs of preschoolers. It is important that children are provided with the opportunity to be physically active. In the research, authors were interested in whether the necessary infrastructure and other requirements were provided to achieve this goal. The survey was conducted in the spring of 2018 in the kindergartens of Debrecen and Hajdú-Bihar County. Authors were keen to find out how many and what size gyms were available for children. The analyses how much time children spent in the open air and asked what other afternoon sessions were held in kindergartens. We need to teach our children the love of physical activity and kindergartens play a decisive role in this process. The survey reveals that there are big differences in the relevant infrastructure; however, institutions involved in the present study seek to meet the children's need for physical activity according to their capabilities.

Keywords: kindergarten, children, physical activity, infrastructure

INTRODUCTION

The increasingly widespread phenomenon of childhood obesity – in Hungary, about 20% of children under the age of 15 can be considered overweight (KSH, 2015) – has drawn attention to the analysis of the physical activity of children of this age. Physical activity in early childhood serves not only healthy physical development but is also an essential prerequisite for many other physiological and psychosocial changes (Strong et al., 2005). Nonetheless, studies and guidelines based on these studies initially addressed the issue of school-age children, for reasons such as the lack of studies on the physical activity of younger children, and the assumption that children of pre-school age participate in a sufficient amount of physical activity. However, in the light of the latest research, this is unlikely to be the case.

The year of construction of kindergartens varies between 1845 and 2015. Looking at the population data of the Hungarian Central Statistical Office database and having examined the period between the end of World War II and 1991 it can be stated that there were 4 "peaks" of live births. After the war, the

number of births increased and after some decline, it almost reached the level of the 1930s by 1954. This is probably due to the aggressive population policy of the Ratkó campaign, which persecuted abortion and trying to encourage the willingness to have children by tax on childlessness (Mink, 1991). However, the illegality of the abortion and the tax on childlessness were abolished in 1956. Consequently, and as a result of the massive employment of women, the number of live births began to decline significantly, which only started to increase after the record-low numbers of 1962 (130,053 persons/year) till 1968, followed by some stagnation in 1975 (194,240 persons per year). Thereafter a continuous decrease may be observed. Overall, it can be stated that – having taken the pre-school age into account – the dates of establishing kindergartens follows the "culmination" of live births.

In Government Decree 363/2012. (XII.17.) on the National Program of Kindergarten Education the Hungarian Government has stipulated that the objective of pre-school education is to satisfy the psychosomatic needs of pre-school children. Within this framework, the Decree emphasizes the importance of education concerning healthy lifestyle in the first place. Health promoting activities (i.e. games and exercises involving physical activity adjusted to the individual level of development of children) also play an important role in this process.

The increased degree of physical activity improves the oxygen supply to the brain and thereby stimulates its functioning, thus reducing the likelihood of developing possible learning disabilities (Komjáti, 2016). It is therefore essential to ensure that children have the possibility to participate in physical activities of all sorts.

In our research, we wanted to observe whether suitable infrastructure and other conditions are ensured for kindergartens.

1. LITERATURE BACKGROUND

Numerous studies indicate that kindergartens play a key role in satisfying children's need for physical activity (Finn et al., 2002; Venetsanou–Kambas, 2010). It is also important to emphasize that at this age the definition of physical activity requires a completely different approach than in adulthood or even in the case of older children (Balogh et al., 2015). The motor development of children of 3-5 years does not primarily happen through or may be improved by participating in classical structured-movement-based activities (such as fitness, aerobics, etc.), but through and by playing games. According to international literature, every activity is considered a game that is "enjoyable" and pursued for the sake of the child's self-satisfaction (Burdette–Whitaker, 2005; Timmons et al., 2007). It is also important to note that at this age motor activity is typically not characterized by continuous moderate or intensive effort, but rather by short activity periods that are followed by longer periods of inactivity (Goodway et al., 2003; American Academy of Pediatrics, 1992). It must also be stressed that according to the Guidelines for the Physical Activity of Pre-School Children issued by the

American National Sports and Physical Education (2002) non-structured physical activity is at least as important as structured; moreover, the former must play a significantly greater role in daily physical activity. In this relation, it is clear that outdoor physical activity in this age group is also an essential part of appropriate development (Timmons et al., 2007).

When compiling the kindergarten program for physical activity, the goal should be to preserve the natural motives of children to play and enjoy physical activity, as it serves not only the development of physical, but also intellectual and social skills (Király–Szakály, 2011). Children's individual needs for physical activity differ, some of them are more relaxed, some more active, but we need to be aware in each and every case that motion development (whether it be free play or planned classes) remains a positive experience, that contributes to the development of physical, mental, psychological, and social abilities when offered regularly (Williams et al., 2008; Gaál, 2010; Csányi, 2012) and helps integrate physical activity spontaneously into everyday life, thus affecting adulthood. To be able to meet the relatively high demands concerning physical activity of preschool children the relevant requirements need to be met (Government Decree on the National Program of Kindergarten Education, 2012), since it is possible through this to have children learn their own needs, abilities, and limitations and acquire self-discipline and endurance (Farmosi, 2011; Koltói, 2013).

In the process of developing adult habits, childhood plays an extremely important and fundamental role (Telama et al., 2005; Németh–Költő, 2014). Parents have a decisive influence on physical activity pursued both on a competitive level and during free time. This can be observed in parental behavior – serving as a model – encouraging and persuading the child to be physically active, as well as organizing physical activity sessions, including jointly pursued sports activities and the solving of the issue of transportation (Edwardson–Gorely, 2010).

Teaching the importance of active living should therefore be started in childhood, and in this context, physical education introduced in a phasing out system as part of the Act on Public Education in 2012 is of great importance. Most European countries have a strategy for teaching school sports (European Commission, 2011). The EU also urged the Member States to adopt a national plan for sports education in order to make society aware that physical activity not only has positive health effects (EU physical activity guidelines, 2008), but also contributes to the improvement of learning outcomes (Hawkins–Mulkey, 2005; Carlson et al., 2008; Pfeifer–Cornelißen, 2010).

2. MATERIALS AND METHODS

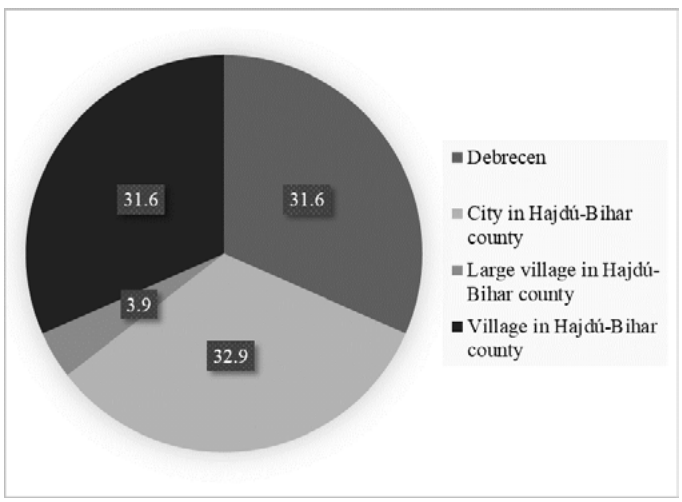
Our survey was conducted in the spring of 2018 in the form of a questionnaire-based telephone interview. We compared the kindergartens of Hajdú-Bihar County with the kindergartens of the local government and foundations in Debrecen.

Hajdú-Bihar county is the fourth largest county in Hungary, with 5.7% of the country's population living there. It ranks 3rd in the country in terms of population aged 0-14 years (79 373 people). The county seat Debrecen is the second largest and second most populous city in Hungary (KSH, 2018)

In the course of our research, we were trying to find out how many and what size gymnasiums are available in each kindergarten, when they were built, and how much time children spend in the open air. We also asked whether the kindergarten has its own swimming pool and whether it is possible to swim in in an organized form as well as what kind of sessions are held in the afternoons. Data was processed using the EvaSys software (VSL Inc., Hungary; http://www.vsl.hu).

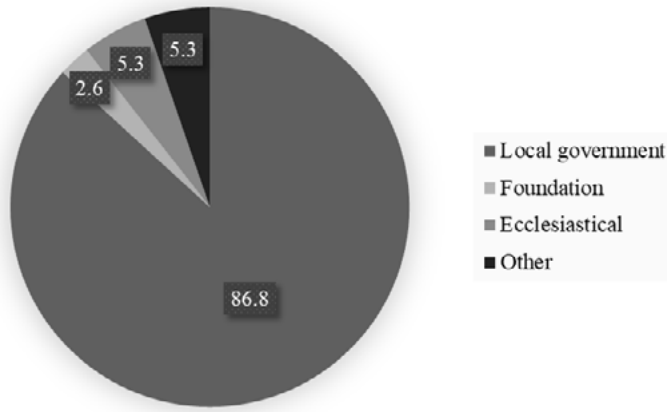
One third of the 152 institutions surveyed was in Debrecen, another one third in the towns of Hajdú-Bihar County, while the rest of them were in smaller settlements of Hajdú-Bihar county (Figure 1). The survey can be considered representative, as more than 90% of the county's kindergartens have been involved. The vast majority of interviewed institutions (86.8%) were owned and maintained by the local government, but some of them were owned by foundations, the church, and other institutions (Figure 2).

Figure 1 Distribution of settlements, n=152, %



Source: Own figure

Figure 2 Distribution of ownership, n=152, %



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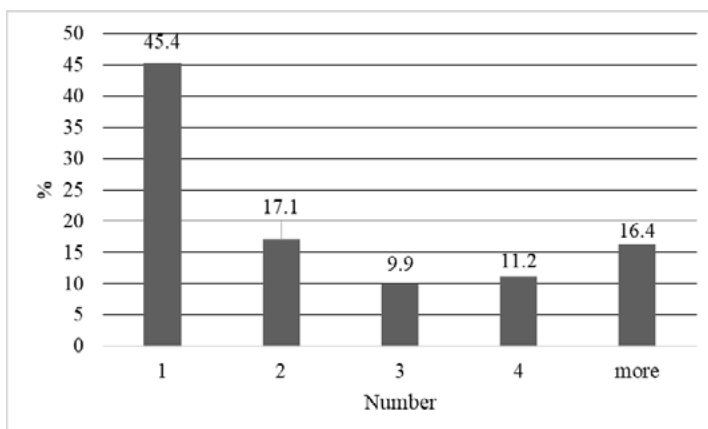
3. RESULTS

45.4% of kindergartens has 1 site, but 16.4% have more than 4 sites (Figure 3). 50% of Debrecen-based institutions operate on one site and 29% have 2 sites. In the case of cities, the multiple-site-based institutions are typical, since 42% of them have more than 4 sites.

Figure 3 Distribution of the number of sites, n=152



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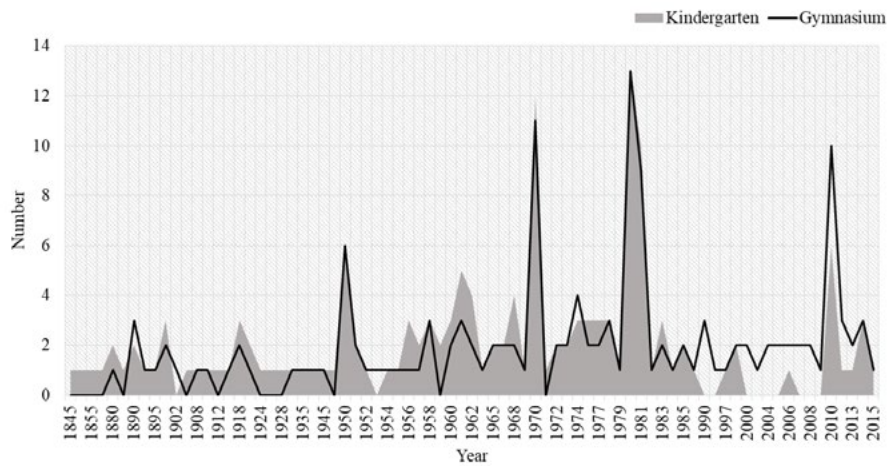
The next issue of the questionnaire concerned the date of construction of the kindergarten. Based on this the institutions were established between 1845 and 2015, varying widely. Most of the institutions were established during the 1950s and then in the 1970s and 1980s, and some around 2010. We also asked about the date of construction of the gymnasiums. The years of construction of kindergartens and gymnasiums is shown in a joint chart (Figure 4).

In 115 cases, the gymnasium was built in the same year as the kindergarten.

Figure 4 Date of construction (kindergarten and gymnasium), n=152

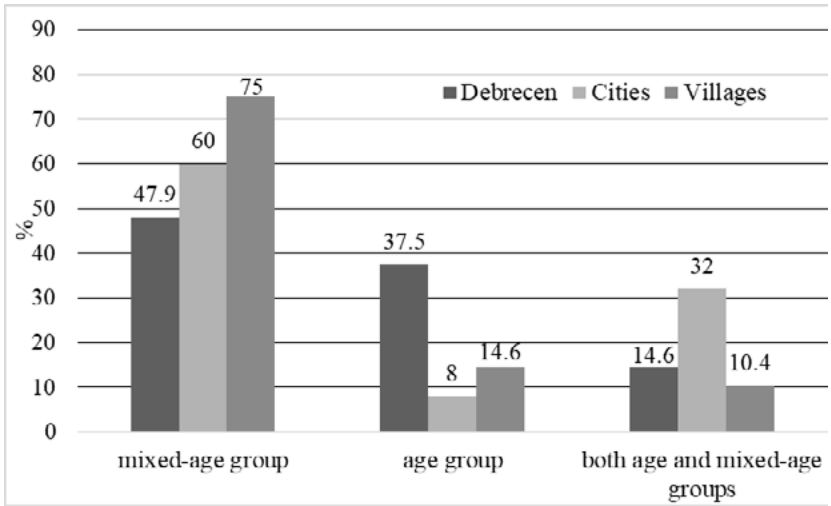


Source: Own figure

61.8% of kindergartens operate with mixed-age groups and only 19.1% of them have single age groups solely, with the remaining 19.1% operating with both mixed-age and single age groups.

The settlement-based data show that mixed-age groups (75%) are the most typical in the villages, while in Debrecen there is a large proportion of age groups as well (Figure 5).

Figure 5 Distribution of the types of groups, n=152



Source: Own figure

42.1% of kindergartens have their P.E. classes in sport rooms (rooms that are not necessarily equipped as a gym but are dedicated to sport activities), 29.6% of them in the gym (out of which 2.6% rent the place), while 27.6% of them rearrange the class room for this purpose. About one fifth (20.4%) of these rooms have a mirrored wall surface.

Typically, the kindergartens in Debrecen have a dedicated sports court (77.1%), but at least one third of kindergartens in smaller towns and other settlements also have one (Figure 6).

A covered terrace may only be found in 42% of the kindergartens, and out of these only 21.5% (typically urban institutions) say that their terrace is large enough to suit some of the groups or every one of them (Figure 7). It is interesting to note that in the case of kindergartens in Debrecen, the covered terrace is not typical. This is particularly surprising from the point of view, as we will point out later, that it is typical in Debrecen that children spend a lot of time outdoors.

Figure 6 Institutions with dedicated sports courts, n=152, %

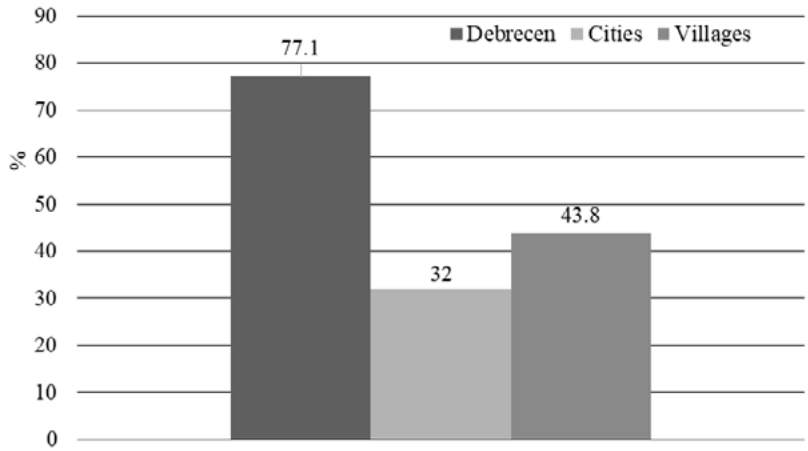


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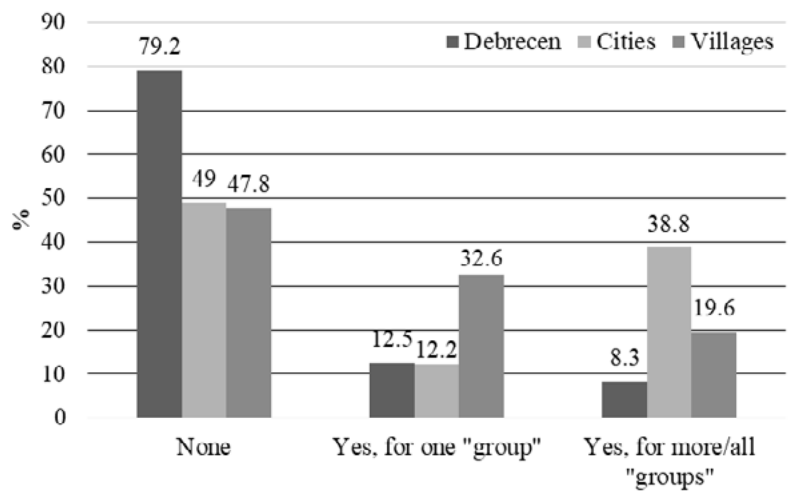
Figure 7 Distribution of the presence of a covered terrace, n=152



Source: Own figure

When examining the frequency of sporting activities, it can be stated that they usually take place in institutions 1–2 times per day or per week. While in Debrecen there is a daily regularity, in the villages there is a weekly 1 occasion. Although there are small differences between the different age groups, they do not show a clear trend. (In the case of cities, small group classes take place once a week that increases to two per week later on) (Figure 8, 9, 10, 11).

Figure 8 Distribution of P. E. classes in „small groups", n=152

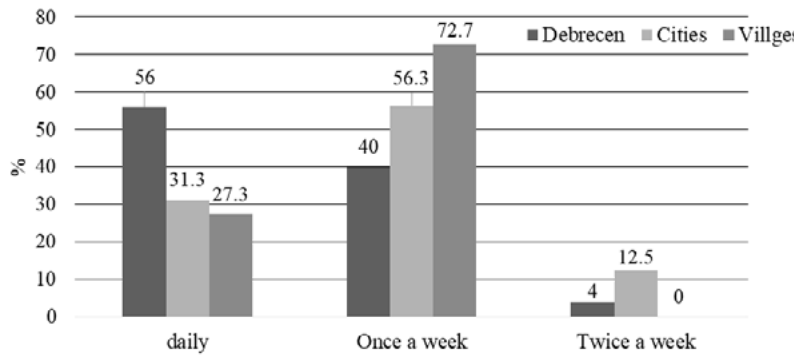


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Figure 9 Distribution of P. E. classes in „middle groups", n=152

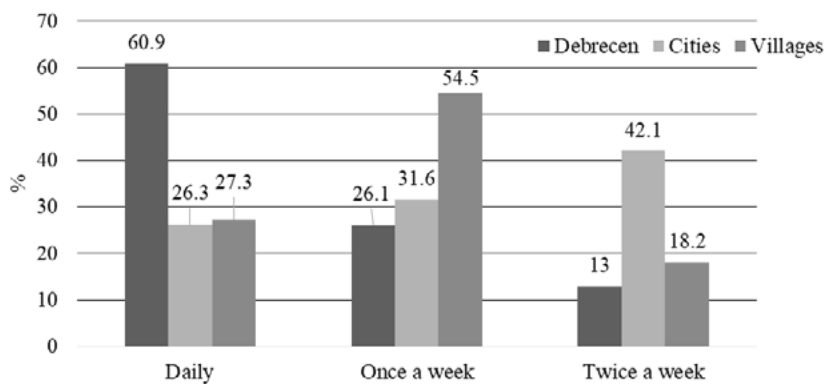

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Figure 10 Distribution of P. E. classes in „large groups”, n=152

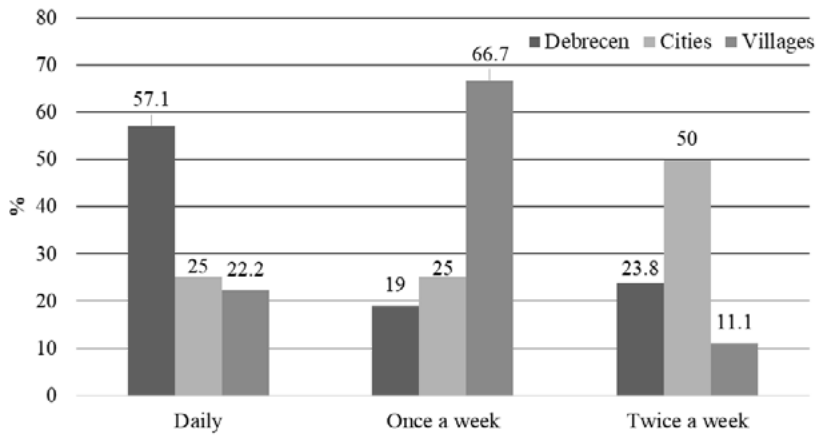

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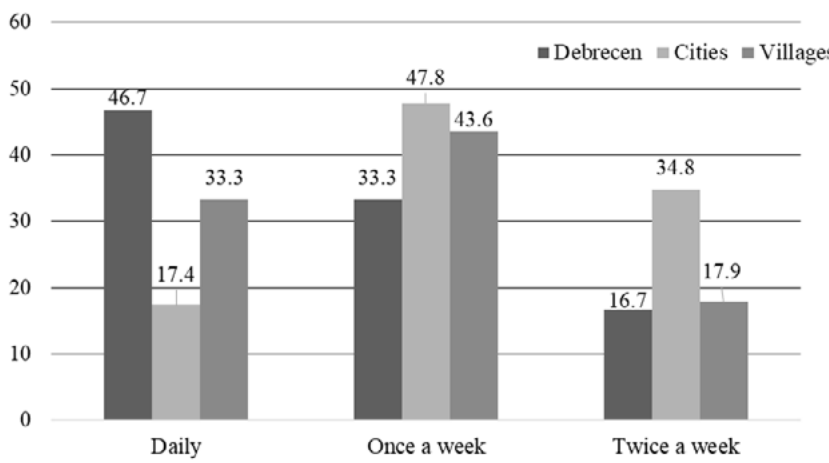
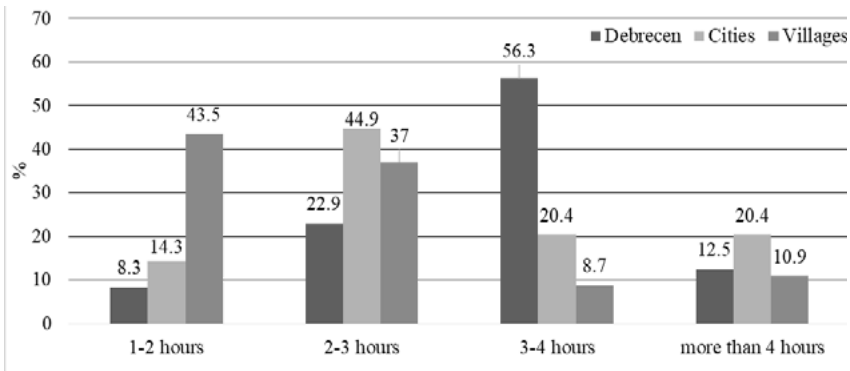
Figure 11 Distribution of P. E. classes in „mixed group”, n=152



Source: Own figure

The daily time spent outdoors in good weather shows a typical settlement-structure-based distribution. While in Debrecen, 3–4 hours a day are dominant, in most villages children spend only 1–2 hours in the courtyard. It is interesting to note that cities are characterized by a time of 2–3 hours between the two extreme values. Although we do not have direct data for this, it can be assumed that kindergartens take into account the home habits of children when determining the time spent outdoors (Figure 12).

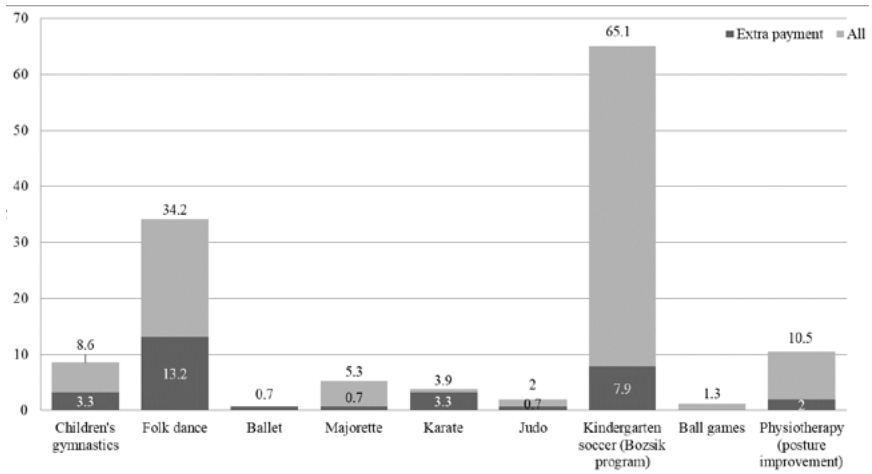
Figure 12 Distribution of the time spent outdoors in good weather, daily, n=152, %



Source: Own figure

Extra sporting activities are offered in 86.6% of kindergartens, most often soccer (65.1%), folk dance (34.2%) and corrective gymnastics (10.5%) (Figure 13). Some of these are fee-paying (typically in Debrecen).

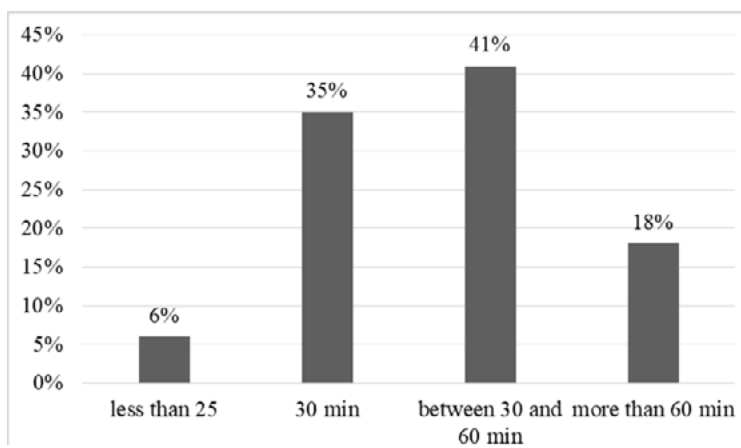
Figure 13 Distribution of specialized P. E. classes offered by the institutions (%). Those that require extra payment are highlighted - note that more than one answer could be named for this question, n=152



Source: Own figure

Classes are typically (35%) 30-minute-long (Figure 14). 41% of the classes are 30–60 minutes long, while only 18% of them are longer than 60 minutes, due to the fact that children are not able to concentrate or focus on one thing for a longer period of time at this age.

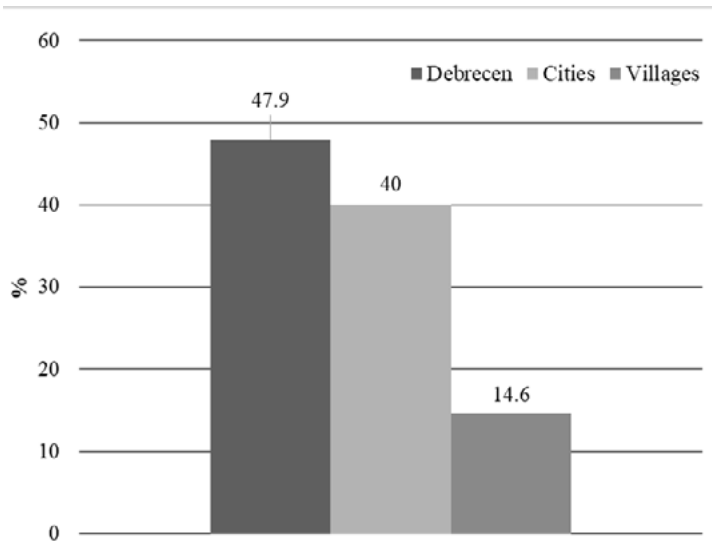
Figure 14 Lengths of specialized P. E. classes, n=152



Source: Own figure

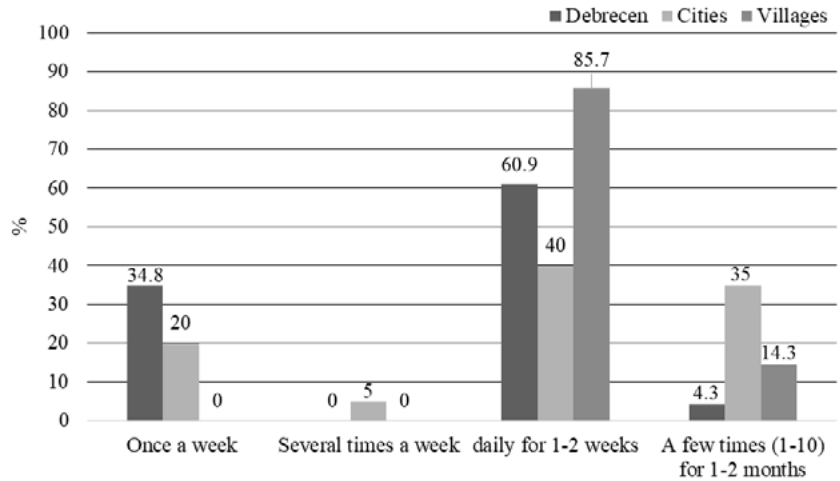
Kindergartens do not have their own swimming pool, but 32.9% organize swimming lessons with different frequencies (Figure 15). The most typical format is attending the swimming pool every day for a period of 1–2 weeks. It should be noted that in 24% of kindergartens swimming lessons once a week are part of the kindergarten program (Figure 16). At the same time, this service is fee-paying in 92% of the institutions. Again, in some parts of the cities and villages – in a larger extent in the case of the latter – the local government supports the swimming lessons by means of tenders, thus free of charge (Figure 17).

Figure 15 Distribution of the number of institutions that offer organized swimming classes, n=152, %



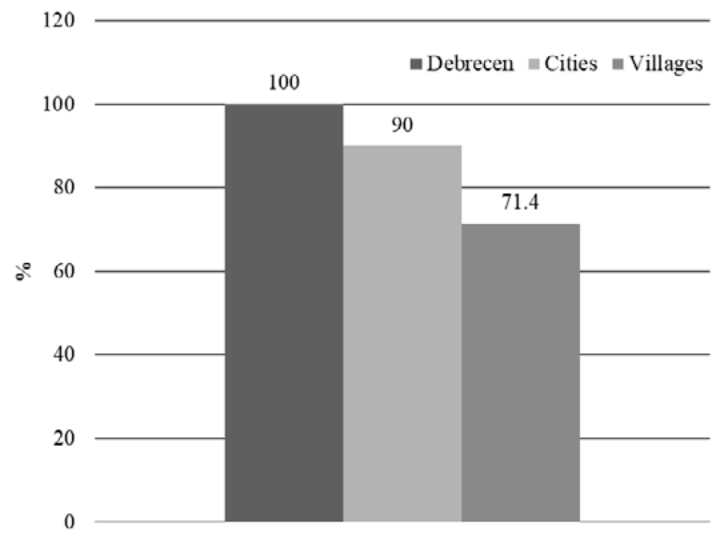
Source: Own figure

Figure 16 Distribution of the frequency of swimming classes, n=152, %



Source: Own figure

Figure 17 Percentage of swimming classes that require extra payment, n=152, %



Source: Own compilation

4. CONCLUSION

If we want our children to be healthy and active, we must teach them the love of sports and encourage them to follow a healthy way of life, in which kindergartens also play an important role, due to our children spending most of their time on weekdays there.

In our survey, we visited 152 kindergartens in Hajdú-Bihar county of Hungary. The institutions were evenly distributed among Debrecen and the towns and small settlements of Hajdú-Bihar county. About one fifth of the institutions operate with single age groups only, all the others operate either with age and mixed-age groups or mixed-age groups solely. Education in a mixed group has many advantages: children become more susceptible to tolerance, their ability to empathize along with their helping and caring attitudes developing greatly. The older ones look after the smaller ones; however, at the same time the smaller ones become independent, more dexterous and attracted by the activities of the bigger ones sooner. In the homogeneous age group, however, it is easier to plan and define the level of expectations, as the child is surrounded by companions with knowledge and abilities appropriate to his / her age.

In more than one quarter of kindergartens there is no gym or gymnasium, so the class room needs to be rearranged if a sports class is to take place. Nearly half of the kindergartens have a dedicated sports court, but only 21.5%of them have a covered terrace. This infrastructure capacity, therefore, "forces" 27.6% of the kindergartens to offer gymnastics in a classroom during rainy or cold weather.

A wide range of extra sporting activities can be observed in the institutions of the region with soccer, folk dance and posture improvement being the most common, but karate, skating, and majorette classes were also mentioned in this relation. It was interesting to note that musical and artistic development, as well as foreign language classes show up in many places in addition to/instead of sports classes in this young age.

We dealt with pre-school swimming lessons as a separate issue. It can be stated that 32.9% of kindergartens are compensated for providing swimming lessons with a diverse frequency.

It can be established that development in this area is also necessary if we want to reach the goal laid down in the National Sports Strategy (2007), that is if we want every child to learn to swim. One of our previous surveys (Balatoni et al., 2018) have revealed that parents (kindergarten, elementary school) expect public education institutions to solve this issue.

Our survey highlights the fact that although there are large differences in the availability of kindergarten infrastructure necessary for physical activity, the institutions involved in the present study seek to meet the children's need for sports.

In order to have health education achieved as a widespread kindergarten pedagogical objective and to reduce the differences between certain areas in a substantial way the development of health-conscious behaviour among young

people requires more attention. Developing and implementing a progressive and conscious strategy that takes local conditions into account, would be beneficial both at national and local levels. In order to have a less developed region catch up in terms of sports infrastructure and health behaviour, funding sources, governmental, municipal and employer actions are also needed.

Pre-school teachers should be given the opportunity to prepare themselves adequately in order to utilize their knowledge and practical experience to develop the skills of children in accordance with their individual abilities, bearing in mind that physical activity should be registered as a positive experience.

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GERGELY GYIMOTHY

Distancing from the living environment

Abstract

The usage of digital equipment has recently become a worldwide issue. Technical progress is a great opportunity for people. However, the latest technological devices are coming under increasing criticism from many aspects. The generation which has grown up in the virtual world rejects traditional lifestyle and value-creating manual activities. Nevertheless, it is promising to see that the initiatives of some social and church organisations may modify young people's environmental attitude. The aim of this study is to highlight the variable relationship between the man and his natural environment in the mirror of the effects of digital revolution.

Keywords: digital equipment, living environment, environmental attitude

INTRODUCTION

This paper has been inspired by my own observations that worry me about social behaviour caused by the usage of digital equipment. It is of great concern how people are becoming distant to the living environment. We contemplate the process as a parent with a large family and a teacher in a certain case we do feel responsibility for the upcoming generation. I would like to give an overview on some initiatives which may restrain children's negative environmental attitude. This problem has arisen recently and it has many roots, making it difficult to approach. It is commonly known that progressive technical development has some advantages, but its negative effects are enhancing difficulties within our societies. Fast-growing digitalisation is even *demanded* by people, although the enchanting virtual world involves numerous traps, too. Turning students' attention towards the living environment and saving our children from nature-deficit disorder (Louv, 2008) may often seem to be a challenge. There are, however, some promising environmental educational elements standing for the provision of daily class-work. We can find examples in several societies of developed countries of how people are sensitizing themselves to an environment-focused way of thinking. They provide adequate answers to the problem using an unorthodox philosophy of eco-theology. Gardening may be one of the solutions among the activities that are based on value creation and co-operation with the living environment.

In the first part of the paper the global effect of the technical development, the anomalies of digitalism and the grades of the digital use are discussed. The next part shows some examples of environmental education which can be used for raising children closer to the nature.

1. EFFECTS OF TECHNICAL DEVELOPMENT

I consider it is important to review one of the most significant stages of the road towards digitalization i.e. industrialization. Industrialization puts economy interests above classic human values. This is the disembeddedment theory of Karl Polanyi (Polányi, 1957.) The human workforce was replaced by machines. General historical studies have shown that the rapid technological development of the industrial revolution caused social tensions. Undoubtedly, we can make life easier by using machines. However, new technologies were not regulated in most cases. Craft workshops were liquidated by factories, the expansion of capitalist societies made factory goods become definitely more preferable to craft goods. Economy quickly recognized the opportunity of mass production. Large-scale production caused the degradation of product quality whilst small producers of high-quality products became largely unemployed. In developed societies, scientifically proven treatises analysing the effects of an industrialization ignoring its own consequences were published at the end of the 20th century (Kaczynski, 1995). Today's market economy labels products with the inscription "craft mark" that may reassure consumers who are responsible for their environment. This phenomenon could be positive if the content corresponded with the manufactory quality in all cases. Obviously, development cannot be prevented, new equipment make everyday life comfortable, although the new technical tools and the way we use our Earth resources should not harm us or future generations.

The negative human-psychological effects of technical development should not be ignored. The central dogma of "self-centeredness", individualism, is a common phenomenon in today's societies. Modern tools can kill the need for personal communication, they lead us to the virtual world and online relationships. It is more comfortable for the individual to hide from the real world, but this will just confirm their egoistic reflection. The result of the degradation of the value system in family life is a sociological problem which is reflected in the egoist person. Thus, society becomes psychologically vulnerable because its smallest sociological unit on which it is based, is slowly being liquidated. This procedure serves the purpose of money-centred worldview while "single-existence" and truncated families are becoming a large market gap (Végh, 2018).

2. PEDAGOGICAL ANOMALIES AGAINST THE DIGITAL WORLD

New and innovative things are great opportunities, but they also involve risks. Gyarmathy (2011) says in her study that student memory has latterly deteriorated with unprecedented speed. The spatial visual processing of children's nervous systems is dealt with even more nowadays. Children do not learn how to use their imagination if they get ready-made images. Machines are run instead of active pastime; the passive experience acquisition is more emphasized, entailing modest bodily-neural participation. The listed characteristics are factors of attention disturbance. Pupils cannot pay attention to things in front of them because other stimuli distract their attention, and this results in decreasing performance. Golnhofer (2009) affirms that school learning does not demand new learning organization methods, but it is necessary to inspire pupils to create and lifelike learning. This is achievable, however, only by active participation.

A reformed pastor of Józsa-Debrecen analysed the unlimited quantity and dubious value system of digital information during a service. The take-home-messages of the mass drew my attention to the problem of the illusion of omniscience. The user becomes confident because of the easy-going information acquisition while using internet, and everything goes blind in the fallacy of this knowledge. Everything that once belonged to traditional life is qualified as worthless by the user, so the victim underestimates all the activities carried out by physical work (Gacsályi, 2017).

Digital prosperity is desirable for developed (and developing) societies in the 21th century. People without internet connection are even isolated from the world. Buda (2012) classifies the information society into several groups according to their digital competences, demonstrating the transition between these categories, too:

1. Digital hermits who do not use info-communication devices.
2. Digital explorers having already started to become acquainted with the devices of digital prosperity represent the next stage.
3. There are intensifying differences between internet users: digital nomads, wanderers, and settlers.
4. Digital conquerors are on the top of the classification. For them, the internet means the only information source, they are online continuously, they just communicate digitally, and they start to have withdrawal symptoms when they have to disconnect from the internet.

Becoming addicted to the web and of computer games is nowadays a common psychological illness. A Hungarian neurologist, Janszky (2016) talked about addictions in an interview. He said that the effects of excessive internet usage are typical to those of cocaine addiction. Therefore, the brain construction in the rewarding centre of the brain may change. He ascertained that internet dependence originates from another psychological problem. When internet dependence is not treated in a proper way, even drug addiction may appear later on. While using information technology

devices, children and young people spend a considerable part of their time playing computer games. One of the disadvantages of computer games which should be emphasized is that they cause dependence. An excessive time spent with computer games often makes people lose their sense of time. Moreover, basic needs are sidelined as well (Jensen–Nutt, 2016).

Block (2008), a famous American psychiatrist, discussed the main signs and symptoms provoking a computer gambling addiction. When there is no computer access, withdrawal symptoms might appear, such as tenseness, depression or aggressive behaviour. Additional symptoms could be the tendency to tell lies and social isolation.

Batthyány et al. (2009) investigated the prevalence of excessive computer game playing behaviour among adolescents. Their results show there are substantial correlations between excessive computer and video game playing behaviour and psychosocial and also psychopathological abnormalities, such as alterations in the intensity of social conflict, concentration deficits, maladaptive coping behaviour, stress and psychosomatic challenge, and school phobia.

The study of Frölich et al. (2009) demonstrated that children with attention-deficit hyperactivity disorder (ADHD) are especially vulnerable to addictive use of computer games due to their neuropsychological profile.

Likewise, Tauszig (2014) provided more information regarding game dependence. Depression, lack of appetite, daily life rhythm problems, being in debt, sleep disorders, work and family problems are all the symptoms of game dependence. Online games reign over the victims as an addictive habitat.

3. GOOD PRACTICES OF ENVIRONMENTAL EDUCATION

It is important to lead children's interest back to the nature, shaping their environmental attitude in the kindergarten education already to avoid being addicted to digital devices.

Children's environmental interest starts by doing adequate thematic activities, being part of the kindergarten daily programme. Villányi (2009) discussed the methods of the pedagogy for sustainability. Discovery plays an important role at the beginning of the learning process. Essentially, the objectives of the kindergarten classrooms must reflect sustainability.

Iván (2004) writes that a school can be considered "green" when the goals of sustainability infiltrate its pedagogic programme, completely taking part of its quality assurance system. The school's local condition is considerable when determining its environmental educational aims. Necessarily, the non-pedagogic employees, the teachers should be involved in the programme, besides the pupils.

The next parts of the paper illustrates some methods of environmental education which can be used both in kindergartens and schools.

3.1. THE BENEFICIENT EDUCATIONAL DEVICES OF A SCHOOL GARDEN AND THE "LIVING CLASSROOM"

Johannes Amos Comenius, the famous theologian and teacher who worked in Sárospatak, declared in his study of Didactica Magna in 1632 as follows: "There shall be a garden beside the school where the pupils can relax, where the pupils can study trees, flowers, medicinal plants comfortably and they learn how to enjoy them!"

At the time of the Rousseauian enlightenment, a collection of natural knowledge, botany and the pedagogy of the physical education spread parallel with the harmful effects. All of these became the part of the history of school gardens.

The Darwinian natural selection theory and cell biology scientific results brought about educational reforms, followed by the education of the natural sciences. As a result, more than ten thousand school gardens were created until the middle of the 20th century.

József Eötvös, religion and public education minister, proclaimed a law (Hungarian Law XXXVIII/1868 on public education) in parallel with the introduction of compulsory education and the initiation of making practice gardens.

Nowadays, the so-called School Garden Programme works in our country. According to the draughting of the programme the primary aim of the school garden is to provide a tangible, practical experience for the pupils from the work itself and from the production of values. More than 110 school have joined the school garden programme so far. A considerable number of the gardens are larger than 500 m^2. Currently, more than 80% of all school gardens were established after 2010 and the dynamical development of the programme was fruitful in later years (Lukács, 2017a). Among various type of school gardens the most common ones are the flower garden, the vegetable garden, the spice & herb garden and the compost heap. The most important goal of school gardens is environmental education and education for sustainability in Hungary (Halbritter, 2018)

Creating school gardens is not possible for all schools, especially in dense urban areas. Instead of school gardens, even a nature-friendly sunny shelf system of the classroom could fulfil a similar role, called a "living classroom". Plant exhibitions can enrich pupils' knowledge about the ontogeny of plants. The features of vegetal organs can be observed. Children can monitor how plants adapt to their environment. In case of the setup of weeds, the haphazardness and the tolerance of them are observable. The additional aim of the living classroom is to improve pupils' sense of responsibility (Dámné, 2005; Lukács, 2017b).

Reisinger and Bándy (2018) stated in their paper that school gardens can be one of the main tools for educating active citizenship. Their results show that citizens can be active in shaping environmental issues, but the most important factor seems to be that they need to be concerned personally about the issues.

3.2. FIELD TRIPS INTO NATURE AND FOREST SCHOOL PROGRAMME

Field trips and such excursions may be qualified as study work where the pupils are able to improve their whole personalities. They get as close as possible to the living environment, they become acquainted with natural and social phenomena and objects and they get the chance to study in natural circumstances. The additional effect of the field trips which should be emphasized is the knowledge to help children's emotional processing. Exploring the beauties of nature and to feel its aesthetic power are also an advantage of field trips. According to the topics of excursions, several nature transformer activities made by the humankind can be shown. Patriotism, the national self-awareness, local identity and popular education competences can be developed due to excursions (Dámné, 2005).

According to my own experience a young person's interest can be aroused by organizing canoeing tours and this is how pupils or students can be energised. I organized water camps for several years on the Tisza river, in the Tiszalök area. The aim of the water camps is more than a general examination of the living world of the Tisza river. The participants can observe the waterside flora and fauna habitats, and they face the physical challenge of rowing the canoes. In addition, I observed that the participants act as a solidary company even long after the three-day rowing camp. I think that the strength demanding work and the intellectual challenges acts as cohesive force between them.

Bilku (2004) says that the forest school is a specific learning organization form which is able to integrate the school's local curriculum, the subject of its cognition is the characteristically natural and sociocultural environment. The realisation of the programme is based on the students' activity. The teacher builds the teaching process primarily on a collective-learning technique. The forest school educates children how to make personal contacts by using the team opportunities. The weekly common work develops the students' social susceptibility in the course. The sense of practicality could significantly increase the self-sufficiency. The students' self-knowledge is converted by using the empirical way of learning. The uprising good relation between the teachers and the pupils helps them with their connection development. Likewise, the forest school is expected to increase the students' physical stamina.

3.3. THEMATIC EDUCATION PROGRAMME WITH THE APPLICATION OF THE PROJECT METHOD

John Dewey, who wished to break with the old methods of education, consulted about the project method firstly in the history of universal education, and he created his experimental school in Chicago in 1896. According to his principal aim of teaching he intended to place special emphasis on the real activity and the experience. He maintained the child's motivation by doing activity and he

perceived the process of learning as a row of acts; accordingly he considered the school life "active" by way of his theory. The teacher's task is complex in the course of the project work. The projects solved by the participating study groups are based on teacher instructions.

Nowadays, pupils' and the students' parents expect more practical knowledge from educational institutes. Therefore, the teacher's role is now changing; the young audience prefers a project-like organizing of the learning process and they dislike learning organization work based on frontal communication. Thus the teacher tries to place emphasis on the pupil or student active participation. We may accomplish the project method easily during biology lessons. Moreover, we may even organize thematic days to stimulate the youth to the cognition of a topic, and this can be a superb occasion to turn their attention to experimentation. An exploration-focused way of learning helps children to take responsible decisions, such as to use creativity urges, and to develop their problem-solving thinking (Hegedűs, 2007).

The value-creating projects, such as the popularization of farming work or any other related program supplies, appear to be essential for our future sustainability. In Hungary, it is part of the seminar curriculum of the biology teacher training programme that students prepare an optional example of the project method for popularizing the self-supporting farming. A study on practical methodology of mine discusses an optional example of the project method for popularizing the self-supporting farming. I defined the "farming" day programme in order to arouse student interest in self-supporting farming production. The aim of this programme was for children to appreciate rudimental work, and to gain cultivational and rudimentary knowledge on plant production and also animal husbandry. I consider it necessary for pupils and students to recognize the fundamental concepts of the rural self-supporting farming. In my opinion they should get to know the most frequent vegetable crops and domestic animals as well as appreciating a traditional lifestyle. The projects also have some additional advantages: they show whether a young person is able to learn how to create a subsistence farm with environmentally friendly methods for ecological agriculture. At the end of the project, students may be required to write a report on the inception of an optionally chosen farm and to have some knowledge about the production of some vegetables and fruit varieties and breeding of domestic animals. This may be an optional initiative permitting pupils to evaluate themselves at the end. Besides this, it should be pointed out that the personal competence connected with creativity is crucial from a pedagogical perspective since this is one of the basic competences to be improved. Social skills develop by working on the farm project of the thematic programme. During agriculture classes, acceptance and appreciation can be achieved by such programmes. Aesthetic and artistic ability is improved due to the part processes of the competition ability and due to the tasks embedded in skill subjects during the project work.

3.4. THE SELF-SUPPORTING FARMING AS A POSITIVE RESULT IN EDUCATION

There is an apparently obvious fact which nevertheless seems to be ignored: parents have an important role to play trying to increase their children's interest in appropriate environmental attitude. They generally do not offer any opportunity for their children to learn about farming or gardening. Nevertheless, this pedagogic aim would be useful to stimulate self-reliance and self-sufficiency in children.

It is commonly known that healthy food consisting of unobjectionable components originates from ecological farming. Traditional horticulture production and livestock conservation as factors of self-sufficiency may work again in the present as well as it worked in the past (Dobos, 2000).

In my opinion we can see some similarities between conventional, large-scale agricultural firms and other large industrial firms, and the motivations seem to be identical for both of them. Large-scale agrarian firms are focused on making as much profit as possible, rather than producing healthy food. Although the above mentioned quantitative production does not contradict any economic rules or regulations, from my point of view it may involve a substantial large ethical burden (Gyimóthy, 2015).

Environmentally friendly behaviour can be improved either on biblical and evangelical or on rational secular bases. It is of vital importance to deal with the Earth's ecological crisis, so it is significant what sort of agrarian production methods are used. Ángyán (2008) recommends ecological farming, instead of the soil blackmailing conventional agrarian production. He affirms that smallholders and medium-sized farms mostly use ecological methods in their farming activities.

4. CONCLUSION

I have pointed out those anomalies which disposed me to think what I have developed in the introduction of my paper. I feel real concern regarding the negative environmental attitude reflected in society. I mentioned the excessive increase in digital use during my teaching practice in numerous situations, based on my spontaneous observation in the student communities. Those who believe in the created world by virtue or by experience, may feel some moral responsibility to keep the unrequired effects of the social processes under control. Firstly, we may address small communities, then also larger ones, to reach that point from which a self-healing process may begin on a social level. After that, we will be able to recognize the consequences of the all-consuming digital consumption which causes self-centeredness, several types of dependence and the negligence of traditional real values. I think it is a wrong way to follow political campaigns agitating for a positive environmental attitude. It may seem to be the best solution to show our environmental conception just through our lifestyle, and not to expect and force others to think similarly. This could be a possible way to exhort the new

generation to reject the restraints placed on human individuality and a roboticized lifestyle, so that the people may turn back towards the values of the created world, due to a positive environmental attitude becoming continually more and more popular in public thinking.

I have pointed out that people may experience isolation when spending time in the virtual space. Therefore, they may become victims of physical loneliness.

The domestic institutional education system provides all the knowledge for the benefit of the next generation. Online content can be reached promptly with a few mouse clicks, and this immediately satisfies any childlike curiosity in the young. Browsing in the virtual world of instant gratification completely extinguishes the chance of gradual discovery and the retardation of the children's expectations. Therefore, they become addicted to the technologies while they are not able to accept the laws of the nature.

These examples may lead to an increasing value creation as it popularizes the ability of self-sufficiency as well as sustainable life. School excursions, forest schools and project works can help the children to interiorize the aims of sustainability. The pedagogy of self-sufficiency organized by the schools, common family gardening and self-supporting farming play a key role so that there may be more and more people who love and admire the living environment.

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Legal resource:

• Hungarian Law XXXVIII/1868 on public education

AUTHORS

DR. BALATONI, ILDIKÓ, PHD: operative director, University of Debrecen, Clinical Center, E-mail: balatoni@med.unideb.hu

Ildikó Balatoni obtained her medical degree at the Semmelweis University in 1995. She is also qualified in medical law, is a specialist of surgery and plastic surgery, she has a degree in controlling, in quality management, and is a qualified auditor. She obtained her PhD degree in 2011 within the field of social sciences, in regional studies. Her scientific interest lies in studying the inner (genetic, physiological and psychological) and external (infrastructure, equipment and human resources) parameters influencing physical performance and their comparative analysis in a regional context.

DR. DERNÓCZY-POLYÁK, ADRIENN, PHD: associate professor, Széchenyi István Univesity, Department of Marketing and Management, E-mail: dernoczy@sze.hu

Adrienn Dernóczy-Polyák obtained her diploma in Faculty of Economics, Course in Economics in Marketing and Economic Forecasting at the University of West Hungary in 2001. She started her professional career there, and continued from 2003 till nowadays at Széchenyi István University. Her research area was about the marketing and the role of colours. She obtained her PhD in the field of Economics in 2007. Presently she collaborates with her colleagues in the fields of healthy lifestyle, eating behaviour and physical activities.

DR. GYIMOTHY, GERGELY, PHD: senior lecturer, Debrecen Reformed Theological University (DRTU), Kölcsey Ferenc Teacher Training Institute, Department of Sciences, E-mail: gyimothy.gergely@drhe.hu

Gergely Gyimothy received his Master of Science degree in agricultural sciences (2004) from the University of West Hungary. He started his professional career as an assistant researcher at Pharmagene-Farm Ltd., and then spent a number of years in Ireland to gain professional experience. Returning to Hungary, he continued his research work in the field of animal reproductive biology. He obtained his PhD from the University of Debrecen. Since 2011, he has been teaching nature science-related courses at DRTU. In January 2018, he received his MSc in teacher of biology (MSc) from the University of Debrecen. Presently, his research interests include agricultural-social research and environmental education.

JUHÁSZ, LÁSZLÓ: PhD student, University of Óbuda, E-mail: j.laszlo92@stud.uni-obuda.hu

László Juhász obtained his MSc degree in Mechanical Engineering at the Budapest University of Technology and Economics in 2016. From 2017 he is a PhD student at the University of Óbuda Doctoral School on Safety and Security Sciences. His major field of research is Industry 4.0 and industrial digitization. In 2017 he was awarded the New National Excellence Program scholarship. In connection with subject "The long-term success of the company - safe company" held by Dr Katalin Beatrix György Dr. Takácsné he has prepared the cost-benefit analysis of Industry 4.0 technologies.

DR. KAZINCZY, ESZTER, PHD: assistant professor, Széchenyi István University, E-mail: kazinczy.eszter@gmail.com

Eszter Kazinczy holds a PhD in Economics from the Corvinus University of Budapest. She worked as an external expert at the research institute of ICEG EC. Then she continued her work at OTP Bank's Private Banking Department as a Subsidiary expert. She participated in a half year research program at the European Central Bank on South-East Europe's banking sector. Currently she is an assistant professor at the Széchenyi István University.

DR. KELLER, VERONIKA, PHD: associate professor, Széchenyi István University, Department of Marketing and Management, E-mail: kellerv@sze.hu

Veronika Keller received a PhD degree in management and business administration sciences in 2010 at the Széchenyi István University, Doctoral School for Regional and Economic Sciences. She has been working at Széchenyi István University since 2006 and currently she is an associate professor. She teaches marketing communication, international marketing and marketing research. She regularly participates at international marketing conferences, especially the ones organized by IPNM (International Association on Public and Nonprofit Marketing). The number of her publications is over 60 and the number of book chapters, articles and conference papers written in English is 25. Her field of research is the analysis of health behaviour from a marketing perspective. She conducts researches connected to eating behaviour, meat consumption and physical activity, especially exploring the motivations.

DR. HABIL KOZMA, GÁBOR, PHD: associate professor, University of Debrecen, Department of Social Geography and Regional Development Planning, Faculty of Science and Technology, E-mail: molnar.erno@science.unideb.hu

Gábor Kozma works as associate professor at the Department of Social Geography and Regional Development Planning of the University of Debrecen. His research interests include local governments and regional policy of Hungary, place marketing and connections between sports and geography.

DR. MOLNÁR, ERNŐ, PHD: assistant professor, University of Debrecen, Department of Social Geography and Regional Development Planning, Faculty of Science and Technology, E-mail: molnar.erno@science.unideb.hu

Ernő Molnár works as assistant professor at the Department of Social Geography and Regional Development Planning of the University of Debrecen. His research interests include the integration of the Hungarian industry into global production networks and its role in the development of underdeveloped regions.

MORVAY, SZABOLCS: PhD candidate, Széchenyi István University, Doctoral School of Regional and Economic Sciences, E-mail: morvay.szabolcs@sze.hu
Szabolcs Morvay is a PhD candidate at the Doctoral School of Regional- and Economic Sciences at Széchenyi István University. Currently he is working as a researcher on behalf of Győr, dealing with the creative cities and the cultural and creative economy.

DR. PLATZ, PETRA, PHD: associate professor, Széchenyi István University, Kautz Faculty of Economics, Department of Marketing and Management, E-mail: platz@sze.hu

Petra Platz is an associate professor at the Department of Marketing and Management. She has been teaching marketing related subjects since 2011. She finished her PhD studies in 2016. Her research field is on the boarder of psychology and marketing. Her research area covers decision theories, consumer preferences and consumer memories.

SZÉPNÉ, VARGA HENRIETTA: University of Debrecen, Clinical Center, E-mail: hvarga@med.unideb.hu

Henrietta Varga Szépné obtained her degree at the University of Debrecen, Faculty of Agricultural and Food Sciences as an MSc in Food Safety and Quality Engineering. She has been working since her graduation at the Office of Quality Assurance at the Clinical Center of the University of Debrecen. Her scientific work is supervised by Dr. Ildikó Balatoni, her research interest is the investigation of the infrastructural background of physical activity/sports in a regional context.

REVIEWERS

Ambrus, Rita Anna
András, Krisztina
Czeglédi, Csilla
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Minerva baglya csak a beálló alkonnyal kezdi meg röptét.
(G. W. F. Hegel)