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The Situation of CEE Economies after the COVID-19 Crisis¹

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Abstract. Written in late summer of 2022, this article aimed to provide an overview on the intra-EU cohesion of the EU Member States that transformed the communist system into a democratic market economy in 1988–90. The study analyses the economic background of these states for sustainable catching-up in the European Union. The result is a picture of a divided CEE area, where some states showed macroeconomic imbalances and economic growth, while others started to catch up with the solid background of the eurozone membership or its future perspective. In terms of most parameters, Hungary is in the first group but – together with Romania – is also facing serious macroeconomic difficulties.

Keywords: cohesion, CEE, imbalances, inflation, competitiveness

I. Introduction

In this study paper, I publish the written version of my lecture presented at Partium Christian University in Oradea in May 2022. I concentrated accordingly on the professionally applied Eurostat and EU Commission / ECB data. Of the data that provided a comprehensive overview available at the time, I only gave an account of the situation in CEE in 2022 in the chapter titled *A Broader Picture of the Situation in the Middle of 2022*. Later in the paper, when touching upon the specific topics, I have only taken into account the data available for 2021 since the assessment of the events of 2022 and the analysis of the effects of the war in Ukraine on the CEE region are only possible – in my opinion – in 2023, or even later, due to the constantly changing situation. Accordingly, in my study, I will therefore refer to the statistics of the first part of the year of the conference (i.e. 2022) only in exceptional cases.

1 This study is based on the author's presentation held at Partium Christian University in Oradea in May 2022.

2. A Broader Picture of the Situation in the Middle of 2022

In 2022, the world economy is in further recovery after the post-COVID crisis year of 2021. The world's economic growth rate falls to half of last year's performance, barely exceeding the psychologically important 3%. While only a 2.6% growth is expected for this year in the euro area, experts are even more pessimistic for the USA: based on the latest IMF outlook in July 2022, the rate of growth this year will only be 2.3%. After many years, it is not out of the question either that the growth rate of the European Union in 2022 will overtake that of the United States (IMF 2022).² It is also not usual that the USA is close to a technical decline in the first two quarters of the year, although – compared to the same performance period of 2021 – it still increased by 3.7 and 1.7% respectively in the first two quarters of 2022. It is not expected for the whole of this year that the largest economy is going into recession. In the eurozone, the first half of the year brought an economic growth of over 4% on an annual basis,³ but overall we cannot be overly optimistic about annual growth, as the EU Commission's forecast in the middle of the year predicted only 2.6% (European Commission 2022).⁴

China has also slowed down – the EU Commission expected a growth of over 4% for the Far Eastern giant as recently as in May, but the IMF predicted only a strong 3% for them in the middle of the summer and saw only a slow growth likely for next year as well. The Russian and Indian growth will almost complement each other (with opposite signs) at around 6% in 2022; the Russians themselves were even expecting a decline the following year due to the war and Western sanctions, while India will constantly grow, but the weight of these two emerging economic powers combined is smaller in the world economy than any of the first three of the actors (European Commission 2022).⁵ What is more, the forecasts for the developed world, which has also been involved in various crises during the war in Ukraine, show a further slowdown in growth by 2023, while in emerging countries they indicate an upswing compared to 2022; but these forecasts should always be viewed with caution. (I would point out here that the two world wars and the most confrontational part of the Cold War were to a greater extent a setback for the developed world most involved in them than for the emerging nations, which in most cases only observed these confrontations).

2 IMF, WEO, July 2022. <https://www.imf.org/en/Publications/WEO/Issues/2022/07/26/world-economic-outlook-update-july-2022>.

3 Report of the Eurostat on GDP Growth in Q2 of 2022, September 2022. <https://ec.europa.eu/eurostat/documents/2995521/14698162/2-07092022-AP-EN.pdf/955b2522-9712-c5bd-5e3>.

4 EU Commission summer forecast, July 2022. d-f7d26d221e6c?t=1662477595315 https://ec.europa.eu/commission/presscorner/detail/en/ip_22_4511.

5 2022 spring economic forecast of the EU Commission. 191. https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3070. In any case, based on the forecasts, it can still be expected that the weight of the developed world will continue to decrease. In 2021, they already represented less than 46% of the world economy after their share had fallen below 50% not too much earlier; and even recently, the weight of developed countries has decreased in the global GDP (EU Commission 2022).

3. Inflationary Situation

In connection with the general overview, it is also worth looking at the fact that in 2021 the European Union started to launch the programmes considered important in connection with COVID-19, in parallel with the joint borrowing, including the national Recovery and Resistance Facilities (RRFs) elaborated by the Member States. (Among the Member States, no agreement has been reached until late 2022 with the Hungarian government, and besides the Hungarians, the Poles also have not yet received concrete RRF transfers either. Romania has been successful in the disbursement of the first payments.)⁶ The purpose of the Recovery and Resilience Facility is to mitigate the economic and social impact of the coronavirus pandemic and make European economies and societies more sustainable, resilient, and better prepared for the challenges and opportunities of the green and digital transitions. The Facility is a temporary recovery instrument. These sources will be relatively quickly disbursed too, as these funds must be committed by 2026.

Inflation has now appeared as a new difficulty for Central European member countries. Of course, the general price convergence (according to the Balassa–Samuelson theory) leads to a higher inflation rate even in consolidated times – that is why the inflation rate (and central bank targets) has always been at least 1-2% higher in the countries of the CEE region than the EU average or the ECB target for years. But in 2022 a significantly stronger (5-10% higher) inflation appeared in the region, quite different from the western half of the EU. Energy inflation is very high throughout Europe, but in terms of food prices inflation has become very high in the Central and Eastern European countries, and even the price of services (Eurostat 2022).

Based on *Table 1*, it can be clearly stated that the general annual inflation is much higher in our region, and especially the price of energy is rising drastically compared to the value in 2021. (There are several forecasts saying that the annual general inflation will be stabilized or moderated for the remainder of the year, but there is no reliable estimate of this with respect to the total short- and medium-term uncertainties.)⁷

6 The Recovery and Resistance Facility (RRF) consist of two parts, the amount of which can be maximum 750 billion euros in total and is borrowed from the market with a joint guarantee of all Member States, which is historic from the point of view that the Union is indebted for community programmes. Almost all member countries have already demanded the resources of the Fund, which has a grant and a loan component, the latter of which was requested by only 8 Member States, with Hungary, Slovenia, Poland, and Romania among them besides the southern countries. European Commission: RRF Scoreboard. State of play, October 2022. https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/timeline.html#timelineTable.

7 I.e. EU Commission summer forecast. Summer 2022 Economic Forecast (europa.eu). It should be noted that the rise in energy and food prices already started in the second half of 2021 not only

Table 1. *Inflation data in Central and Eastern Europe*

Country	Average Inflation 2021	Average Food Inflation 2021	Inflation 22.08 q/q4	Food Inflation 22.08.q/q4	Household Energy Inflation 2022.08.q/q4
EU27	2.9	1.5	10.1	14.3	48.8
Hungary	5.2	3.5	18.6	34.0	49.6
Estonia	4.5	1.7	25.2	22.3	145.1
Poland	5.2	2.5	14.8	17.0	40.0
Czechia	3.3	0.8	17.1	20.5	39.8
Slovakia	2.8	1.9	13.4	21.6	16.9
Latvia	3.2	2.6	21.4	26.3	86.2
Lithuania	4.6	3.2	21.1	30.1	95.6
Romania	4.1	2.8	13.3	19.4	33.8
Bulgaria	2.8	2.9	15.0	25.0	32.3
Croatia	2.7	1.8	12.6	19.6	18.9
Slovenia	2.0	-0.2	11.5	14.2	42.6

Note: q/q4 means the same period of the previous year.

Source: Eurostat database

One of the interesting correlations is that in the countries of the eurozone and in the system-changing Member States in the CEE region, inflation reaches an annual level that the price level in the latter is more rapidly catching up (ECB 2022).⁸ It is somewhat surprising that in the case of Hungary the annual general and food inflation is high, but at the same time, due to the existing government regulations, this will remain for the rest of the year and will only start to ease in 2023. In the case of the Baltic states, Bulgaria and Czechia, who still insist on exchange rate stability, this may ease faster, parallel with the EU. Although energy inflation is high everywhere, there was an increase on the Hungarian and Baltic sides that cannot be explained by the general price and wage convergence but that is also a matter of internal ‘suppressed’ cost factors.

For the Poles and Romanians, who also carried out the devaluation of their currencies earlier – even if moderately in comparison with Hungary in the period

in CEE but in most of the developed states such as the USA; accordingly, this trend cannot be contributed only to the war in Ukraine.

8 The three Baltic and two post-Yugoslav countries are already members of the eurozone (Croatia joins in 2023), but the Czech Republic and Bulgaria also maintain a stable euro exchange rate, the latter of which already joined the ERM II mechanism in mid-2020 and wants to join the eurozone in 2024; however, during the current crisis years they are not progressing in this direction in terms of fulfilling the Maastricht criteria. ECB Convergence Report, June 2022. https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp220601_1~0a8d84186b.en.html.

of 2020–22 –, this can be accounted for even below the rate of 20%, but for the Hungarians and the Baltic members of the Eurozone the rate of increase in inflation is very high. For the sake of their independence from Russian foreign trade (especially the import of energy), the Baltics and Poland are ready to make much greater economic sacrifices than the landlocked three other Visegrád countries. In the case of the Baltics, however, it can also be assumed that in the event of a possible stabilization of world market prices, their inflation rate will quickly consolidate since the high base and the absence of devaluation as Eurozone members will strengthen this process.⁹

In the case of Hungarian, Romanian, Polish, and especially Czech factors causing inflation, one of the reasons for the discrepancy can obviously be explained by the different exchange rate policies since in some countries the devaluation of the national currency was very serious in the past period, especially over the course of the past years (see *Table 2*).

Table 2. *Medium-term and short-term devaluation (or appreciation) of national currencies compared to euro in some Central European countries and Sweden*

Region/Country	2016–21	09.2021–08.2022
Eurozone	100	100
Hungary	115	114
Estonia	100	100
Poland	105	103
Czechia	95	97
Slovakia	100	100
Latvia	100	100
Lithuania	100	100
Romania	110	99
Bulgaria	100	100
Croatia	100	100
Slovenia	100	100
Sweden	107	103

Source: Eurostat database – author's calculations

I examined in *Table 2* the currency devaluation in Sweden as well because, in addition to the general policy of stable exchange rate, this Nordic country has

⁹ See the European Commission's 2022 summer forecast: in the third quarter of 2023, inflation will already be moderate (2-3%) for the Baltics, while it is expected to be a little bit higher for the Hungarians and Romanians and much higher in Slovakia – even if it is member of the eurozone – and Poland. Summer 2022 Economic Forecast (europa.eu).

recently applied a sophisticated devaluation of the koruna against the slightly internationally weakening euro – just like during the 2008–09 financial crisis –, unlike e.g. the also free-floating Czech koruna, which has recently become stronger – at least compared to the euro.¹⁰ (This will be primordial in terms of competitiveness and external balance – see Chapter IV.)

By comparing inflation and the exchange rate policy in the short term, we can see which Member States had to resort to the devaluation of their national currency in order to maintain external competitiveness and the decreased internal demand and supply balances, and – as in Hungary in early 2022 – who has paid higher budget deficit for that. The non-devaluation policy of Czechia also calls for further reasonable arguments.

Although the devaluation of the national currency was stronger in Hungary than anywhere else in the region, this still provides only a partial explanation for the high inflation rate, so we must also analyse other internal, endogenous factors.

4. Development of Current Account Balances

For my part, I attach great importance to this indicator, as it essentially shows how a catching-up country can ensure the external balance at the end of the day with payments covering the real foreign economic performance.¹¹ Before the regime change in 1990, when the inflow of foreign direct or portfolio capital into the CEE territory was not yet really possible, this indicator had shown even more clearly the problems of competitiveness in the region. That could only be counterbalanced with a drastic deprivation of the standard of living and forced exports (e.g. Romania) or the accumulation of foreign indebtedness (e.g. Hungary and Poland). After 1990, the difficulties of the balance in the current account payments could be compensated by the net inflow of Foreign Direct Investments (FDI), but for different reasons this source has now run out;¹² the stock of FDI in the region is rather stagnant, which does not help significantly in maintaining solvency.

10 Not only the currencies of the Member States or candidate states that are pegged to the euro held the exchange rate – in addition to the kuna and leva, e.g. also the North Macedonian denar –, but the British pound, the Czech koruna, and the US dollar even strengthened against the euro.

11 Of course, true solvency can be determined by adding the capital balances and financial balances; it is also worth examining the external financing capacity after the inflow of the capital balance. This shows how much international reserves or external capital movements have to compensate for the possible foreign deficit or how much foreign currency surplus can still be absorbed by the international reserves of the country.

12 The privatization announced for convertible currency has already been finished, and the availability of cheap but disciplined labour for FDI has run out.

Table 3. The balance of the current account in 2019 and 2021 in the Central European countries as % of the GDP and the change in the terms of trade ratio (ToT)¹³ for goods in 2021 (%)

Region/Country	2019 Current Account	2021 Current Account	2021 Terms of Trade
EU 27	2.8	3.0	-3.1
Austria	2.2	-0.5	-3.2
Hungary	-0.8	-2.9	-3.6
Estonia	2.5	-0.7	0.6
Poland	0.8	1.6	-1.5
Czechia	-0.9	-2.3	0.2
Slovakia	-2.0	-2.4	-1.1
Latvia	0.7	-0.5	2.5
Lithuania	3.5	2.0	-6.4
Romania	-5.3	-7.0	0.8
Bulgaria	1.9	-1.1	2.1
Croatia	2.8	3.3	-0.4
Slovenia	6.1	4.4	-2.6

Source: EU Commission forecast, spring 2022

As we can see from *Table 3*, the EU's and the EU Member States' current account balance showed a positive picture before but also during (in 2021) the COVID-19 crisis. That is also indicated by the figures of Austria, as a country specifically located next to our region that has the characteristics of a landlocked country – although in this case the balance sheet also turned moderately negative in 2021, primarily based on the deterioration of the terms of trade for goods ratio as a result of the increased energy and food import prices. Compared to this background, the countries of the region generally have a worse but mixed picture.¹⁴ In 2019, the countries of the region operating with a fixed or practically fixed exchange rate still had significant surplus in this field, but they were also affected by the deterioration of the commodity terms of trade index – mainly due to the rising price of the imported energy –, which they could not always compensate for, e.g. with net

13 Here, the 2022 spring forecast of the European Commission used the ratio of the export and import price indices calculated on the turnover of goods.

14 When the manuscript was submitted, the current account balance data for the first half of 2022 was already published (only in billion euros), from which it can be seen that in the war-stricken year of 2022 – as in the entire EU – the current account balance of the CEE region will continue to deteriorate. In the case of the Hungarian and Romanian indicators, there was already cause for concern regarding their solvency, but it is still too early to assess the entire year in advance due to the hectic global economic conditions.

services export performances. The Baltic and the former South Slavic EU Member States were able to come out of this comparison of the current account balance excellently – behind the latter case, there may not only lie a rapidly improving tourism balance but also the fact that they were able to maintain their commodity foreign trade balance at a relatively good level. And the Baltics basically came out with good figures in 2021. Apart from Romania, three Visegrád countries (Hungary, Czechia, and Slovakia) ‘excelled’ with a deteriorating current account balance, which depend very high on FDI (the profit withdrawal), while Poland came out very well in this comparison. In the case of Czechia, to be fair, in the last five years, the koruna has strengthened by five percent compared to the euro (see *Table 2*). The difficulties of the Central European model keep emerging, as the disruptions in the logistic and value chains are clearly visible in the three smaller Visegrád countries due to the high dependence on FDI. In terms of Hungarian performance, the situation is only made worse by the fact that in the meantime (as we saw in Chapter III on the analysis of inflation) a significant devaluation was carried out, but the balance is still very bad. And in the case of Romania, a continuous devaluation was taking place – which has not reached the Hungarian rate but was not far behind it by the end of 2019 – and continues to indicate that payment problems could have soon appeared in Romania if there were no EU funds.¹⁵ It can also be ascertained, even without a deeper analysis, that in the field of services the Hungarian balance indicator had deteriorated quite spectacularly by 2021 compared to 2019.¹⁶ The Romanian indicator or the Czech performance were unchanged here, and even the service trade surplus of Poland increased in 2021 compared to 2019 within the current balance of payments.

4. Who Managed to Achieve the 2019 Performance in 2021?

In 2021, the EU was not yet able to reach the real economic performance per capita of 2019. It is particularly interesting that the larger Member States, Germany, France, Italy, and Spain, were lagging behind. The other Member States had practically already caught up in 2021, but it is expected that in 2022 this condition will prevail in almost every Member State – depending on the war situation and its economic involvement. (Even Germany, the European engine, may have the biggest question mark, which has

15 Romania already started the disbursement not only of the MFF (seven-year-long EU budget line) sources but its possible RRF allocations as well in mid-2022. European Commission: RRF Scoreboard, state of play: October 2022. https://ec.europa.eu/economy_finance/recovery-and-resilience-scoreboard/timeline.html#timelineTable.

16 Eurostat, Balance of Payment statistics.

countless risk factors: inter alia, disruptions in the industrial value chains that are important to it and exposure to the Russian energy transmission.) What is surprising, however, is that the states in the region that have been disciplined, the Czech Republic and Slovakia, can hardly catch up due to high FDI exposure dominances. In fact, the Bulgaria–Latvia couple has only just managed to recover even though Bulgaria wants to apply for the possibility of joining the euro in 2024 (ECB 2022).¹⁷ The Hungarians and Romanians, struggling with imbalances – with strong consumption growth behind it, which raises the GDP –, have so far taken this recovery indicator well (Králik 2022) (see *Table 4*). It should be noted that in Hungary, Bulgaria, and Romania the public is in favour of accession to the eurozone (Becsey 2022).

Table 4. *GDP level of the EU and Central and Eastern European countries (2015 = 100)*

Region/Country	2019	2021
EU 27	109	108
Hungary	117	121
Estonia	118	124
Poland	119	124
Czechia	115	112
Slovakia	112	110
Latvia	113	113
Lithuania	116	122
Romania	122	125
Bulgaria	113	113
Croatia	114	115
Slovenia	117	121

Source: Eurostat database

The two Baltic states with good balance sheets, Lithuania and Estonia, performed well compared both to their performance in 2015 and to the level before COVID-19 (2019), while the third Baltic state, Latvia, has had a much harder time coping with the challenges of recent years. (The Baltics start to form two blocks in catching up, as Latvia has difficulties in several fields.)¹⁸ It is also striking how easily the

17 Croatia (that joins the euro area on 1 January 2023) together with Bulgaria joined the ERM-II mechanism, known as the euro's 'front room', on 10 July 2020. Romania has not yet entered the common exchange rate system but wants to introduce the euro in 2029 (Králik 2022).

18 According to the statistics, Latvia differs from the other two Baltic states in terms of GDP/capita, growth, R+D, wage level, etc. See Eurostat.

ex-Yugoslav duo of Slovenia and Croatia – which stagnated for a long time after the financial crisis at the beginning of the previous decade and were forced by the ECB and the EU Commission to undergo structural reforms – can overcome the current crises; and it is even probable that they will come out of the pandemic and the Ukrainian war crisis with a relatively good external balance and growth performance (EU Commission Economic forecast, 2022).

5. The Maastricht Deficit Indicators

As for meeting the maximum 3% annual public budget deficit at the end of 2021, the eastern countries, just as the whole of the EU, also came out with a mixed performance.

Of the 11 system-changing Member States of the Central European region, only four (Estonia, Lithuania, Poland, and Croatia) were able to fulfil the conditions in 2021. (In the aggregate, only 11 out of the 27 EU Member States – at the same time, Denmark and Luxembourg remarkably – had a budget sufficit; Sweden’s indicator was practically in balance.) Although the strict procedures have been suspended now for the duration of the pandemic crisis (in the so-called Temporary Framework – EU law on the special anti-cyclical state subsidies) and prolonged during the military conflict in Ukraine, this does not mean that many Member States should not let deficit indicators go up based on anti-cyclical aspects.¹⁹

This raises an even more important question in this sense, namely whether most Member States can start reducing their debt/GDP ratio. Six of the countries in the CEE region were able to start this in 2021, while the other five were not. (In addition to the Czechs and Slovaks struggling with unexpected economic adaptation difficulties, Romanians, Bulgarians, and Latvians are permanent members of this latter group. It is noticeable that on the so-called ‘Western side’ in the EU, only the performance of Malta and Germany belongs to this category.) But it is also striking that some countries, including Slovakia and Romania, increased their debt ratio by more than 10% during the period of the crisis so far (2020–21). All of this indicates that these countries are now beginning to consume the ‘economic reserves’ they have enjoyed through the low inherited debt ratio of the pre-1990

19 The European Commission launched an excessive deficit procedure (EDP) against Romania based on the deficit for three years that ended in 2019, since ‘tolerance’ only started in 2020 during the COVID crisis. Despite this, no strict prosecution of Romania is expected, not only because it is not part of the eurozone, and thus cannot be sanctioned directly, but also because tolerance is greater due to the crises that have appeared in the meantime. But it is to be noted that Romania has placed itself in such a severe external and internal imbalance that it may soon exceed the 60% debt/GDP limit if a special stabilizing programme is not implemented. European Commission: Excessive Deficit Procedure – Overview. https://economy-finance.ec.europa.eu/economic-and-fiscal-governance/stability-and-growth-pact/corrective-arm-excessive-deficit-procedure/excessive-deficit-procedures-ovteserview_en.

period – until now. In the case of Slovakia, for example, the debt ratio now exceeds the critical 60% of the country's GDP – the so-called Maastricht criteria on debt limit, which has been unprecedented since its independence in 1993. Romania has also started to walk along this path, but the indicator is still below 60% – a state that will certainly persist at least for a while. Among the three Baltic states, Latvia clearly stands out in this respect as well although its imbalance cannot be compared to Hungary, for example.

6. Conclusions

1. The performance of the system-changing 'new' EU Member States in the last few years cannot be qualified with a uniform assessment. During the COVID-19 and the post-COVID period, several nations aimed for membership in the eurozone – Croatia has already been included by a definite decision in July 2022 –, and the enlargement of the Schengen Area has again made its way to the agenda after more than a decade.²⁰

2. The countries of the region are generally committed to the functioning of the European Public Prosecutor's Office, of which only Hungary and Poland have not joined the organization.²¹ (There is a so-called rule of law and conditionality procedure against both countries in connection with possible corruption charges on the payments of EU financial transfers, but it is not possible to predict whether, in exchange for compromises, the two countries will eventually become members of this newly established EU institution, through which possible abuse related to EU financial support – or its charge – could be mitigated.)

3. Macroeconomic discipline is also very different between states in the region, as is competitiveness at the end of the COVID-19 crisis; primarily, Romania and Hungary, but to a lesser extent also Czechia, Slovakia, and Latvia struggled with problems in this field at the end of the pandemic period and at the beginning of the war in Ukraine. On the other hand, those regime-changing EU states that follow macro models less dependent on FDI (the two Baltic states of Estonia and Lithuania and the two ex-Yugoslav member states) overcame the economic stagnation of the COVID-19 crisis with apparent ease and can respond to the new crisis period of 2022–23 with good balance positions.

20 Currently, among the EU Member States in the region, Croatia, Romania, and Bulgaria are awaiting accession to the Schengen Area. Croatia will join (after 9 years of EU membership) in 2023, as decided in late 2022 by the EU Council, but Romania and Bulgaria still need to wait even though they already joined the EU back in 2007 and have ever since been applying for Schengen membership.

21 The European Public Prosecutor's Office, established on the basis of the principle of enhanced cooperation, began operation in June 2021 with the accession of 22 Member States under the leadership of the Romanian citizen Laura Codruța Kövesi.

4. Based on the competitiveness indicators and the quality in this respect of the use of EU funds, the continuation of the rapid catch-up of Hungary, Poland, Slovakia, and Romania still holds strong uncertainties. The disputes in Brussels about these topics – and the rule-of-law evaluation of the CEE states – do not favour the richer Member States deciding to add new member states to the ranks of EU members. The accession negotiations of Turkey, Serbia, and Montenegro have been stagnant for years, and for similar reasons it does not seem realistic to start the negotiations in a timely manner in the case of (potential) candidate countries, namely Moldova, North Macedonia, Albania, Bosnia-Herzegovina, or Ukraine either.

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Labour Productivity in a Central and Eastern European Secondary City – Evidence from Regional and Firm-Level Data

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Abstract. Our article examines the changes in the economic position of a Hungarian secondary city, Pécs, and its region in the post-crisis period from a labour productivity perspective. Our aim is to contrast results based on data of the city's largest local firms from the Orbis Europe enterprise database with the results based on the EuroStat regional database. We assess local trends in a sectoral disaggregation and focus on the period between the two crises. Our results suggest that Pécs and its region face a persistent difficulty in attracting external resources and in retaining and generating endogenous resources.

Keywords: labour productivity, regional growth, firm-level analysis, Central and Eastern Europe, lagging regions

Introduction

Economic development in post-transition countries is heavily dominated by the performance of the capital cities, although second-tier cities, such as growth poles, are also important drivers of development. They can lift the economic performance of their regions and reduce interregional inequalities, promoting territorial and social cohesion (ESPON 2013). An important feature of the Hungarian urban structure is the quasi-absence of the second level of the urban pyramid, i.e. the category of large towns with a population of 300,000 to 500,000 in the settlement network. Pécs is one of the Hungarian growth poles, a medium-sized city according to EU standards, with a population between 100,000 and 200,000, it is lacking scale, critical mass,

and international visibility (Somlyódiné 2014, Molnár et al. 2018). An important feature of Pécs is its remoteness from the capital; nevertheless, its direct cross-border activities are not significant due to the economic weakness of its wider region. Pécs is a deindustrialized rural university city, and its region, Baranya County, is located in a weak economic environment, showing signs of stagnation rather than expansion. In this research, we intend to gain insight into the development potential of a second-tier city, which is itself developed, but its regional hinterland is underdeveloped. Our preliminary assumption is that behind the development challenges of Pécs and its region there lies a multi-level governance problem (Pálné Kovács 2020, 2021) stemming from the low quality of institutions (see Rodriguez-Pose 2020). The novelty of our research is that the Orbis database has been in use for a relatively short time in the Hungarian academic community (see e.g. Muraközy et al. 2018), especially in the field of regional studies, although it has a longer history in the international literature (Gal 2013), and it allows us to dig deeper into productivity analysis than the standard regional-level data.

The global financial crisis has brought about a lasting, hysteretic change in economic development worldwide, a major symptom of which being a global slowdown in productivity, called the ‘productivity puzzle’ (Haldane 2018). An important change occurred during the 2010s, namely that the unemployment problem in the Central and Eastern European countries, prevalent after the transition and the global financial and economic crisis, has turned into the reverse, with labour shortage becoming an increasing hindrance to growth. In addition to intensive job-creating investments (especially in the lower value-added segments), there has been an overall improvement in labour market indicators across the regions, triggering remarkable interregional convergence in this respect. The economy is, in effect, in full employment, but, despite the improvement, significant spatial inequalities persist. In those regions where labour shortages and unemployment coexist, the employability problem of the workforce is assumable. As a result, this situation leaves little room for further economic development and territorial rebalancing driven by labour market expansion. An important observation is that regional differences in labour market indicators account for a vanishing fraction of the total spatial economic (per capita GDP) inequalities (not more than 3 or 5 percent), and the remaining part is attributable to interregional labour productivity differences (well above 95 percent), as indicated by Monfort (2020) in several European countries. All this points to a need for a heightened focus on efficiency-oriented territorial development policies and planned urban development. (Evidently, urban dynamics play a pivotal role in the economic performance of regions, whereas second-tier or smaller cities could attempt to attain agglomeration advantages by mitigating their disadvantages through a different spatial structure in which their efforts and sizes are bundled (Ouweland et al. 2022, Rechnitzer–Berkes 2021).)

Whereas productivity challenges (Askenazy et al. 2016) have a clear regional dimension (Tsvetkova et al. 2020), the corporate sector has an ultimate role in determining regional productivity. Altomonte and Békés (2016) highlight that the economic fortune of regions and nations is increasingly driven by a handful of large firms. The privatization or dissolution of potential national champions after the regime change and the weakness of domestic mid-sized firms (Lux 2020) provide scant alternatives to the FDI-driven model of so-called dependent market economies (Bohle–Greskovits 2006). Nölke and Vliegenthart (2009) note that the institutional frameworks and innovation systems are so different from the Western context that they engendered a distinct variety of capitalism whereby CE economies are highly exposed to the decisions and activities of MNEs, and the hierarchical control of subsidiaries provides the main coordination mechanism. In such export-oriented branch plant economies, foreign MNEs are at the forefront of market-driven reindustrialization, the pattern of which is highly heterogeneous across the regions (Lengyel et al. 2016). Our present research examines the changes in the economic position of the city of Pécs and its surrounding region in the period following the financial and economic crisis. The aim of our research is to identify the main development opportunities available for the city and its region in the medium and long term. We intend to analyse this question at the meso (regional) and the micro (firm) level.

In this article, we intend to study the above-described processes through explorative statistics at the regional level and contrast them with insights from firm-level data. The second section of our study summarizes the results of previous literature in this context. Then we introduce our database and the methodology applied, and the results will be presented in the following section. The last section concludes and establishes the proposed directions of further research.

Literature Context

Regional economic disparities are commonly large in CEE countries (Szilágyi-Debrenti 2020), but in Hungary they are even higher compared to other countries of the Visegrád group (Kuttor 2018). The growth performance of the Hungarian regions was uneven and variable in time during the post-crisis period, especially at the top of the distribution, while growth at the bottom remains persistently low. The most remarkable change was that in the first half of the 2010s the FDI-manufacturing type regions, as defined by Lengyel and Varga (2018), were areas of high growth, whereas the capital city experienced an economic slowdown; however, this trend turned to the reverse during the second half of the decade (Zsibók 2021). Lengyel and Varga (2018) classify Baranya County as a knowledge centre region where considerable human capital creation is accompanied by low

manufacturing output and funding from the rural development programme can improve the population retention capacity of the lagging depopulated region (Szabó 2021). This is in line with the view of Iammarino et al. (2020) that human capital accumulation alone is insufficient to spur dynamism in low-income regions and to mitigate the risk of falling into a development trap: to benefit from more human capital in the region, there must also be an overall economic environment that allows this resource to be productively employed.

In the post-2008 period, the main challenge for Hungary was to generate growth driven by investment and productivity against the backdrop of declining labour productivity and a slowdown of growth rates for the EU as a whole. However, a marked specialization in value chain function production undermines efforts in regions serving mostly as assembly platforms of TNCs to attract higher value-added, headquarter activities and to overcome the middle-income trap (Gál-Schmidt 2017). Headquarter companies tend to keep strategic activities close to home and the decision autonomy of local subsidiaries, the role of R&D, business support, distribution, and sales remain limited even in the presence of functional upgrading (i.e. by acquiring more service tasks). The weaknesses of the FDI-driven model (relying on low labour costs, skilled labour, tax advantages, and proximity to the West) manifest in the absence of domestic innovation-leading companies and headquarters and are compounded by a shrinking working-age population (see e.g. Galgóczi et al. 2015, Lux 2017, Egyed-Rácz 2020). In terms of labour costs, Hungarian workers were the third worst paid in the EU in 2020, with an average hourly earnings of € 9.9 compared to the EU average of € 28.5, which explains the growing number of western branch plants in Hungary. In fact, the contribution of foreign affiliates to value added was around 40 percent in Hungary in 2018 (Grieverson et al. 2021). Despite a slight decrease in the productivity gap, a recent OECD economic survey documents persistently large differences between export-oriented, capital-rich, foreign-owned, investment-intensive companies and low-productivity firms serving domestic demand and with few connections to global supply chains. The specialization of foreign subsidiaries and their suppliers in fabrication-type activities (assembly) in GVCs is associated with low domestic value-added content in their export, which places industrial diversification at the top of the agenda of industrial policy. Accordingly, the Hungarian Government's Irinyi Plan aims to achieve a 5% growth in domestic value added in total export performance whilst increasing the participation of domestic SMEs in the supplier chains of large MNEs with high innovation potential. The dominance of manufacturing production by the automotive industry (NACE sector C29) reflects the strategic position of Hungary in the EU automotive value chain. Thus, the economic fate of the country – and of the V4 as a whole – is inextricably linked to the automotive sector, accounting for 13 percent of all manufacturing jobs in Hungary compared to 8.5% at the level of the EU.

Molnár et al. (2018) identify spatial and hierarchical effects in the Hungarian municipalities' competitive differentiation: the proportion of competitive municipalities is higher in the more successful central and north-western regions of the country and at higher levels of the urban hierarchy. In other parts of the country, better competitiveness indicators are limited to large cities and suburban municipalities, whereas underdeveloped regions are characterized by the combination of a competitive centre and disadvantaged hinterland (see also Tóth-Nagy 2013). The authors state that the economic success of Hungarian second-tier cities is primarily attributable to their integration into global production networks led by big foreign companies as well as the reindustrialization process. Pécs and its region, as a victim of economic geography (forces of clustering and density) and political neglect, are lagging in these terms. Displaying the traits of left-behind places, defined by Storper et al. (2020) as deindustrialized shrinking cities and struggling rural areas, they confirm the thesis of Florida (2017) according to which talent, youth, and wealth tend to flow to a limited set of mostly metropolitan areas, the so-called 'cities of elites'. Meanwhile, regions left behind by economic transformation and which do not possess any unique special assets face brain drain, migration, and decline. This echoes the main findings of the literature that stress the importance of extra-regional linkages for economic growth and diversification in the CE space at the expense of the factors of regional competitiveness, i.e. the presence of clusters and regional innovation systems that are relevant for highly developed Western regions. Strategic documents and policy efforts emphasize the need for high-tech clusters but disregard whether the necessary conditions for their development are available and whether the local business environment has the capacity to utilize the innovation potential of cutting-edge science outside the metropolitan regions. As Zenka et al. (2014) succinctly observe, the scarcity and high level of spatial concentration of lead firms, headquarters and strategic functions such as R&D design or marketing, and the limited prospects of functional upgrading are likely to reinforce spatially imbalanced growth at the expense of non-metropolitan regions in the branch plant economies. According to Molnár et al. (2018), the economic duality of Hungary is well reflected in the performance differences of second-tier cities, showing the advantageous position of centres located closer to the capital, benefiting from both localization economies and borrowed size.

Harris (2021) suggests that there are three main possible causes of low aggregate productivity. First, frontier firms are not among the global leaders in their industry; second, there is a lack of diffusion of technology from (national) 'best-practice' frontier to non-frontier firms; third, there is an insufficient reallocation of resources from less to more efficient firms through 'creative destruction'.¹ The low rate of firm entries and exits indicates a weakness of competition, allowing low-productivity firms to maintain

1 Harris (2021) explains that 'creative destruction' as per Schumpeter (1943) can take place via two mechanisms. First, 'churn' means the opening of more efficient and/or the closure of less

their presence on the market. Due to the dual structure of the Hungarian economy, we believe that the most significant mechanism may be the lack of technology diffusion; however, the mechanisms of creative destruction are also at play due to the specificities of the state's economic role in Hungary (on the sub-optimal mechanism of resource allocation among firms and actors, see e.g. Mátyás 2022).

Muraközy et al. (2018) warn that not only the large productivity gap between the frontier firms (defined as the top 5% firms in terms of productivity performance) and the rest (i.e. the long tail of laggard firms) is a problem for the aggregate economic performance in Hungary but also the generally weak productivity of the frontiers themselves. A well-developed diffusion infrastructure (such as the Fraunhofer Institutes in Germany) to help non-frontiers adopt innovation could prevent this gap from growing wider.

As mentioned in the introduction, Monfort (2020) shows that in most European countries the contribution of labour productivity disparities to per capita GDP dispersion is above 90 percent because regional disparities in terms of labour productivity have increased, while disparities in regional labour markets have decreased. Central and Eastern European countries are among the top countries in this respect (with well above 95 percent contribution of labour productivity to total per capita GDP disparities). From this, it follows that in a labour-scarce environment labour market policies play a marginal role in further reducing regional disparities, while rebalancing labour productivity is of key importance. A large part of labour productivity disparities can be explained by structural effects, namely that companies of larger size and foreign ownership have a significant productivity advantage over smaller, local companies (Muraközy et al. 2018). The low level of immaterial investments by European standards, especially in manufacturing and ICT, undermines domestic firms' ability to access knowledge and skills vital for increasing productivity. Furthermore, local productivity spillovers are weak due to the low local capacity for technology adoption (Éltető–Alguacil 2020). Foreign-controlled companies accounted for 47.4% of gross value added in Hungary in 2018, and foreign-owned firms have a productivity advantage of twofold over domestic firms regarding the value added per employee (HCSO 2020). The distribution of foreign-owned, larger companies is highly concentrated in space: the capital city, Budapest, accounted for 44.8 percent of the total Hungarian FDI stock (net liabilities) in 2020 (HCSO 2022). In line with the literature, we assume that within-sector productivity differentials have a larger role than between-sector disparities (Harris 2021). Andrews et al. (2019) state that aggregate productivity and differences thereof across countries are increasingly being linked to the widespread heterogeneity in firm performance within countries and sectors.

efficient firms, and, second, an external reallocation means the reallocation of existing market shares from low- to higher-productivity firms.

Data and Methods

Our empirical research covers data from the largest local firms (in terms of operating revenue and employment) in the city of Pécs, analysed from a labour productivity perspective. We take into account the 200 largest enterprises according to two indicators: the employment-based and the revenue-based firm size. The source of our data is the Bureau van Dijk's Orbis Europe enterprise database,² supplemented by Eurostat data at the regional (NUTS 3) level. We intend to study the regional and local economic dynamics over time; hence we analyse data for the period between the two crises. Firm-level data are available for the period of 2013–2020. The extracted information includes the company name, the 4-digit NACE Rev. 2 core code, the operating revenue in US dollars, and the number of employees. Unfortunately, there are numerous missing data in our database, therefore we opted to consider companies that had available revenue and employment data for the year 2020. On average, 77 percent of the data are available, with the latest years having 80 to 90 percent coverage (and full coverage in 2020).

The regional analysis is based on Eurostat data. The statistical office of the European Union publishes gross value added (GVA) data and employment data at the NUTS 3 level in a sectoral decomposition between 2000 and 2020.³ When calculating temporal dynamics, it is useful to evaluate GVA and revenue data at constant prices. For this purpose, we use the GDP deflator published in the AMECO database,⁴ which is available at the national level. It is common in the literature that regional price levels are approximated by their national-level counterparts due to data limitations (see e.g. Rokicki–Hewings 2019). With the deflator, we convert the values so that the price level in the year 2015 represents 100.

The Orbis Europe database listed a total of 41,574 companies in Pécs. The largest companies (N = 200) included in our analysis account for a total of 34,654 employees (according to the employment-based top list) and 2,841 million dollars of operating revenue (according to the revenue-based top list), based on the data from the year 2020. Of course, there is a sizeable overlap between the two sets of companies, but it is far from complete, with 116 out of the 200 companies appearing in both rankings, but 84 companies missing from one or the other top list.

Labour productivity at the regional level is measured as the ratio of regional GDP (or GVA) to the number of persons employed. Unfortunately, we do not have data for the hours worked and cannot distinguish between full-time and part-time employment. In parallel, as an approximation for labour productivity at the firm level, we use the ratio of revenues to the number of employees. Gal (2013) uses turnover-based labour productivity for international firm-level comparisons among

2 We are thankful to Tamás Szabó (CERS-IRS) for his help in data collection.

3 Databases named *nama_10r_3gva* and *nama_10r_3empers*.

4 <https://db.nomics.world/AMECO/PVGD?tab=table> (retrieved on: 12.09.2022).

other alternative measures (such as total factor productivity – TFP). Gal (2013) considers total revenue-based labour productivity as the most widely available measure, whose major weakness is that it does not control for intermediate input usage. A company with substantial reselling activity (especially in the trading sectors) will probably rank very high in this measure. The use of value-added-based labour productivity resolves this issue, as value added in itself is the difference between output (sales or revenue) and intermediate inputs (including resold goods, typical in retail trade). Still, labour productivity does not control for differences in capital intensity across firms; therefore, in order to control for capital intensity, total factor productivity (TFP) should be calculated. To reach the highest possible coverage of the data, we opt for the use of revenue-based labour productivity at the firm level.

Development and Productivity in Baranya County

After the global financial and economic crisis, Central and Eastern European economies underwent a slow recovery process, and in the second half of the 2010s, the high-pressure economy took off and allowed the economies to converge towards the average European level of development (in terms of per capita GDP in PPS). Hungary reached 75.7 percent in 2021, starting from 66.1 percent in 2010,⁵ which is close to the development level of Poland (77.1 percent), Portugal (74.0 percent), and Romania (72.7 percent). The capital regions have been the uncontested winners of this process, but non-capital regions have also been able to gain strength, albeit to a lesser extent. Territorial disparities peaked right after the global financial and economic crisis, but their decline came to a halt after 2015. Spatial inequalities are high in Hungary: Budapest is among the 20 most developed NUTS 2 regions in the EU (ranked 19th in 2020 at 153 percent of the average per capita GDP), while three Hungarian regions, including South Transdanubia (reaching 51 percent in 2020), are permanently among the 20 least developed ones.

The regional-level analysis indicates that in terms of labour productivity Baranya is well below the Hungarian average level. The distribution of production and employment is highly concentrated in the capital city in Hungary, with the exception of the manufacturing industry (*Table 1*). Although we have available data for 2020, we compare the data up to 2019 because of the distorting impact of the coronavirus crisis.

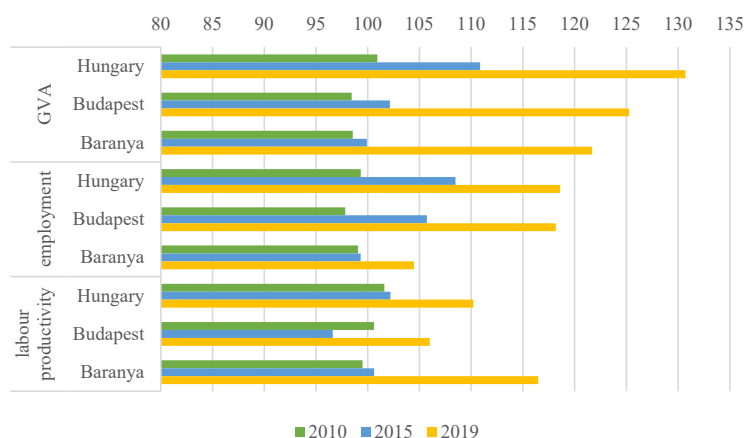
5 Based on Eurostat's *nama_10_pc database* (https://ec.europa.eu/eurostat/web/products-datasets/-/nama_10_pc).

Table 1. Selected relative economic indicators at the NUTS 3 level in Hungary (2010–2019, Hungary = 100)

Indicator	NUTS 3 region	2010	2015	2019
Relative labour productivity	Budapest	112.2	107.1	109.0
	Baranya	82.1	82.6	88.6
Share in national gross value added	Budapest	37.9	35.8	37.2
	Baranya	2.6	2.4	2.5
Share in national employment	Budapest	33.7	33.4	34.1
	Baranya	3.2	2.9	2.8

Source: authors' elaboration based on Eurostat data

The economic dynamics of Hungary and Baranya heavily relied on employment growth (*Figure 1*); however, it has not been coupled with remarkable productivity improvements, therefore labour productivity was sluggish, especially during the first half of the previous decade.



Source: authors' elaboration based on Eurostat data

Figure 1. The change of gross value added (at constant prices), employment, and labour productivity (at constant prices) relative for 2009 (= 100) in Budapest, Baranya County, and at the national level (2009–2019)

Baranya has a specific sectoral structure (*Table 2*). Classified as a knowledge centre region (see Lengyel–Varga 2018), the public sector (O to Q) is overrepresented in terms of both employment and GVA in Baranya. In addition, the primary sector (A), as well as the construction (F) and arts, entertainment and recreation (R to U) sectors have a strong representation in terms of both GVA and employment relative to the national average.

Table 2. *Distribution of GVA and employment between the different sectors at various spatial levels in Hungary in 2019 – percentages (total economy = 100)*

	A	B-E	F	G-I	J	K-N	O-Q	R-U
	gross value added							
Hungary	3.9	23.6	5.7	18.3	4.9	23.8	16.7	3.0
Budapest	0.2	11.6	3.7	20.6	9.5	35.0	15.7	3.6
Baranya	8.2	19.1	6.6	15.4	3.0	19.2	24.9	3.6
	employment							
Hungary	4.0	20.8	7.6	24.0	3.3	14.7	21.0	4.6
Budapest	0.2	9.0	5.7	25.2	7.2	24.5	22.7	5.5
Baranya	7.2	18.5	8.0	20.5	1.9	10.0	28.6	5.2

Source: authors' elaboration based on Eurostat data

As a result of the uneven sectoral distribution of employment and gross value added, labour productivity also differs across sectors and regions. *Tables 3* and *4* indicate the relative sectoral labour productivity values in two different comparisons: first, vis-à-vis the national average and, second, relative to the total economy's average. Our calculations (*Table 3*) show that Baranya has a slight relative advantage over national-level productivity in the financial, real estate, professional, scientific, and administrative activities (sectors K to N). Labour productivity is similar to the national level in the primary sector (A), but it lags far behind in the industrial sector (B to E) and in terms of the total economy, as well.

Table 3. *Labour productivity in a sectoral breakdown in Baranya and Budapest vis-à-vis the national average (= 100) – 2019*

	Total	A	B-E	F	G-I	J	K-N	O-Q	R-U
Hungary	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Budapest	109.0	88.5	124.8	94.3	116.4	97.1	96.1	94.5	114.2
Baranya	88.6	100.6	81.2	98.0	86.6	92.7	104.4	97.1	94.6

Source: authors' elaboration based on Eurostat data

Table 4. *Labour productivity in a sectoral breakdown in Baranya and Budapest vis-à-vis the total economy (= 100) – 2019*

	Total	A	B-E	F	G-I	J	K-N	O-Q	R-U
Hungary	100.0	99.8	113.0	75.2	76.6	148.5	162.3	79.6	63.8
Budapest	100.0	81.1	129.4	65.1	81.8	132.4	143.1	69.0	66.9
Baranya	100.0	113.3	103.6	83.1	74.8	155.3	191.1	87.2	68.1

Source: authors' elaboration based on Eurostat data

Table 4 shows the relative labour productivity values obtained from a comparison of sectoral performances within the different spatial units. Within Baranya, a significant relative advantage of the financial, real estate, professional, scientific, and administrative activities (sectors K to N) and the info-communication sector (J) can be detected, and there is some advantage in the primary sector (A) and the industry (sectors B to E).

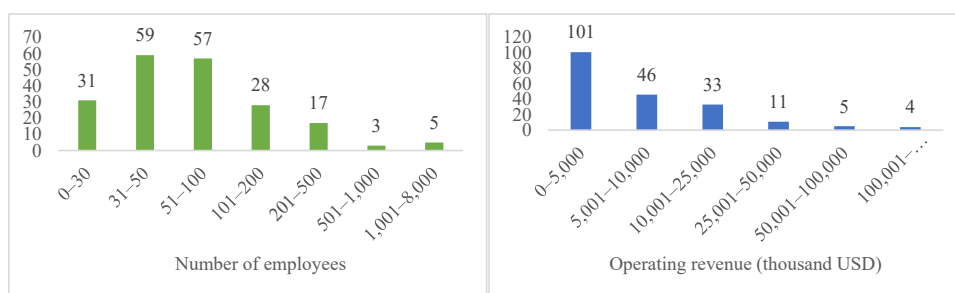
The above calculations provide the general impression that Baranya County has a relative productivity advantage in those sectors whose relative importance is below the national average, with the exception of agriculture. In those sectors that are overrepresented in Baranya (agriculture, construction, and the public sector), labour productivity is close to the national level, but it does not exceed it.

Labour Productivity and Challenges at the Firm Level in the City of Pécs

Based on the Orbis Europe database, we have calculated the share of the economic performance of Pécs within the county's economy, restricted to the 100 leading enterprises (in terms of employment and revenue) in 2019. From the 100 largest employers of Baranya County, only 51 are headquartered in Pécs, representing 70% of their employees, while 48 out of the 100 largest companies in Baranya in terms of revenue are located in Pécs, generating 60% of their revenues.

When inspecting a larger bundle of the sample, almost four quarters (73.5 percent) of the 200 largest companies have less than 100 employees, and around half of them have not more than 5,000 thousand dollars operating revenue (data from 2020 – see *Figure 2*). The employment ranged between 26 and 7,950 persons, while the operating revenue ranged between 2,595 and 368,758 thousand dollars in the 200 largest companies located in Pécs (according to the two different measures of firm size). The sectoral distribution shows that the three dominant sectors in terms of operating revenue are industry (B to E), trade, transport, accommodation and food services (G to I), and the public sector (O to Q), but in terms of employment, the public sector has a clear dominance, employing around half of the workforce. Within the industrial sector, the manufacturing sector (C) takes around two-thirds of the employment, while electricity, gas, steam and air conditioning supply (sector D) take around a fifth of the industrial employment. Water supply (sector E) employs ten percent of the workforce, while mining and quarrying (sector B) has a negligible role. The distribution of the revenues within the industry is more uneven compared to that of employment: in addition to manufacturing (sector C), the electricity, gas, steam and air conditioning supply (sector D) also accounts for a significant share of industrial revenues (38 percent in terms of the employment-

based ranking and 46 percent in terms of the revenue-based ranking, which is higher than that of manufacturing, with 44 percent of total industrial revenues). Within sectors G to I, trade (sector G) is dominant, employing three-quarters of the workforce within the 200 largest companies, but in the revenue-based ranking list, there is no firm operating in sector I (accommodation and food service activities) at all. Within the public sector, education (sector P) is the most represented with almost 60 percent of the employment and revenues, public administration, defence, and compulsory social service activities (sector O) are represented with up to one third of the employment, and 10 percent of the employment and revenues of the public sector appears in the health sector (sector Q).



Source: authors' elaboration based on Orbis Europe data

Figure 2. The distribution of the 200 largest firms in Pécs according to employment and revenues, 2020

Table 5. The sectoral distribution of the largest firms in Pécs in 2019

Sector	Employment-Based Top List			Revenue-Based Top List		
	No. of Firms	Revenue	Employees	No. of Firms	Revenue	Employees
A	1	1.1%	1.0%	2	0.9%	1.1%
B-E	58	38.6%	20.9%	52	39.4%	20.9%
F	18	3.3%	2.1%	24	3.5%	2.6%
G-I	43	25.9%	12.7%	64	26.1%	13.7%
J	4	0.3%	0.5%	6	0.4%	0.4%
K-N	35	5.0%	9.1%	24	4.4%	6.8%
O-Q	30	24.4%	50.9%	24	24.7%	53.0%
R-U	11	1.4%	2.8%	4	0.7%	1.7%
Total	200	100.0%	100.0%	200	100.0%	100.0%

Source: authors' elaboration based on Orbis Europe data

We calculated the average performance of the companies in a sectoral breakdown and found a somewhat different picture according to the two kinds of firm size measures (*Table 5*). In terms of the employment-based ranking list, the public sector ranks high according to employment and revenues, but labour productivity is poor relative to the average of the 200 firms. Keeping in mind the specificities of the trading sector, the highest relative labour productivity was measured here, although employment is below the average. If we consider the revenue-based ranking list of the examined Pécs-headquartered companies, the industrial sector (B to E) and the public sector (O to Q) excel in labour productivity and revenues as well relative to the average. In all cases, the art (R to U) and the info-communication (J) sectors performed relatively poorly. This latter finding is in stark contrast to what was stated in the analysis at the county-level aggregation for Baranya above. We suspect that this issue is due to differences in company size, because the companies in the info-communication sector might be generally smaller, that is, they appear at the NUTS 3-level aggregation but not in our sample consisting of the largest companies.

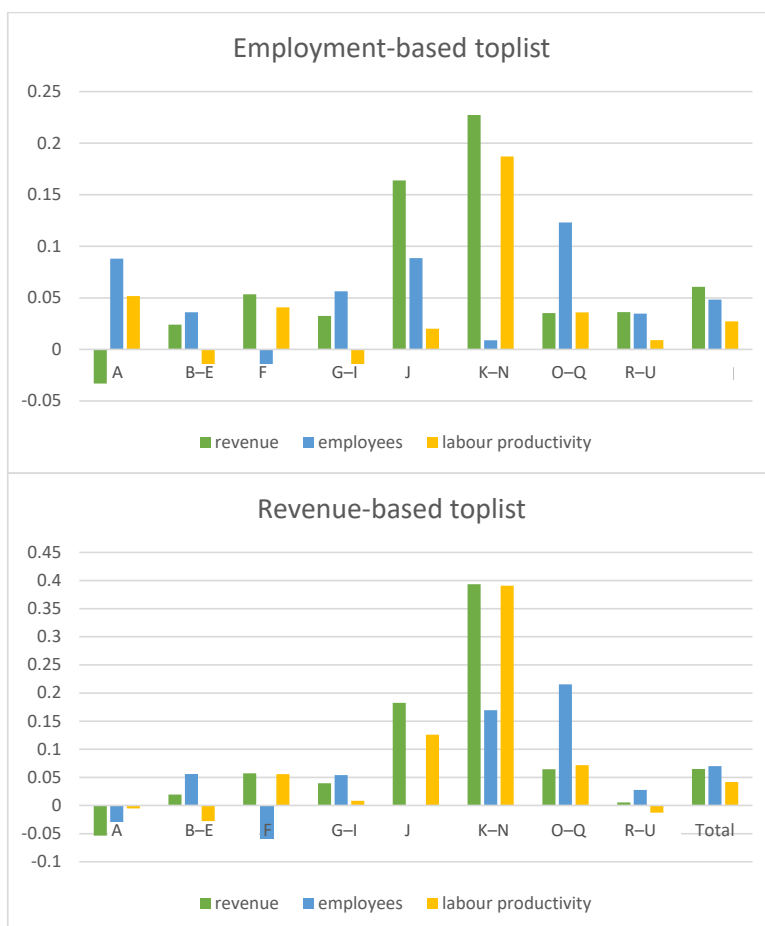
Table 6. Average firm-level employment, revenue and productivity data in a sectoral breakdown relative to the total economy (= 100%) in Pécs, 2020

Employment-Based Top List					Revenue-Based Top List				
Sector	No. of firms	Revenue	Employees	Labour productivity	Sector	No. of firms	Revenue	Employees	Labour productivity
A	1	192%	181%	82%	A	2	85%	101%	27%
B-E	58	125%	74%	98%	B-E	52	141%	84%	132%
F	18	36%	26%	109%	F	24	29%	21%	48%
G-I	43	121%	61%	199%	G-I	64	82%	43%	98%
J	4	17%	35%	39%	J	6	28%	18%	46%
K-N	35	29%	51%	56%	K-N	24	44%	53%	90%
O-Q	30	179%	332%	39%	O-Q	24	216%	490%	140%
R-U	11	23%	48%	40%	R-U	4	34%	78%	11%
Total	200	100%	100%	100%	Total	200	100%	100%	100%
Total volumes	200	11,149	173	83	Total volumes	200	14,203	163	462

Source: authors' elaboration based on Orbis Europe data

Revenue and productivity changes are measured at constant prices, so near-zero percent values represent stagnation in real terms. We have found no remarkable drop in employment connected to the coronavirus crisis in 2020 despite finding

evidence of a decline (albeit not dramatic) in revenues in most sectors. A few outlier values have a strong impact on the averages, as there are only a few larger companies in addition to the many smaller ones in Pécs; therefore, we have chosen to exclude the data of Harman in 2018 because this company significantly widened its production in that year.



Note: outlier values are excluded.

Source: authors' elaboration based on Orbis Europe data

Figure 3. Average growth rates in a sectoral breakdown, 2013–2020

Our firm-level calculations show that the dynamics of average firm-level labour productivity growth reflects better the evolution of revenue growth than employment growth (*Figure 3*). As expected, employment growth paths have been smoother than revenue growth. In line with the literature (Askenazy et al. 2016), in the course of the post-crisis adjustment, the flexibility of the labour

market was quite low at the expense of the productivity of labour, and we have observed similar trends with respect to the COVID-19 crisis. However, this was not considered problematic since job security is a priority from a social aspect, while the main problem was the persistence of productivity slowdown even in the post-recovery period.

Our results demonstrate that the 200 largest companies were not severely affected by the negative impacts of the COVID-19 crisis. These findings recall the long-standing debates on the role of the public sector in peripheral regions (James et al. 2012). As pointed out by Venables (2020), localization economies (i.e. knowledge spillovers, labour market pooling and specialized suppliers) in the production of internationally tradable goods generate two types of cities, those producing tradables (e.g. manufacturing) and cities specialized in non-tradable sectors (e.g. public sector or restaurants) that serve social needs. We do not believe that the public sector has a crowding-out effect with regard to private sector economic performance; indeed, a well-functioning public sector, or in a broader sense a ‘foundational economy’ (see Bentham et al. 2013, Russell et al. 2022) is necessary for the whole regional and local economy to work efficiently (Birch–Cumbers 2007). Moreover, increasing productivity in the foundational economy would result in more regionally balanced growth than an exclusive focus on frontier firms that are highly concentrated spatially. Our firm-level analysis shows that a strong public sector provides a degree of stability for the local economy in Pécs but is unable to contribute adequately to long-term growth.

Rechnitzer and Berkes (2021) classify Pécs as a ‘wayfinding’ city where, despite its favourable conditions in several aspects of territorial capital, the directions of future development are unclear. A typology by Lengyel et al. (2016) characterizes Pécs as an efficiency-driven, follower-type potential knowledge region where engineering is supplanted by the role of research-intensive industries (e.g. pharmaceuticals). An enduring challenge arises from the persistence of labour market tightness, leaving limited scope to exploit additional labour reserves. As a result, the key issue for future regional economic growth is productivity improvement fuelled by the improved efficiency of local SMEs.

The inflow of EU funds is a critical issue, but mainly for overall national economic growth because their interregional rebalancing effects are not evident due to the highly centralized management of these financial sources in Hungary.

The regional development trap (Diemer et al. 2022) remains a serious challenge for Pécs and its wider region. A further increase in the role of the public sector is contested by the unsustainable finances of the municipal government, but the university still remains an important development factor. Nevertheless, reindustrialization efforts are necessary to hold Pécs on a development path based on the utilization of its endogenous resources (Rechnitzer–Berkes 2021, Lux 2021).

Conclusions

Our article examined the changes in the economic position of a peripheral regional centre, the city of Pécs and its region, in the period following the financial and economic crisis. Our results suggest that productivity challenges are a long-term issue both at the firm and the regional level and that their resolution cannot be postponed, as in a labour-scarce environment in the 2020s extensive employment expansion in itself can no longer fuel economic growth. The main challenge for Pécs is to attract external resources and retain and generate endogenous resources.

The main limitation of our research is its relatively short time coverage with respect to the firm-level data. The cross-sectional coverage of the Orbis database is not complete either. Future research directions include the extension of our database with additional variables in the firm-level analysis, e.g. to estimate total factor productivity and foreign direct investments, as well as using additional data sources such as that of the National Tax and Customs Administration.

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Patterns of Cooperation in the European Defence Sector – A Network-Approach-Based Investigation of EU Projects

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Abstract. In this paper, we introduce research results from our network-approach-based investigation of the European Union defence cooperation projects. After brief remarks on the background, the research problem, the conceptual and methodological issues, we focus on the structure of the cooperation network and introduce the territorial, institutional, and (sub)regional patterns of partnerships. The data analyses illustrate that an integrated but fragmented cooperation network could be explored, and in several aspects remarkable differences can be measured on country-, regional, and sub-regional levels implying that territorial and institutional factors might have an important role in this specific area as well.

Keywords: European Union, defence projects, territorial differences, network analysis, embeddedness

1. Introduction and Background

Europe witnessed several events in the middle of the second decade of the new millennium that spectacularly illustrated the importance and necessity of adequate defence capabilities. The illegal annexation of the Crimea by the Russian Federation in 2014 and the culmination of the refugee crisis in 2015 highlighted some potential vulnerabilities of the region and the fragility of the neighbouring areas. These developments might have played an important role in paving the way for a (re)starting and intensifying process of defence capacity building. These processes can be observed on the one hand in the case of the increasing share of budget spent on defence issues by several European NATO member countries ('D.E.N.C.' 2021) and the direct investments into security infrastructure by purchasing different products.¹ On the other hand, a more subtle dimension of investment into security also started to evolve: certain states of the European Union initiated cooperation

¹ See, for example: <https://www.sipri.org/yearbook/2021/08>.

projects in different spheres of defence issues. Besides that these projects might highly contribute to the integration and development of a common strategy and repository of relevant assets, the cooperation has the potential to facilitate and take advantage of partnership, social capital, and embeddedness (Granovetter 1985).

In our investigation, we wish to empirically explore the different structures and potential relations between the European Union members in partnership and network embeddedness through defence investments.

2. Research Problem and Conceptual Remarks

Cooperation and social capital and connections as a general means can promote development and increasing standards of living conditions (see Orbán–Szántó 2006, Putnam 2006), as the resources of the networks can provide novel resources for the community concerned (Coleman 2006.). In this sense, European integration can also be interpreted as a process of building partnership and trust among the European countries² in order to better realize common objectives and manage or prevent undesirable processes arising as potential threats for the countries involved and for the community as a whole. However, the evolution and development of integration might lead to a higher level of cooperation, a convergence of certain countries or regions, and clusters of Member States characterized with less deepened partnership relations or smaller sub-regions or subgroups with specific areas of cooperation. That is, a differentiated integration pattern might evolve (Brunazzo 2022) with a segmented structure of partnership, which could also be explored in specific areas, including defence initiations (see Blockmans–Crosson 2019).

Accordingly, the general research problem of this paper is whether a pattern and relationship between the network embeddedness and defence investments can be explored in the recent European context. Among the possible research topics, the following ones can be differentiated: (1) can stable patterns of fragmentation be measured in the European defence partnership network? It might be interesting to investigate (2) the level of inequalities and concentration of defence cooperations among the participating European Member States, and also (3) it could be worth looking into whether the possible role of the time factor has any impact on the embeddedness in the cooperation network of this specific context of defence projects. Last but not least, (4) the regional differentiation and territorial disproportionalities and inequalities of the partnership relations could be in the focus of the investigation.

Some outcomes of the research might have some policy implications worth considering as well, and regarding the methodological background the investigation

² In this context, certain scholars also introduce the concept of European Social Capital (Praprotnik–Perlot 2021) while investigating the issue of the possible directions of the development of the European Union's future.

might promise a complex design and could facilitate the profound examination and comprehension of the topic.

3. Methodological Background

Our research is based on publicly available data sources of defence cooperation partnerships (PESCO), and in the course of data analysis a basically quantitative approach would be applied. In order to empirically investigate the patterns and differences of the *defence cooperation* partnerships and explore regional clusters and distinctive hubs of defence collaborations, we assembled a complex database from available online information. Several articles and studies (Blockmans–Crosson 2019, Varga 2019, Nádudvari–Etl–Bereczky 2020, Molnár–Szabolcs 2020) have already mapped the overall structure and some deeper characteristics of the cooperation, which results can be utilized for further investigation. In this respect, it might be worth investigating the structure as a *directed asymmetric network* in order to find out whether some kind of difference in the evolving structure can be measured. The calculation of network-specific measures might also be fruitful when trying to describe the territorial and regional differences.

As for the methods applied, besides the quantitative approach in our research project, we rely on the network analysis perspective, which enables us to explore the inner patterns of the graphs and also to quantify the positions of the states and regions involved. Furthermore, we find it to be illustrative to utilize some measures and indices of inequalities and concentration – primarily the Lorenz curve and the Hoover index – from the field of geography and spatial analysis, which help to express and compare in one single number the level of disproportionality.

3.1. Limitations

The following analyses thus will be based on a quantitative approach that enables us to draw a complex picture of the investigated phenomenon and examine it from various aspects, but it has potential shortcomings as well. Accordingly, it is necessary to consider that certain outcomes regarding the patterns of cooperation, network positions, and relations might be – at least partially – explained with further, essentially qualitative argumentations. These background connections cannot be fully investigated in the analyses, as these would exceed both the formal length and content limitations of this paper. However, we select certain cases when we refer to the potential background and context of the quantitative patterns. Similarly, it needs to be added that the relationships between certain variables investigated in the analyses can be connected to other alternative explanations which, as cannot be quantified, cannot be included formally in the statistical analysis.

In spite of the considerations mentioned above, the author finds worth and potentially fruitful investigating the differences and regional patterns of EU defence cooperations with a quantitative approach.

4. Data Analyses

4.1. Introducing the PESCO Projects

The four waves of the PESCO projects contain an overall number of 60 defence initiations among 25 European Union Member States. The most active participant of the defence programme is France with its fourteen coordinated projects (see *Figure 1*). With a kind of gradual decrease, Italy and Germany follow the most active country with eleven and nine initiated projects respectively, and then Greece, Spain, Estonia, and Portugal can be found with a minimum of three projects. There seem to be an essentially negative relation between the activity level and the number of partners in the cooperative defence initiations. This rather unclear pattern can be illustrated with the correlation coefficient ($-0,097$) as well and might be explained, at least partially, with the notable outliers among the less active project coordinator countries. Lithuania, Hungary, and Bulgaria each have only one project coordination; however, they have a relatively higher number of partners/ties directed towards other EU countries. This inverse pattern is the most visible in the case of Belgium and the Netherlands, in the latter case 23 partners being involved in a single coordinated project.

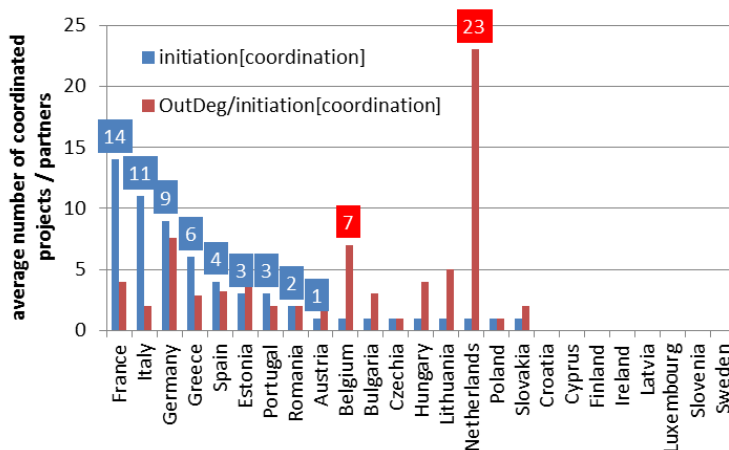
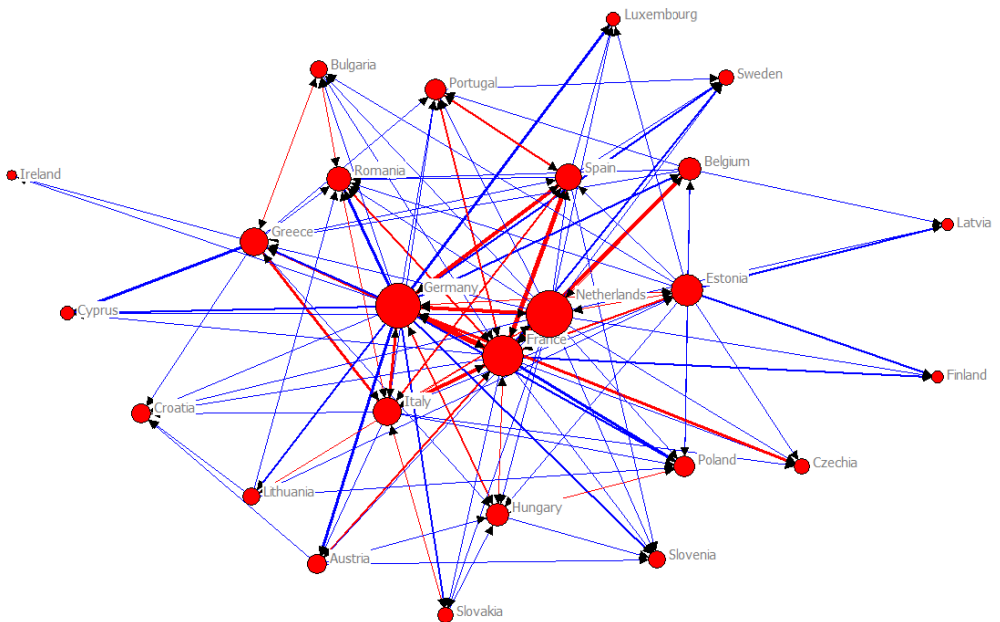


Figure 1. Number of defence initiations among 25 European Union Member States

The pattern of the cooperation network based on the PESCO projects can be described as a structured and differentiated network containing more or less clearly distinguishable segments (see *Graph 1*). These segments can be interpreted to some extent even as an arrangement of concentric circles. In the centre of the network, we can primarily find Germany, France, the Netherlands, and Italy as well – although the latter is located more distant from the other three most active countries. This pattern could imply a progress of concentration – which would be a comprehensible process considering certain models of network evolution – if we consider that the analyses based on earlier waves of PESCO projects³ identified more numerous leading countries.

The next segment of the network could be interpreted as an intermediary ring located around the core with the most active countries. In this section, Estonia and Greece seem to be more significant countries with a relatively higher number of connections, but Spain and Romania could also be considered as such.



Graph 1. *Pattern of the cooperation network based on the PESCO projects*

On the periphery of the network, we can find the third, outer ring with the least integrated states of the PESCO cooperation network – namely Ireland, Latvia, and

3 See, for example, Nádudvari–Etl–Bereczky 2020.

Finland. Hungary is positioned around the border area between the intermediary and the outer segments, in a sub-graph with Austria, Slovakia, and Slovenia.⁴

A further characteristic of the directed graph worth mentioning is the frequent and dense presence of mutual links – although obviously, in the light of the nature of the cooperation projects (fixed participants), this is understandable: France possesses eleven partners with reciprocal links, Germany and the Netherlands have seven and six respectively. These mutual relations contribute to the evolvement of a more embedded network structure.

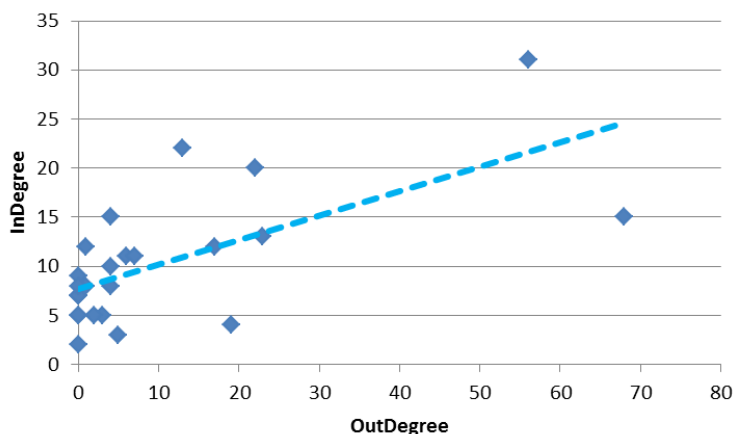


Figure 2A. *Distribution of initiations, ties pointing to other countries and partnerships*

The positions of the countries in the graph of the cooperation network proves to be structured in a different way: based on the figures of the distribution of initiations – or ties directing towards other countries (out-degree)⁵ and partnerships –, ties

4 It should be noted that the pattern of defence cooperations explored in this part of the analyses might emerge as an intersection of various different factors not ready to be measured quantitatively. On the one hand, regarding the central players of the network, the presence of a traditionally strong, developed, functional, and many-sided defence sector has the potential to invite others to cooperate in several different fields of defence, that is, these actors can necessarily have a greater and wider room for building collaborative relations. In this sense, we encounter a mechanism widely known in the social sciences which describes that the more one has, the more will be given to him/her – referred to as the Matthew effect in sociology (see Merton 1968.).

On the other hand, similarly, the less significant countries of the cooperation network could have smaller and less diverse defence sectors which prevent them from participating in several dimensions of the development projects. However, it should be emphasized in this regard that specialization can play an important role, and in some cases we might again discover the process linked to the Matthew effect: when a state acquires a specific, strategically important element of the European Union defence sector – as in the case of Estonia regarding cyber defence (centre) or the Czech Republic and space developments –, it also gets an advantage to accumulate further development projects and collaborative relations.

5 Degree – or number of ties – is the most important characteristic of a node (Barabási 2016: 63–65).

point towards an arbitrary state – a positive relation can be explored (see *Figure 2A*). That is to say, the more active a country is in the PESCO initiations, the more numerous partners it can achieve in the cooperation network (correlation coefficient; $R = 0.657$). Certainly, France and Germany seem to be some kind of outliers in this sense; however, if we exclude them from the analysis (see *Figure 2B*), the pattern proves to be essentially the same ($R = 0.537$).

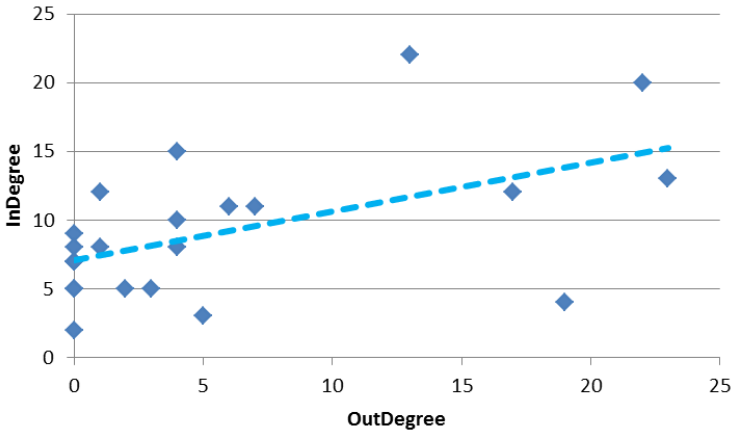


Figure 2B. *Distribution – excluding outliers (France, Germany)*

4.2. Country-Level Inequalities

If we investigate the differences among the countries participating in the sixty-one different European Union defence cooperation projects applying certain measures of territorial inequalities, a moderate level of concentration emerges. On the one hand, the inequalities of the distribution of the projects can be illustrated with the Lorenz curves (Németh 2005: 11–12) – illustrating a single-variable expression of the cumulative distribution –, which imply (see *Figure 3*) that the pattern of project initiation and the externally directed ties of the countries in the cooperation network prove to be rather unequal (see Németh 2005: 12), as the curves – similarly or even identically – run parallel with the X axis in the first segment of the distribution, which can be understood if we consider that the correlation coefficients between the relative distribution of the external ties and the project initiation shares is: $R = 0.969$. A slight difference can be seen in the initial phase of the growth of the curve where in the case of the project initiation values a somewhat flatter pattern can be explored, while the case of the network ties pointing outwards the distribution implies a more consistent cumulative pattern. However, both of the aforementioned variables exhibit a greater level of inequality compared to the values of inward or

partnership ties of the countries in the network structure. This less curved pattern can be explained by the fact that – contrary to the initiation distribution and outward network ties⁶ – every EU Member State is involved in one or more defence projects, that is, they all have several partnerships.

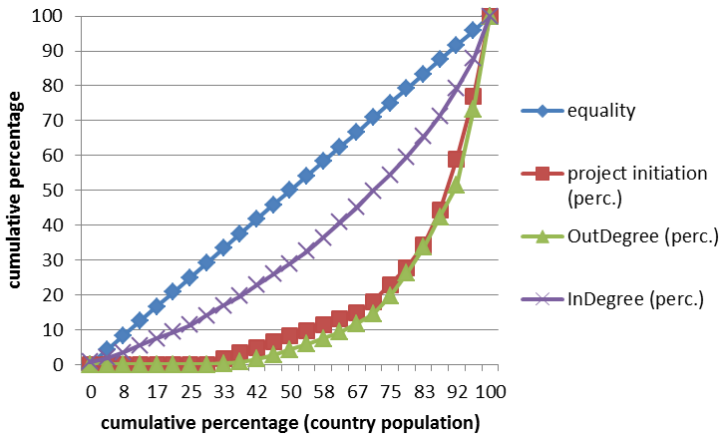


Figure 3. Lorenz curves illustrating the inequalities of the distribution of the projects

The distributional differences of the defence project variables – besides the graphical single-variable illustration – might also be fruitful to be investigated with a quasi-comparative approach, applying the formula of the Hoover index (Németh 2005: 8). In the light of the values of the Hoover indices (see *Figure 4*) based on the calculation with a comparison to the population⁷ distribution of the EU members involved in the projects, a moderate level of inequality can be observed. In this context, a different similarity pair can be identified: the level of concentration of the project initiations in the light of the population shares of the countries is identical with the distribution of inward ties of the countries compared to the population data. That is, a slightly more than one fourth (28%) of the initiated projects and the partnership ties should be reallocated among the participating countries in order to be in line with the population distribution of the investigated countries. However, in the case of the ties representing outward relations in the cooperation network, an even higher rate of inequality can be measured: nearly one third (32%) of this kind of partnership ties prove to be unevenly distributed compared to the population data.

⁶ Where an overall number of eight countries have 0 values; see *Figure 1*.

⁷ In this comparison, we calculated the average number of population for each country based on the Eurostat population data for 2018–2021, as this period is relevant for the time span of the cooperative defence projects.

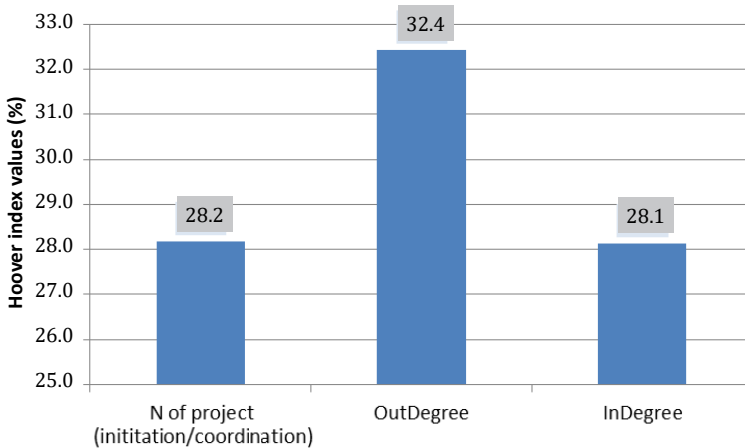


Figure 4. Hoover indices

Based on these findings, it can be generally stated that project initiation and positions or integration in the cooperation network of the PESCO defence projects prove to be unequal to a certain extent based on both the graphical and numerical investigation methods of territorial analysis.

4.3. EU and NATO Differences

Since all PESCO countries are European Union members, only inner comparisons can be carried out. One aspect can be the time spent in the organization – accordingly, the first comparison reveals the differences of the network centrality values in the light of the date of accession.

As per the data explored, both the out-degree and in-degree mean values tend to decrease towards the EU members that joined the organization later (see *Figure 5*). This negative tendency is more notable in the case of the initiations, but in the case of the partnerships it is also visible. That is to say, the countries with longer memberships have higher volumes – as a tendency – of participative actions and community collaboration, which might imply a kind of institutional learning and the cultivation of cooperative norms and might illustrate the evolvement and possible role of trust and embeddedness.

A similar mechanism can be empirically explored if we distinguish between the founders of the EU and the rest of the countries. The average values of both the initiations and collaborations prove to be remarkably higher in the group of the six EU founders (see *Figure 6*). The project initiations seem to be polarized, as there can be measured values of out-degree more than seven times higher in the case of the

funding states compared to the other countries, and the average level of participation is also almost twice as high in the founding Member States.

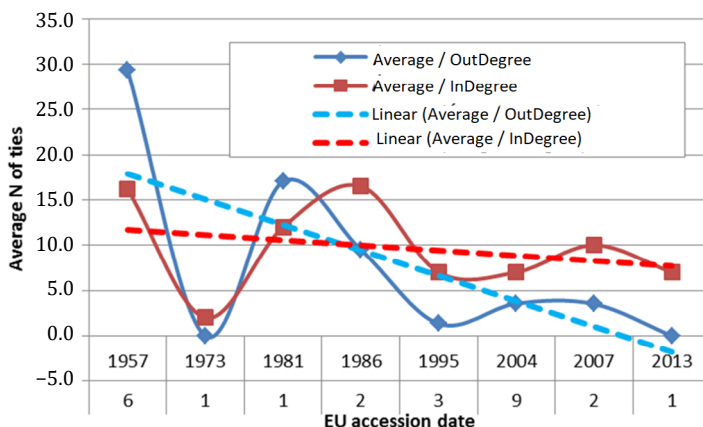


Figure 5. Differences of the network centrality values in the light of accession dates

So, the countries in the European Union seem to be different regarding their activity in both defence investment initiations and partnerships. The main pattern implies that the EU members with more experience have higher levels of collaborative activities, which might be explained with institutional learning, embeddedness, and trust.

However, several countries of the PESCO projects are also NATO member countries, so this differentiation offers a similar possibility for comparison.

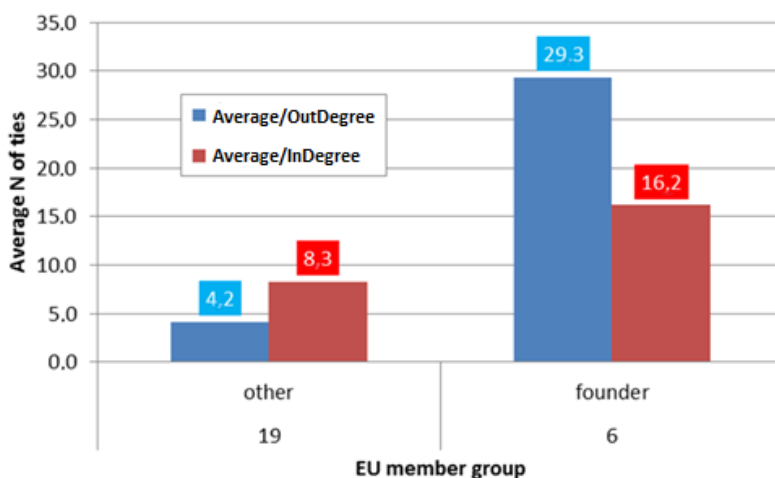


Figure 6. Average values of both the initiations and collaborations in the group of the six EU founders and other member countries

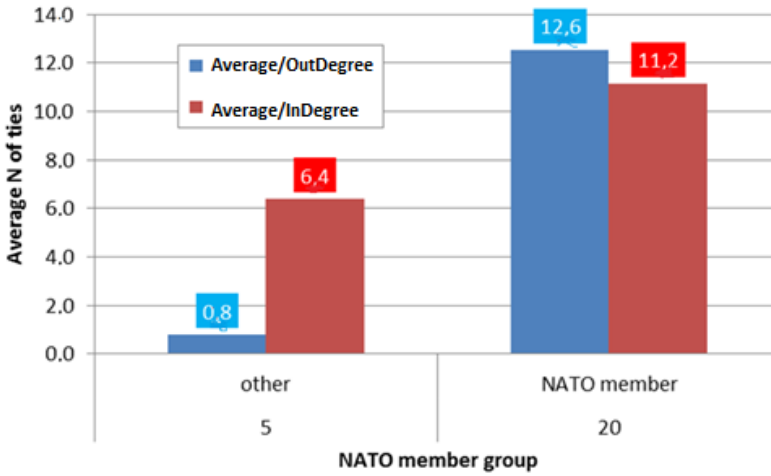


Figure 7. Differences between NATO member countries and others regarding the average number of network ties (based on the initiated defence projects)

The most notable difference can be seen – in this case again – in the context of the initiations. That is, the average number of network ties based on the initiated defence projects is more than fifteen times higher in the case of those EU members that are also NATO member countries (see *Figure 7*). Furthermore, states with NATO membership prove to be also more desirable or more frequently ‘targeted’ partners.

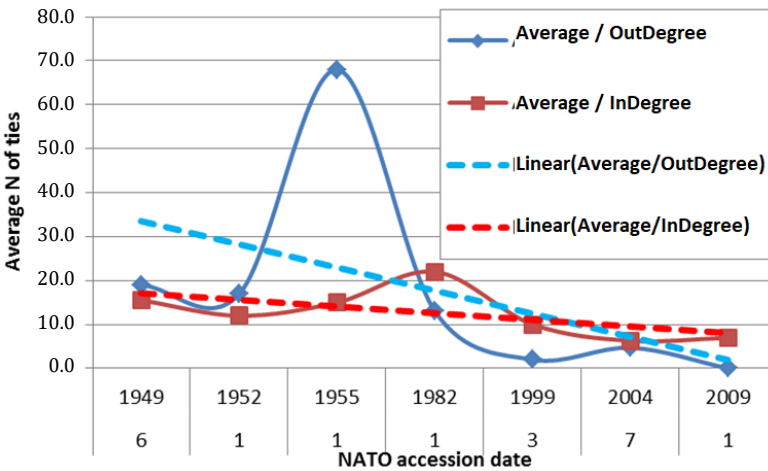


Figure 8. Average number of ties depending on NATO accession date

It can also be added that based on the data, an identical pattern can be seen regarding institutional learning (see *Figure 8*): the in-degree values are less notably related to membership duration, but the values tend to be higher with long-term membership, and defence partnership initiations show a more remarkably positive connection.

In this sense, both EU and NATO membership figures corroborate that a longer, more significant experience in a multi-player, cooperative institutional environment increases the activity and partnership potential in a rather specific domain of defence investments.

4.4. Regional Differences

Considering the regional patterns of participation in PESCO projects, notable differences arise (see *Figure 9*). The Western European region appears to include the most active countries regarding defence project coordination (17.2 ties on average), and the average rate of partnership is also the second highest (12.8 ties on average) in the region. Southern Europe is characterized with a similar value in initiation (13.7 ties on average), and the highest value of partnership relations (17.7 ties on average) can be measured among the regions in this area. The relatively higher values in the Central European region might be explained with Germany being part of the group, and the Northern European region proves to be the least integrated area in the defence cooperation.⁸

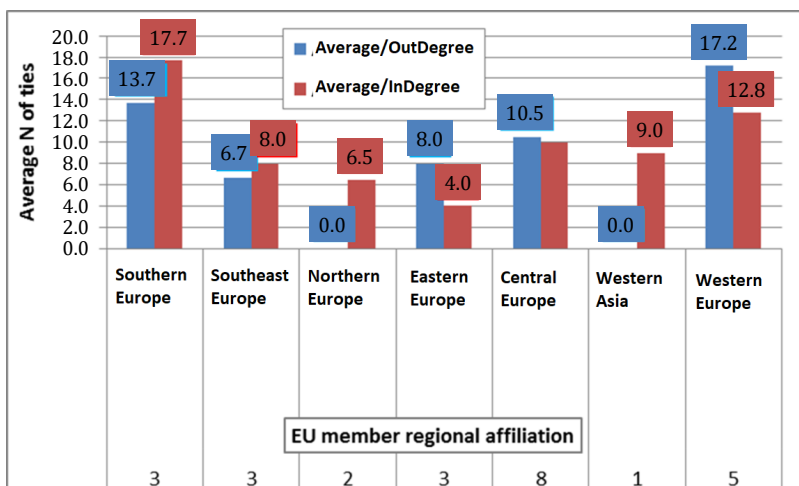


Figure 9. Regional patterns of participation in PESCO projects

8 To a certain extent, this pattern may be explained, at least partially, by the fact that Finland and Sweden are neutral, and also notable arms manufacturers on their own.

As a greater territorial unit with twelve countries, Central and Eastern Europe has lower values in both out-degree and in-degree measures (see *Figure 10*) although intra-regional differences show an opposite pattern: in the Central and Eastern European region, initiations are slightly higher than partnership values, while in the other remaining areas in-degree values are a bit higher.

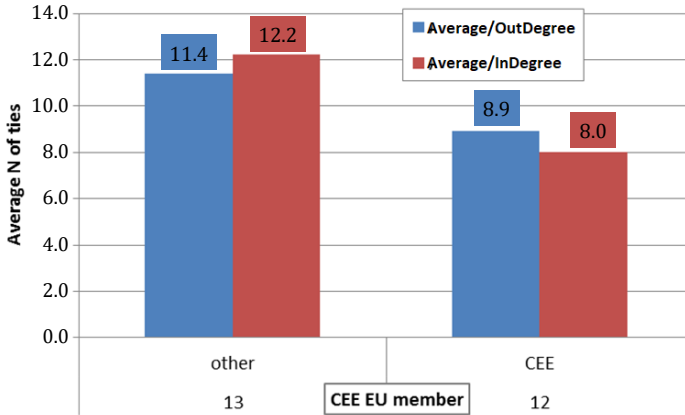


Figure 10. Differences between the Central and Eastern European region and other EU members

Finally, the comparison between the more limited area of the V4 countries and the other regions of the European Union illustrates notable differences primarily in the case of the PESCO project coordination (see *Figure 11*). The average number of defence project initiations is almost six times higher in the case of non-V4 countries although in the area of collaboration remarkably more moderate differences can be measured.

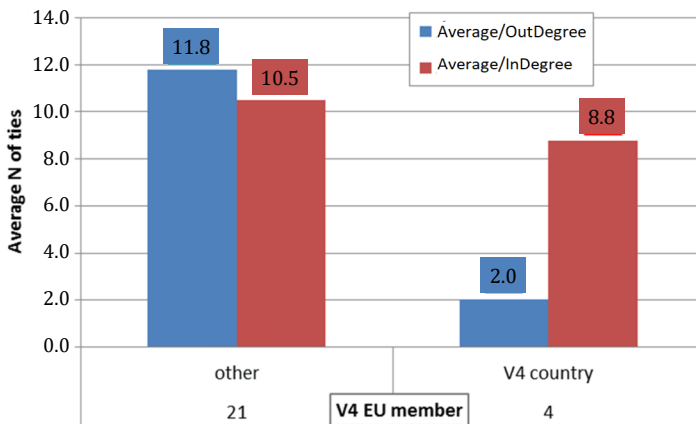


Figure 11. Differences between the V4 countries and other regions of the EU

Besides that the PESCO projects tend to be more frequent in countries with more institutional experience and the countries are arranged in a structured cooperation network, significant territorial differences can be explored from a regional and sub-regional perspective, which also corroborates the advantage of the core Member States.

5. Summary and Conclusions

Based on the research outcomes, it could be stated that (1) cooperative EU defence investment projects evolve into structured, dense, and embedded networks. Contrary to the initial presupposition, (2) a high degree of fragmentation could not have been explored – the relations among the investigated countries create a completely integrated network. However, (3) the states in the network have different inner positions, of course – based on their ties, they occupy more central or rather marginal status, but there cannot be found isolated segments or clusters. (4) The differences among the positions of the countries and the embeddedness of the networks could also have been illustrated by the reciprocal ties between certain states. As for further country-level investigations, (5) project initiation and positions or integration in the cooperation network of the PESCO defence projects also prove to be unequal to a certain extent. Institutional background – primarily the length of membership in the European Union and in the military alliance of NATO – has been (6) identified also as a differing factor in the PESCO projects, which might be explained, at least partially, with the potential to accumulate skills and experience in collaborative patterns of decision-making and in cooperative reaction to evolving challenges. As for the regional and sub-regional aspects, notable differences could be explored: (7) Western Europe proves to be the most active region if we investigate the outward ties of the cooperation network, and, on the other hand, South Europe has the highest values concerning the partnership roles of the cooperative defence projects. However, in both measures of network positions (9) the sub-region of Central and Eastern Europe has notably smaller values, similarly to the V4 group members, which exhibit a kind of asymmetric integration, as they have a rather low outward connectedness and a higher – however still relatively low from an overall perspective – partnership value.

It seems that the various forms of connections among the investigated countries and the differences illustrated in institutional and regional affiliations all imply the *emergence of a highly structured and embedded pattern of relations* among the studied segment of the European sphere. The differences indicate an inner central-periphery pattern with some long-term significant EU members in the core of the defence cooperation network and a remarkably lower level of integration of the countries from the central and eastern regions of the community.

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Market Changes in the Pharmaceutical Industry

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Abstract. The pharmaceutical market is in a constant state of dynamism. There have been many changes in the market recently, and the business environment has changed, one of the most important factors driving the market being consumer behaviour and habits. Trends towards a healthier lifestyle are reflected in changes in purchasing behaviour, with the consumption of dietary supplements becoming increasingly popular. Within the pharmaceutical supply chain, the analysis focuses on pharmacies. The aim of the study is to describe the market changes affecting pharmacy retailing, in particular the effects of changing consumer habits and more conscious purchasing and the impact of the strong presence of players outside the supply chain on pharmacy turnover.

Keywords: pharmaceutical industry, supply chain, market changes, consumer behaviour

Introduction

The supply chain of the pharmaceutical industry is in many ways unique, closed, and tightly regulated in terms of its operations and interfaces. The main challenge of the supply chain is to maintain a secure supply of medicines, which requires meeting transport and logistical challenges. Patient care, ensuring that stocks are available in the pharmacy, and maintaining the viability and profitability of the pharmacies are important tasks. Changes in recent years have affected the functioning of the supply chain. The market has restructured, but at the same time it has given visibility to the direction of development and has encouraged operators

to deliver value-added services. The quality of cooperation between actors in the pharmaceutical supply chain is essential to maintain and improve the quality of supply. The integration of suppliers, manufacturers, and distributors can be observed (Nagy 2005: 27–31), as well as the spatial concentration of buyers and the dominance of certain products (Rácz-Kummer 2009: 349–357). Respect for the buyer and the supply partner is a value just as important as respect for competitors. As a result of the day-to-day operational cooperation between manufacturers, wholesalers, and pharmacies, the supply of medicines in Hungary is safe and of European quality. There is also need for forward-looking, strategic cooperation, where the actors in the supply chain need to work together, in concert with each other.

Identifying the Problem

In the pharmaceutical supply chain, the role of the buyer, i.e. the patient, is rather passive, as the doctor, the social insurance system, and the pharmacist play a major role in demand creation (Antalóczy 2007: 58–82). In the case of prescription drugs, the pharmacy will dispense the product prescribed by the doctor to the patient. In the case of non-prescription products, the pharmacist's opinion, suggestion, or recommendation will influence the buyer's decision. In this situation, the pharmacist will be guided by the manufacturer and the pharmacist's customer and will have a preference for the products that can boost sales. However, we have to see that consumer thinking and needs have changed. Increasing flexibility, convenience, health-consciousness, and personalized services are important for the consumer. Patients are more likely to be informed online, to form their own opinion, and to take a more active role in their own health (Wallisch 2022). It is estimated that around 4.5% of all Internet searches worldwide are related to health-related questions or information. These trends are further expanding with the use of mobile devices. Consumers turn to the Internet not only to find health information but also to buy services or products (Fittler et al. 2018). This means that they are more informed when shopping and go to the pharmacy with a specific product need and less influenced by the pharmacist's recommendation because they also take into account a number of factors when choosing a product such as price, packaging, manufacturer, TV advertising, and specific needs. A wide range of products gives the opportunity to choose and to meet individual needs. In many cases, it is a challenge to meet the needs of patients and to be more attentive and responsive to changing consumer needs. Manufacturers are also entering other channels such as drugstores or grocery chains with the range of products they can afford, and consumers are increasingly shopping in these places. The presence and influence of players outside the supply chain on the market is a problem.

The Supply Chain

One of the most commonly used terms in logistics management literature in recent years is supply chain or supply chain management. Although the textual definition of the term often differs, a consensus seems to be emerging on the content. At the heart of this consensus are the following three observations:

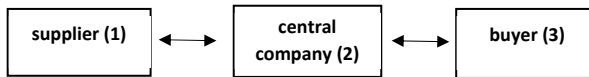
- It aims to satisfy consumer needs.
- The supply chain can be understood as a chain of several cooperating market actors.
- Supply chain encompasses the real processes involved in value creation and their system (Gelei 2003).

Supply chain and supply chain management are not unfamiliar terms in logistics terminology (Ványi–Varjasi 2014: 58). In the 1980s, supply chain meant the coordination of a company’s internal processes such as purchasing, manufacturing, sales, and distribution. The integration of these activities ensured the smooth functioning of processes within the company. With the expansion of the coordinated system within the company, we can now talk about value-creating processes that extend beyond the boundaries of the company. This broadened approach extends the cooperation between organizations from the raw material producer to the end user. This enables companies to face new market challenges as part of a chain.

The supply chain is nothing more than a series of value-creating processes – production and logistics – across cooperating organizations that produce a product or service to satisfy consumer needs (Chikan 2008). The supply chain is the individuals and organizations involved in the production and sale of a product or service, resources, activities, and technologies (Basuki 2021: 9–12). According to La Londe and Masters (1994: 35–47), a supply chain is a group of firms that transfer materials, i.e. the group of firms between which goods and services flow in the production process. A supply chain can also be defined as a group of firms that jointly market a product or service (Lambert 1998: 1–19). According to Lambert et al. (1998), supply chain members cooperate in the production and marketing of products and services. According to Harland (1996: 183–192), supply chain actors are those actors who cooperate in the process of sourcing, producing, and delivering a product or service to a customer. In Chikan’s (2008) formulation, a supply chain is a vertically interconnected set of economic activities across firm boundaries to satisfy a given consumer demand. The four main processes of planning, sourcing, manufacturing, and delivery that define the supply chain include demand-supply management, sourcing of raw materials and components, manufacturing, assembly, inventory management, order processing, distribution, and delivery to the final consumer (Szegegi 2017).

Cooperation between actors is based on trust and commitment, which members need to develop continuously. They accept interdependence and share the

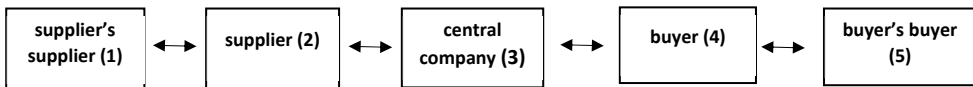
information available to them. The actors seek a long-term relationship in which each member tries to find its own solution. The main objective of the supply chain members is to satisfy consumer needs by cooperating in value creation processes while sharing both risk and profit (Gelei 2002). They have a common interest in the success of the whole supply chain, as being part of a well-functioning chain can give members a competitive advantage in the market (Gelei 2003). Supply chains can be understood as business networks (Gelei et al. 2010) – a network is a structure whose nodes are business units such as a producer firm, a buyer, or a supplier. The relationship between the nodes is the link between the actors. The relationship between the members determines the nature of the supply chain. A supply chain has at least three business units, and its length is determined by counting the number of actors in the chain. The more members, the longer the chain, but it is particularly short if the manufacturer sells the product or service directly to the end customer. The simplest type of supply chain is the direct supply chain, in which the producer, the buyer, and the supplier cooperate in the flow of goods and services.



Source: Mentzer et al. (2001)

Figure 1. *Direct supply chain*

In the extended supply chain, in addition to the above actors, the supplier's supplier and the buyer's buyer are already part of the integration by participating in the value creation process. In a broad sense, the scope of the supply chain includes both the supply chain and the distribution chain (Kozma–Tóth 2017).



Source: Mentzer et al. (2001)

Figure 2. *Extended supply chain*

The relationship between the members determines the nature of the supply chain. The starting point of the business relationship is the exchange, which is a one-off transaction and can include the transfer of goods, services, and money. If the relationship between the seller and the buyer is limited to the exchange of goods and services, it is a short-term relationship that does not imply trust between the members and does not depend on each other. In a later interpretation, interdependence appears, which may involve resources, skills, or even information.

In a well-functioning supply chain, the actors can gain a competitive advantage in the market by sharing the information available to them. Socio-cultural ties, such as trust and commitment, are established between them. They take into account that their decisions may have an impact on the other actors in the chain. They contribute to each other's profitability and seek to achieve mutual benefits (Lambert et al. 1998: 1–9). Cooperation allows the parties to work together to grow the pie – and thus their own slice – rather than trying to cut a bigger slice of a pie of a constant size at the expense of each other (Cigolini et al. 2004: 7–41).

The structure and type of the supply chain can be directly determined by the expectations placed on its operation and the objectives assigned to it. A crucial aspect in setting the target is the nature of the products and their demand (Fisher 1997: 105–116). According to Fisher, the first step in building an appropriate supply chain strategy is to understand the characteristics of demand (Fisher 1997: 105–116). Demand for a product is a complex concept, involving the current stage in the product's life cycle, the breadth of the product range, the degree of predictability of demand, and the lead time and service quality of the market, which is mainly availability, i.e. the proportion of the order that can be satisfied from stock.

Supply chains, according to Fisher, essentially perform two functions, the physical and the market intermediation function. The physical function includes activities such as the production of a product from raw materials, its assembly into components, and their delivery to the appropriate actor in the supply chain and, finally, to the end consumer. The market intermediary function aims to ensure that the range of products placed on the market actually meets the specific needs of the customers. The efficient flow of information is the means of coordination between the cooperating partners, the aim of cooperation being to meet predictable demand at minimum cost. However, in the case of innovative products, unpredictable demand can lead to excess stocks or shortages in the market (Fisher 1997: 105–116).

While the supply chain is defined as a series of value-creating processes across companies, supply chain management can be defined as the conscious management of the supply chain to improve the competitiveness of the companies involved (Gelei 2002). Supply chain management can be formulated as a long-term agreement between two or more companies, the development of trust and commitment, the integration of logistics activities, including the sharing of demand and sales data (La Londe–Masters 1994: 35–47).

The conditions for supply chain management are (Mentzer et al. 2001: 1–25, in Gelei 2002):

- Supply chain orientation: the recognition and shared belief of the participating companies that conscious supply chain management is of strategic importance because it improves their market position.

- Integrated enterprise logistics: The coordinated planning and management of value-creating processes between companies is not possible without the coordination of real processes within the company.
- Systems approach: the participating companies jointly determine the market performance of the chain, the aim of cooperation not being to optimize the position of one company but the chain as a whole.

Supply chain management aims to increase competitiveness and improve cooperation between partners (Hattayer–Gál 2022: 51–58). Members are advised not only to coordinate material flow functions but also to integrate several other activities within the company or the supply chain to achieve higher customer value and satisfaction. In this respect, the joint understanding and servicing of customer expectations and values, and their becoming a common goal, is essential (Gelei–Nagy 2005). With the spread of a customer-centric approach, tracking customer satisfaction has become an increasingly accepted and expected requirement (Kolos 2006).

The Supply Chain of the Pharmaceutical Industry

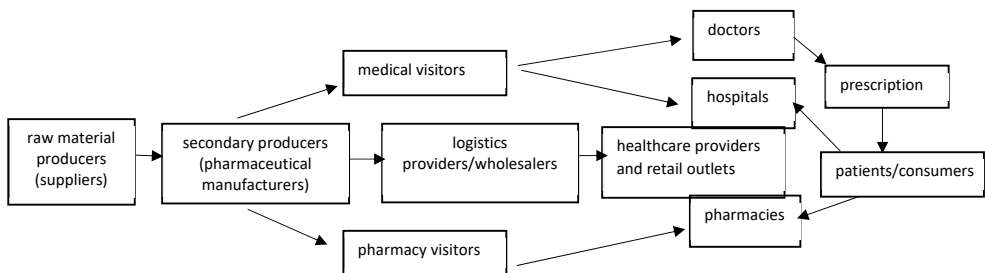
The production of a pharmaceutical product goes beyond the traditional duality of production and marketing because it also involves scientific research, clinical trials, and the social sustainability of health promotion. A specific feature of the pharmaceutical industry is its specific legal regulatory environment (patents, regulatory licensing, social security, agent–client relationship, code of ethics, environmental protection) (Lengyel–Molnár 2014: 115–123). The strategies and competitive factors of pharmaceutical companies differ depending on whether they are involved in the production of originator or generic medicines. Nowadays, the pharmaceutical industry has become a highly globalized industry (Antalóczy et al. 2019: 41–72, Haakonsoon 2009: 75–95), a dynamic and innovative industry in the global economic environment (Nozari–Szmelter 2019). The proper functioning of the supply chain is also of high economic importance in the pharmaceutical industry (Kozma–Tóth 2017). The structure of the industry’s supply chain is also becoming increasingly complex. In the current fierce economic environment, relatively few companies can compete without paying attention to both their direct and indirect external relationships.

The supply chain is responsible for the efficient and effective transfer of materials from suppliers to end users (Bititci et al. 2004: 251–268), and it is composed of primary raw material producers (suppliers), secondary producers (pharmaceutical manufacturers), logistics providers/wholesalers, healthcare providers, and retail outlets (Savage et al. 2006: 1–8, Zahiri et al. 2017: 109–142). It is important that this is a regulated and closed supply chain to ensure protection against hoarding and the safe supply of medicines. The pharmaceutical industry is a highly regulated

industry. Regulation covers many operational areas, including manufacturing, quality, end-product specifications, or product packaging (Abdallah 2013).

The rapidly changing market environment and fluctuating customer demands require efficient logistics processes (Kovács–Kot 2016: 115–126). In such an unstable environment, companies need to develop more flexible and robust relationships and continuously improve them with partners to respond to these changing market situations in a timely manner (Ghatari et al. 2013: 193–205). In recent years, globalization processes have accelerated, and with the development of markets it has become increasingly important for companies to have a good understanding of supply chains and maintain good relationships between them (Kot 2012). Strategic cooperation can improve the quality of products and the customer service of companies (Bititci et al. 2004: 251–268). Trust is very important when considering strategic cooperation, and the fundamental role of trust should be emphasized. Trust is important not only to exclude market and environmental uncertainties but also to help both parties manage these uncertainties (Haakansson et al. 2009, Mandják et al. 2010: 1–25).

Today, supply chains compete with each other (Markovits–Somogyi–Ulechla 2016: 5–7) instead of products and services, a fact that can now be interpreted as a criterion for competitive advantage, as the main objective of a supply chain is to maximize the value created and to meet customer needs. This additional value is generated by the efficient operation of the supply chain (Kozma–Pónusz 2016: 181). Organizations aim to improve supply chain efficiency (Mandják et al. 2010: 1–25). Sharing risk, experience, and common purpose ensures coordinated operations (Parast–Spillan 2014: 289–314). A supply chain can provide the greatest value creation and competitive advantage if it can successfully align knowledge, skills, and capabilities towards a common goal through mechanisms that drive efficiency and effectiveness – for the benefit of customers in the narrow sense and the community in the broad sense (Katits–Varga 2016).



Source: own edition

Figure 3. *Pharmaceutical supply chain*

Every company is part of a supply chain, in many cases a supply network, with many different suppliers and partners (Morley 2017). Within the supply chain, the wholesaler's important and primary role is to source, store, stock, quality control, and deliver medicines to pharmacies, providing a fast and flexible service to them. Thus, the operation and inventory management activities of pharmaceutical wholesalers are affected by market factors that affect all actors in the supply chain. Companies both up and down the supply chain need to be alert, agile, and responsive to the changes they notice (Pulcini et al. 2018: 590–592). Recently, the pharmaceutical industry has grown, and this growth has necessitated an acceleration of the transportation and logistics challenges. Given the global nature of the pharmaceutical industry, the importance of a coordinated and flexible supply chain cannot be overemphasized (Venkateswaran 2018).

Research Purposes, Methodology

The effects of environmental changes, changes in consumer behaviour, and market shifts are being felt and are driving and pushing supply chain actors towards change. Due to the popularity of health-conscious lifestyles, we can assume that the market has shifted towards OTC and dietary supplement purchases (H1), with a focus on health maintenance. Patients are becoming more aware, and with the advance of digitalization, they receive all information instantly, which empowers their role, opinion, will and most importantly changes their attitude. As a result, they are less influenced by the pharmacist during a pharmacy purchase, it is more difficult to influence them as to which product they should buy (H3), and they have a more active role in shaping demand. The importance of actors outside the closed and secure supply chain is increasing (H2).

Methodology, Hypotheses

The study examines the changes in the market from the perspective of pharmacies, in particular the consequences of changes in consumer behaviour in the post-COVID period.

- Will demand for over-the-counter products increase?
- Can the pharmacist influence the purchaser's decision?
- How popular is the purchase of dietary supplements outside the pharmacy?

The research is based on the literature review, the fundamental issues of the supply chain, and the structure, operation, and specificity of the pharmaceutical supply chain. Based on the combination of literature and market knowledge, the hypotheses were formulated. A questionnaire survey was carried out among pharmacies in Hungary to verify the hypotheses. The pharmacies participating in

the survey were selected randomly. Our questionnaires were made available on an online pharmacy platform for a duration of one month. The responses received were aggregated on Scriptor, an SFA platform for the pharmaceutical industry. The data were transformed into statements in Excel, coded and further analysed using SPSS software. The survey was conducted in autumn 2021. 114 questionnaires were found to be evaluable.

Table 1. Demographic profile of the sample ($N = 114$)

Variables	Item	Count	%
Region	Bács-Kiskun	8	7%
	Baranya	8	7%
	Borsod-Abaúj-Zemplén	14	12%
	Budapest	16	14%
	Csongrád-Csanád	10	9%
	Győr-Moson-Sopron	4	4%
	Hajdú-Bihar	8	7%
	Heves	3	3%
	Komárom-Esztergom	5	4%
	Pest	15	13%
	Szabolcs-Szatmár-Bereg	8	7%
	Vas	4	4%
	Veszprém	8	7%
Zala	3	3%	
City/Country	City	91	80%
	Country	23	20%
Pharmacy chain	Alma	8	7%
	Benu	22	19%
	Csillag	4	4%
	Gyöngy	4	4%
	Kulcs	1	1%
	Patika Profi	2	2%
	Szimpatika	5	4%
	Chain pharmacy	46	40%
Independent	68	60%	

implications of our findings for the functioning of the pharmaceutical supply chain and its actors.

Hypothesis 1: Due to changing consumer demands in recent years, the sales of OTC and dietary supplements in pharmacies have increased compared to the sales of prescription products.

Hypothesis 2: The turnover of pharmacies is negatively affected by the sale of dietary supplements in drugstores and grocery chains.

Hypothesis 3: More informed buying habits result in less influence on patients' purchasing decisions.

Ground for the Hypotheses, Marketing Background

The pharmacy market is a more complex supply chain with many regulations affecting it such as price regulation, margin capping, or price fixing. A government decision sets out the margins that wholesalers can work with when selling prescription medicines. The applicable margin is degressive, i.e. the higher the price of a medicine, the lower the margin. For products with a producer price below HUF 500, the margin is 8% (of which there are very few), but if the price of the medicine reaches HUF 2,000, the margin is 4.4%. The pricing policy is strictly regulated by law, and there are margin constraints. Among the actors in the supply chain, this not only affects the wholesaler mentioned above, but it also has an impact on the retail sector, i.e. pharmacies. Under the regulations, the average margin for prescription products in a pharmacy is 12%, which is considered low.

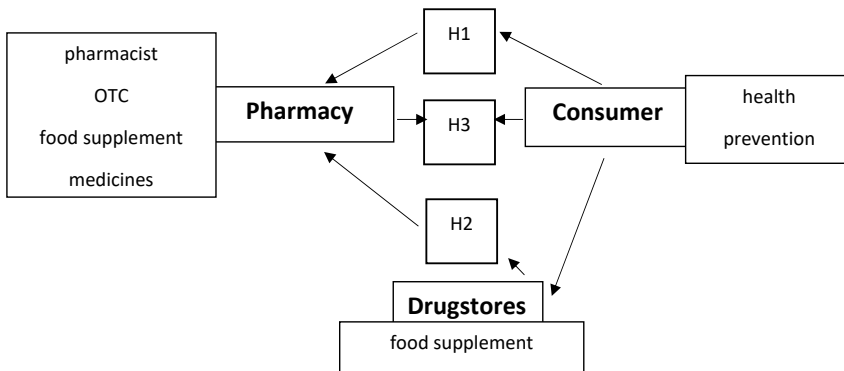
The regulation governing margins was last amended nearly a decade ago, but since then the costs for businesses have increased substantially. For many years, pharmacies and wholesalers have been trying to counter this problem by cutting costs and optimizing processes within the supply chain. Both sectors live on margins; if there are insufficient resources, there is no funding for the necessary investments and improvements, and the result is that patients receive a lower-quality service (Galambos 2021).

Within the category of food supplements, vitamins accounted for the largest share of sales in pharmacies during this period. During the pandemic, prevention became even more important for people. In particular, sales of vitamins C and D increased. Market surveys have also shown that people are taking vitamin D specifically to strengthen their immune system against COVID-19 in addition to supporting the immune system. Purchases of vitamins C and D were more frequent than before the outbreak. Such a surge in consumer demand during this viral period has resulted in stock shortages at pharmacies and wholesalers and has also caused problems with production schedules. The change in circulation and the buying up of stocks had a major impact on all players in the supply chain, as there were no spare stocks to meet the increased demand. Pharmacies

in a more advantageous position were those operating with a higher stock level than the average 7–14 days’ supply, so products that were already in short supply elsewhere could still be supplied by these pharmacies. The stock shortages resulted in disrupted deliveries, which disrupted the supply chain. Thus, for the future, rethinking stocking strategies within the supply chain is an important issue. In order to ensure a safe and continuous supply of medicines, it is important that pharmacies’ orders are not disrupted and that patients visiting the pharmacy are served smoothly, as this will ensure the smooth functioning of the supply chain.

The aforementioned shortages in pharmacy stocks have also led to people obtaining the vitamins and minerals they need from other sources. In addition, during the emergency, people visited pharmacies less frequently, although the value of the basket was higher on a shopping occasion. There was a limit of one person at a time in the pharmacy. Discount chains and drugstores did not have such strict restrictions. Customers were more likely to buy basic vitamins and other dietary supplements in these shops.

Today, drugstores and grocery chains offer a wide range of dietary supplements. These channels are becoming increasingly popular due to changing consumer behaviour. More and more people are buying dietary supplements in drugstores, discount chains, and other food chains. It is assumed that some of the pharmacy sales will thus shift to drugstores and discount chains. This is because consumers’ mindset and needs have changed. Increasing flexibility, convenience, health consciousness, and personalized services are important for the consumer. Based on the above market changes, we have formulated the hypothesis that pharmacy sales are negatively affected by the sale of dietary supplements in drugstores and grocery chains.



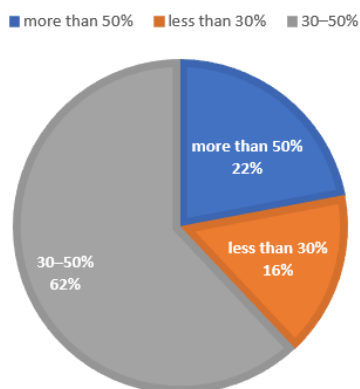
Source: own edition

Figure 5. The context of hypotheses

Our third hypothesis is based on the observation that people are becoming more health conscious, specifically looking for (disease-)preventive ways of living, and are therefore consuming more vitamins and supplements. Nowadays, consumer attitudes have changed, as the world has become faster, information is instant and up-to-date, and people are used to and expect to have instant access to everything, be it information, products, or services. They are more aware of what they buy and are more informed before they do it. Consequently, I assume that the consumer will play an increasingly important role in shaping demand and that it is not the pharmacist/manufacturer-influenced pharmacist who will cause the demand for a product to increase or decrease. I argue that more informed buying habits will result in less influence on patients' purchasing decisions.

Results of the Examination, Evaluation of the Hypotheses

Hypothesis 1: Due to changing consumer needs in recent years, the sales of OTC and dietary supplements in pharmacies have increased compared to prescription sales.



Source: own edition

Figure 6. Share of OTC sales in pharmacies compared to prescription sales

This hypothesis is based on the fact that people are becoming more and more concerned about their health and that prevention and healthier living are becoming increasingly important. They are buying more vitamins and supplements, as can be seen from the sales figures. The pandemic has had an impact on this, as the viral season has made it even more important for people to replenish their bodies with the right vitamins and minerals. We are also seeing a change in the proportion of sales in pharmacies as a result, with an increasing emphasis on OTC product categories. The traditional pharmacy model is based on serving patients with prescriptions and providing medicines to them to help

them heal. The essence of prevention is placing the emphasis on OTC products. It is important to see the current ratio of prescription to non-prescription sales in pharmacies. The results of the questionnaire survey are shown in the pie chart above (*Figure 6*).

62% of the surveyed pharmacies said that the OTC category accounts for around 30-50% of the total sales. This means that the turnover is still primarily from prescription products. 22% of pharmacies have more than 50% OTC turnover: in these pharmacies, this category is stronger, and they sell the most. In only 16% of the pharmacies is this share typically very low. Looking at this, we can say that sales from the OTC product categories are becoming more significant and approaching 50%. But currently, prescription medicines still account for the bulk of sales. The analysis, market expectations, and experience show that the OTC category is growing and will continue to grow alongside prescription sales.

In the present case, however, the hypothesis does not hold, as the bulk of pharmacy sales are still generated by sales of prescription medicines.

Effect on the supply chain: supply chain actors need to respond to changing consumer demands. Pharmacies need to replenish their stocks in anticipation of higher future demand for dietary supplements and to listen to patient feedback and needs. Wholesalers will also need to stock a wider range of these products to ensure uninterrupted service. And manufacturers should be alert to new product innovations and portfolio expansion.

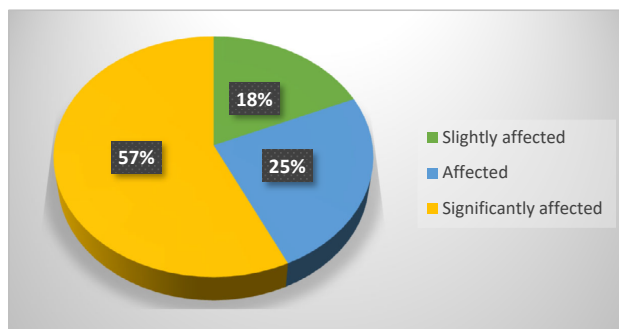
Hypothesis 2: Pharmacy sales are negatively affected by the sale of dietary supplements in drugstores and grocery chains.

The question asked was as follows: How much is pharmacy turnover affected by the sale of dietary supplements in drugstores and grocery chains? Basically, we want to see clearly as to whether the rise of discounters is affecting pharmacy sales and whether the increasing choice of products in drugstores is shifting pharmacy sales away from dietary supplements, i.e. whether people are buying fewer dietary supplements in pharmacies than in drugstores. Shopping habits have changed, with more and more people buying dietary supplements in drugstores. The COVID-19 epidemic has had an impact on changing shopping habits. People could shop in pharmacies for a single person and almost only for the essentials. More people shopped in drugstores and grocery stores, where they could buy essential vitamins in the same way. Another reason was that the pharmacies were running out of stock, and people were going elsewhere.

Drugstores are also now offering a wider range of products. It can be an advantage to be able to pick up the product and even buy it at a better price. A disadvantage may be that the customer cannot ask for professional advice, unlike in a pharmacy, where the pharmacist can provide help and product information.

Most importantly, based on the results, we see that all pharmacies believe and perceive that selling dietary supplements in drugstores and grocery chains affects

pharmacy sales. All respondents believe that it is an influencing factor, with responses differing only in the extent to which they believe it affects turnover.



Source: own edition

Figure 7. *The influence of drugstores and food chains' sales of dietary supplements on pharmacies*

57% of the responding pharmacies say that sales of dietary supplements in drugstores and grocery chains have a significant impact on their turnover. This is quite a high proportion, more than 50%. This means that the importance of drugstores and food chains in this respect cannot be disputed. It is therefore very important that supply chain members keep a constant watch on market changes and the environment, just as to find strategic advantages that can ensure that pharmacies operate profitably.

In the context of this study, I hypothesise that urban pharmacies will be more influenced by the expansion of drugstores and discounters and the ever-expanding range of products. Drugstores are only found in cities, and discounters and grocery stores are mostly found in cities. In smaller municipalities, there are few opportunities to buy food supplements outside pharmacies, and the product range is rather limited. In towns with fewer inhabitants, some basic vitamins are stocked, one reason being that they are reluctant to take risks with higher stocks.

However, if we assume that people who live in municipalities commute to work in urban areas and therefore do their shopping, buying medicines and supplements in towns, then this will have some impact on the turnover of pharmacies in municipalities. We assume that some of these purchases are also made in drugstores and grocery stores. To verify my assumption, I used the Mann–Whitney test. I tested two independent groups who were completely unrelated to each other when completing the questionnaire. One group is made up of urban pharmacies and the other group is of rural pharmacies. Based on an independent sample design, the results of the Mann–Whitney test are as follows.

Table 2. *The Mann–Whitney test results (SPSS statistics)*

Test Statistics	Sales of Food Supplements in Drugstore	Group	N	Mean Rank	Sum of Ranks
Mann–Whitey U	408,000	Pharmacies in city	91	64.52	5,871.00
Z	–5,061	Pharmacies in rural areas	23	29.74	684.00
Asymp sig. (2-tailed)	<0,01	Total	114		

Using the Mann–Whitney test, the hypothesis was confirmed because a significant difference was found between the two groups, with the turnover of urban pharmacies (Mdn = 4) being more significantly influenced by the sale of dietary supplements in drugstores and grocery stores than that of rural pharmacies (Mdn = 2) [U = 408, Z = –5.061, p = 0.005 (1-tailed), r = 0.474].

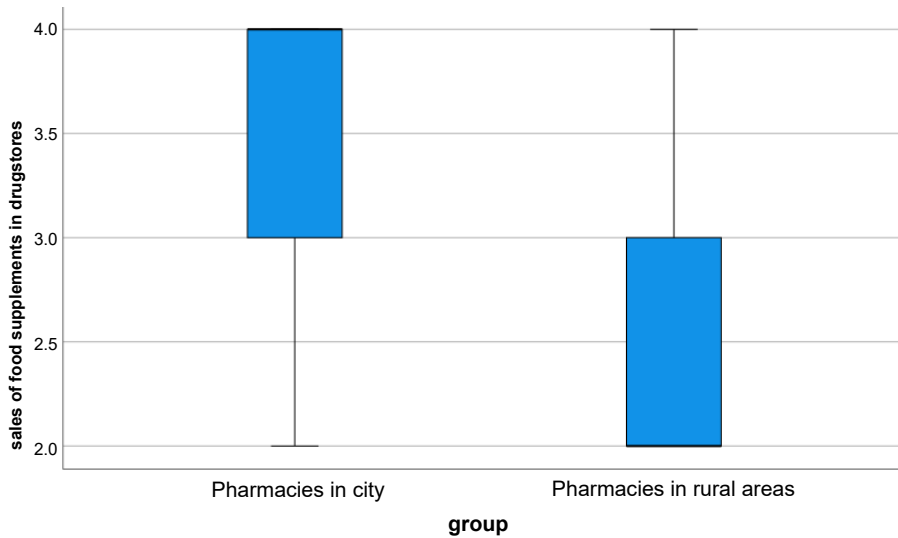


Figure 8. *Comparison of urban and rural pharmacies based on the Mann–Whitney test (SPSS statistics)*

The graph shows that urban pharmacies have scores between 3 and 4, i.e. they are significantly influenced by the sale of dietary supplements through other channels. In this case, the fact that people can buy these products in drugstores and grocery stores has a negative impact on their sales. In contrast, the rural pharmacies’ values have fallen to between 2 and 3, and their turnover is affected

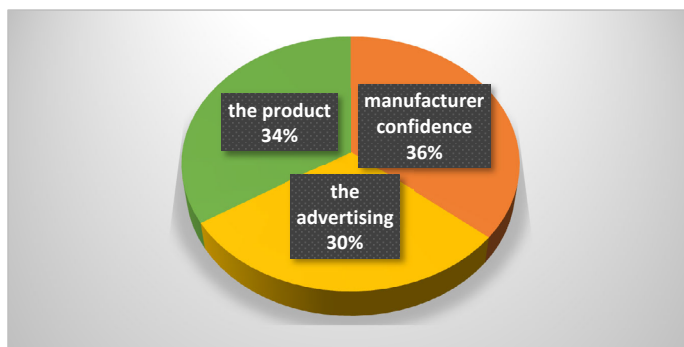
(though only slightly in most cases) by this market phenomenon. It can also be seen from the graph that the sale of dietary supplements in drugstores certainly affects the market and the players to some extent since the ‘not affected’ answer assigned to the value of 1 was not found.

The above analysis confirms the hypothesis.

Effect on the supply chain: Distribution outside the chain, distribution channels pose challenges to the members of the chain. It may trigger the idea of necessary changes both in pricing issues and in the context of product portfolio expansion. As outsider distributors, i.e. non-members of the pharmaceutical supply chain, drugstores and grocery chains have an impact on the chain’s operation, gaining sales and customers away from pharmacies. This demonstrates the importance of looking at external environmental impacts. It is necessary to look for competitive advantages that can increase the economics of pharmacy sales.

Hypothesis 3: More informed buying habits will lead to less influence on patients’ decisions.

The literature suggests that the patient is a passive actor in the development of pharmacy demand because the pharmacist plays a major role in the development of demand (Antalóczy 2007). Product recommendations in pharmacies are greatly influenced by the relationship between the pharmacy visitor and the pharmacy consultant. If the pharmacy is still member of a pharmacy chain, the category management built up there is decisive when recommending a product.



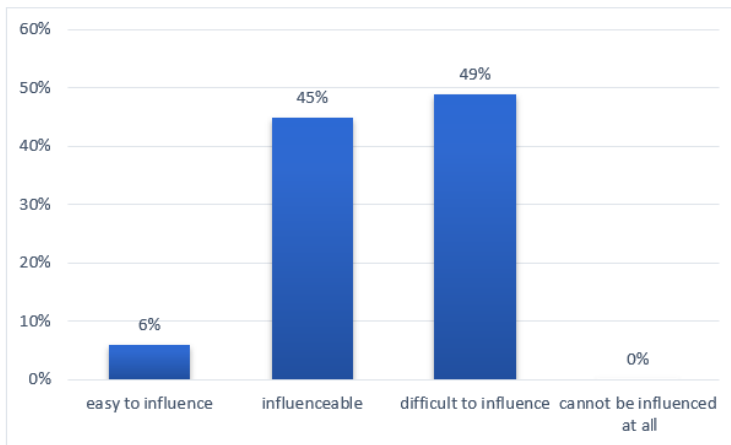
Source: own edition based on the database of VitaPlus Ltd.

Figure 9. *Influence of a pharmacist’s recommendation*

It is assumed – and I think the market changes suggest so – that customers are coming to the pharmacy more and more aware and prepared, with a specific product need, less open to persuasion, and the decisions about their purchases are certainly not pharmacist-driven. Based on this, the hypothesis is that it is not easy to convince a patient to buy another product if they come with a specific

idea in their mind (here we are talking about over-the-counter products). Results from a previous manufacturer market survey involving nearly 800 pharmacies show that pharmacist recommendations are primarily driven by the belief in the product manufacturer. This can shape demand because the pharmacist will prioritize formulations, and there will be certain products/product categories that s/he will recommend more often, prioritizing them over other products, which can influence demand and sales figures.

We assume that the market is not that simple; especially in recent years, consumers have become more vigilant and have much more information available to them, including about what products are available for a given healthcare issue. They have choices, their own opinions, own will, and own ideas. There has also been a step forward in health awareness, which has been reinforced by the pandemic period, so we are consuming more health-promoting products. The patient is now less influenced by the pharmacist. It is more difficult for the pharmacist to ‘put’ the product s/he prefers, if any, in the consumer’s basket. We used a 4-point Likert scale to measure how impressionable the customer is, how easy it is to convince him/her to buy another product. On a scale of 1 to 4: 1 = the customer was easily influenced, and 4 = the customer’s decision could not be influenced at all.



Source: own edition

Figure 10. *Pharmacists' influence on customer decisions*

Results show that patients are becoming increasingly difficult to influence although as much as 45% of pharmacists argue that they *can* be persuaded. But when we compare the figures, we see that 49% say that patients' decisions are difficult to influence. And this trend is expected to increase. The hypothesis that patients' decisions are difficult to influence can be confirmed.

Effect on the supply chain: The first step in strategically building the right supply chain is to understand the characteristics of demand (Fisher 1997). As per the literature, it is necessary to understand what drives demand, and we need to understand the factors that influence consumer expectations and purchasing decisions because the role of the patient in shaping demand is an important factor. Decision-making is less influenced. In the case of OTC products, it is no longer only the pharmacist who plays an active role in shaping demand. It is therefore an important task for supply chain actors to map consumer expectations in order to meet them as flexibly and as quickly as possible, and one of these important factors could be availability and out-of-stock service in the future. Summarizing the hypotheses put forward, the results are as follows.

Table 3. *Justification of hypotheses*

H1	Changing consumer needs in recent years has led to an increase in the sale of OTC and dietary supplements in pharmacies compared to prescription products.	FALSE
H2	Pharmacy sales have been negatively affected by the sale of dietary supplements in drugstores and grocery chains.	TRUE
H3	Patients' purchasing habits are less influenced because customers are becoming more aware of what they buy, making their own decisions.	TRUE

Conclusions

The pharmaceutical market has shifted due to the transformation of consumer habits. As a result, the over-the-counter market is growing, and sales of OTC products, mainly of vitamins and dietary supplements, are increasing. People are willing to spend more on their health. For pharmacies, it is OTC products and pharmaceuticals that can provide an added margin due to pricing. There is an increasing pressure on the traditional business model of pharmacies, with margins from the traditional and core business of pharmacies, the sale of prescription medicines, declining for years. Most pharmacies would already not be able to operate profitably without the distribution of non-prescription medicines, nutritional supplements, and other products. It should be noted that these products are also widely available in drugstores and grocery chains, which have a major impact on the life of pharmacies. In Hungary, there is a 7-9% growth in the OTC product categories, while the prescription market is stagnating because the margin is fixed, so there is no volume growth. However, it is also clear from the studies that prescription products account for the bulk of pharmacy sales. Market demand for the level of supply is increasing. There is a constant need for all actors in the supply chain to be ready to innovate and respond to new market challenges and

changing consumer behaviour. This change of mindset will be important for all actors. They need to be prepared and flexible in their response to challenges. To do this, it is necessary to see what is happening in the pharmacies today, what determines pharmacy management, so as to monitor changes in the turnover of the OTC and prescription market.

Understanding demand characteristics will be a strategic building block for supply chain operations. In developing a new approach with a visible focus on patient needs, the primary focus will be on meeting demand by providing accurate, fast, reliable, and as wide a range of care as possible. This means maintaining safe stock levels, delivery frequency, and discount levels to keep pharmacies viable and profitable, which will be the primary responsibility of the wholesaler. Further, it will be important to develop an ever-improving core service, value-added services, and innovative solutions for pharmacies.

Pharmacies are the first to meet the patient, the first to recognize consumer needs. Through their daily contact with the patient, they can provide information to the rest of the chain on changing market needs, evolving consumer habits, and emerging needs.

The quality of cooperation between the actors in the pharmaceutical supply chain is essential to maintain and increase the quality of supply, and respect for the buyer and supplier partners is a very important value, as well as respect for competitors. As a result of the day-to-day operational cooperation between manufacturers, wholesalers, and pharmacies, the supply of medicines in Hungary is safe and of European quality. Strategic collaborations within the supply chain need to be developed with the primary aim of achieving higher customer value and satisfaction, as per the literature. The literature also suggests in this respect that the joint understanding and servicing of customer expectations and values, and their becoming a common goal, is essential (Gelei–Nagy 2005).

It is necessary to understand customers' needs, constantly research the direction of change, and adapt services accordingly. This could be the key to progress, to halt the decline in the number of pharmacies and in the sector's profitability, and to make pharmacy an attractive profession for young people again.

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Drivers of Regional Economic Growth in Hungary before and during the Pandemic Crisis

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Abstract. The 2010s saw a gradual improvement in economic growth in Hungary, which was noticeable in all regions. In this research, we examine the post-crisis economic development trends in a NUTS 3 level disaggregation in the context of the dependent market economy model. The research uses descriptive and multivariate statistical analysis to shed light on the main regional trends. Notable changes occurred mainly in the top and middle performing counties in terms of output, while the bottom of the ranking was characterized by stagnation. Territorial disparities have temporarily narrowed, but there has been no significant catching up of lagging regions.

Keywords: regional economic growth, Hungary, foreign direct investments, labour market, dependent market economy model

Introduction

The Hungarian economy has slowly and gradually emerged from the previous economic crisis of 2008/09 and has embarked on a growth path in a high-pressure economic environment (NBH 2016) during the second half of the 2010s. As a result, we could reasonably expect the economic crisis caused by the coronavirus to be only temporary and a return to strong growth soon, though with higher inflationary pressures and a tighter monetary policy environment. By the early months of 2022, the adverse international developments have made it certain that inflation will be persistently high with deteriorating fiscal balance and growth outlook, or even recession concerns. Our economy is highly vulnerable to external shocks (Gál–Lux 2022), while monetary policy instruments are more likely to affect the demand side of the economy, but inflation is currently being driven by supply-side frictions. At the same time, the scope for fiscal policy has also been severely constrained by the international energy crisis and the delay in receiving EU funds.

The above-mentioned macro processes are not affecting the regions of Hungary in the same way: territorial disparities are persistent in the long term, while the position of the regions may change from time to time (Vida 2022, Benedek 2021). In this article, we intend to analyse the regional economic inequality trends in Hungary in a county-level disaggregation. The main focus of our interest is the per capita GDP growth rate and its underlying drivers such as labour productivity or investments, including foreign direct investments (FDI) and labour market developments. These variables were considered the most relevant (and readily available) in the light of the literature on endogenous and exogenous regional development factors (Smętkowski 2018, Bodnár et al. 2022). The major added value of this research is the use of regionally disaggregated FDI data because there are only a few articles that deal with these processes in a regional breakdown in Hungary and Central Europe (see e.g. Gál–Singh n. d., Gál 2019, Lengyel–Varga 2018). In this article, we explore two main research questions: 1) how did the per capita GDP inequalities evolve during the post-crisis period in Hungary at the NUTS 3 level? 2) how did the specific drivers of growth contribute to the per capita GDP growth and labour productivity growth?

In this article, we first depict the nature of spatial inequalities with respect to the per capita GDP. Following Monfort (2020), we also use a decomposition approach highlighting the contribution of changes in labour productivity, employment rates, and demographic indicators to the changes in economic development. In the next part, we intend to get further insights by analysing the evolution of unemployment and investments, including foreign direct investments. The source of our database is the Hungarian Central Statistical Office (HCSO). Time series are available for the period between 2009 and 2020 at the NUTS 3 level, that is, we cannot see the overall impact of the coronavirus crisis, only the impact of its first few months. We assume a certain degree of resilience in the regions, therefore the downturn caused by the crisis was somewhat reversed in the following year, as confirmed by the latest sub-national employment data (HCSO 2022).

The Evolution of per Capita GDP in a Regional Breakdown during the Previous Decade

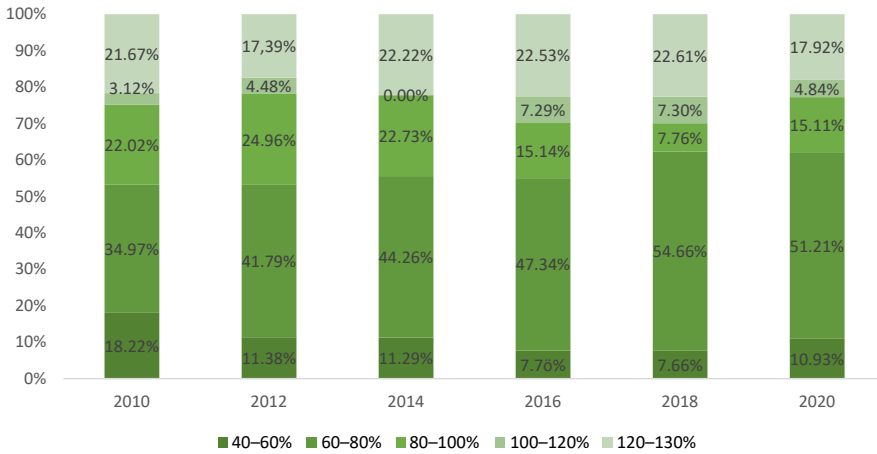
Given the uneven spatial distribution of growth factors (human resources, natural resources, capital stock, technology, entrepreneurship, etc.), understanding the development of regions is an essential dimension of understanding growth at the national level (Lengyel–Varga 2018). Differentials of development are wide and persistent among the Hungarian regions, although there have been notable changes during the previous decade. In terms of GDP per capita (*Table 1*), the counties

of Nógrád, Szabolcs-Szatmár-Bereg, Békés, Somogy, Jász-Nagykun-Szolnok, and Baranya are persistently the most backward areas. After 2010, Borsod-Abaúj-Zemplén, Heves, and especially Bács-Kiskun counties started to show spectacular progress, and Veszprém County also improved its position. Hajdú-Bihar and Tolna counties have fallen back slightly compared to their performance at the beginning of the decade, while Zala County has deteriorated significantly and Csongrád-Csanád County has stayed at around three quarters of the national level. Pest County has seen a significant decline, with Bács-Kiskun County on a par with its GDP per capita. Vas County followed a similar trajectory to Fejér County in the first half of the decade, approaching the national average year on year, but then gradually declined, while Fejér and Komárom-Esztergom counties hover close to the national level. Győr-Moson-Sopron is the only county outside the capital that has consistently exceeded the national average, moving further away from it until 2016, but since then it has been on the decline. An important feature that adds to the overall picture is the fact that the development of the national average GDP per capita itself is strongly influenced by the economic growth of Budapest, which gradually declined until 2015 but then accelerated again, and it has always been above twice the national average. Of course, the primacy of the capital city (or capital-city centricity) is not a unique, Hungarian feature in Central and Eastern Europe (see Rácz 2019).

Table 1. *The ranking of the Hungarian NUTS 3 regions by GDP per capita (as a percentage of the national average), 2010–2020*

	2010	2015	2020		2010	2015	2020
Budapest	219.1	200.2	207.2	Heves	68.6	71.6	75.5
Győr-Moson-Sopron	121.2	130.4	113.0	Hajdú-Bihar	74.8	71.2	71.9
Fejér	87.6	103.6	98.8	Zala	86.2	81.7	71.8
Komárom-Esztergom	100.8	102.4	96.3	Borsod-Abaúj-Zemplén	59.9	71.1	70.5
Vas	86.5	97.5	86.3	Baranya	66.6	64.3	68.5
Bács-Kiskun	66.6	78.2	80.3	Jász-Nagykun-Szolnok	61.1	65.3	68.2
Pest	87.6	83.5	79.9	Somogy	63.6	62.5	64.9
Csongrád-Csanád	73.7	75.3	76.3	Békés	57.7	60.7	59.5
Veszprém	72.9	74.3	75.6	Szabolcs-Szatmár-Bereg	54.1	55.8	57.9
Tolna	73.9	75.3	75.5	Nógrád	44.4	44.3	45.2

Source: author's elaboration based on HCSO data



Source: author's elaboration based on HCSO data

Figure 1. Population distribution between regions in different development categories in Hungary, 2010–2020

It should be kept in mind that compared to 2010 only the city of Budapest and the counties of Pest and Győr-Moson-Sopron have seen a population growth, so the GDP per capita figures are also affected by the general population decline, which is most severe in Békés, Baranya, Nógrád, and Borsod-Abaúj-Zemplén counties. In this context, we also examined the change in the population distribution between regions of different levels of development by dividing our regions into five development categories (*Figure 1*). Since 2010, the lowest development category has narrowed, but an increasing share of the population lives in regions with a GDP per capita between 60% and 80% of the national average level. This indicates a kind of middle-income trap, as there seems to be a lack of endogenous development factors that could boost our non-core areas out of this level (Diemer et al. 2022, Lux 2021). The biggest changes are in the categories around the national average, and the share of these categories is decreasing. The size of the population in the highest development category is determined by whether or not Győr-Moson-Sopron County exceeds 120 percent of the national average in a given period (see also Zsibók 2022).

The Decomposition of the per Capita GDP Change

According to a growth-accounting framework (Kónya 2018), GDP per capita can be decomposed into its underlying factors, namely labour productivity, the share of the working-age population in the total population, and the employment rate. These factors are central to the concept and measurement of regional competitiveness.

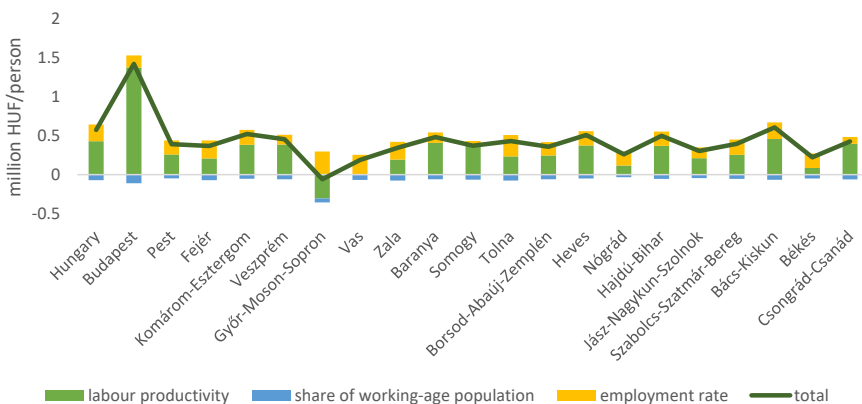
According to Lengyel (2000: 976), regional competitiveness is defined as the size and growth rate of income per capita generated in a region, which is the result of both high labour productivity and high levels of employment. In other words, competitiveness is sustainable economic growth that results from high productivity combined with a high employment rate (see also Nemes Nagy 2005):

$$\frac{GDP}{population} = \frac{GDP}{employed\ persons} \cdot \frac{employed\ persons}{working\text{-}age\ population} \cdot \frac{working\text{-}age\ population}{population} \tag{1}$$

This decomposition applies also to the changes of per capita GDP in an additive manner:

$$\Delta \frac{GDP}{population} = \Delta \frac{GDP}{employed\ persons} + \Delta \frac{employed\ persons}{working\text{-}age\ population} + \Delta \frac{working\text{-}age\ population}{population}, \tag{2}$$

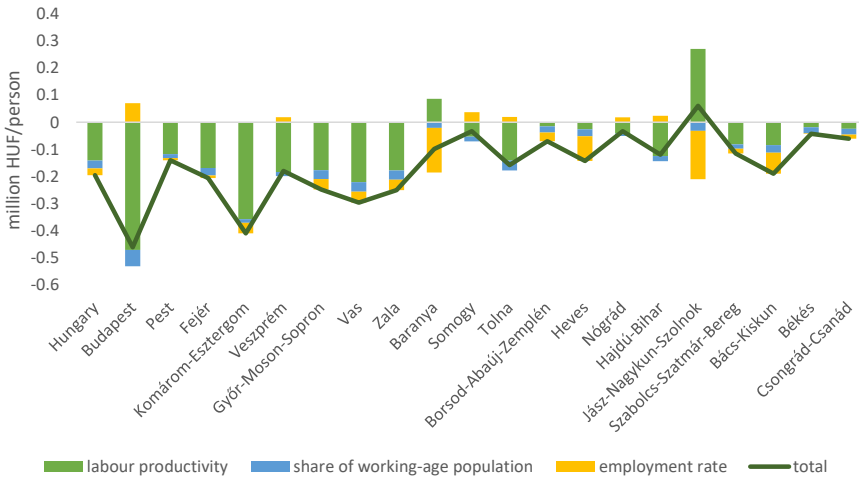
where Δ refers to the change of the variable between two periods. As explained in the next section, the second half of the 2010s brought significant changes in the contribution of the underlying factors to GDP per capita due to the shift from unemployment to labour shortages. These changes were analysed in detail by Zsibók and Páger (2021); therefore, in our calculations, we first focus on the era of the high-pressure economy (roughly between 2016 and 2019), and then we study separately the period of the COVID-19 crisis (the change between 2019 and 2020). This kind of decomposition does not separate the contribution of capital deepening and total factor productivity within labour productivity; therefore, we have to keep in mind that the contribution of labour productivity can be attributed to both efficiency improvements (or deterioration) and capital intensity growth (or decline).



Source: author's elaboration based on HCSO data

Figure 2a. The decomposition of the per capita GDP change (at constant prices) in a NUTS 3 level breakdown in Hungary between 2016 and 2019

The main driver of GDP per capita growth (at constant prices) during the period of high-pressure economy was productivity improvements (except in Győr-Moson-Sopron and Vas counties), while the mobilization of employment reserves was also successful, although not to the same extent as in the first half of the 2010s (*Figure 2a*). The decline in the working-age population contributed only slightly (with a negative sign) to the change in GDP per capita in all areas, and this effect is most striking in Budapest. Budapest and Bács-Kiskun County were the forerunners in this period in terms of per capita GDP growth, while Győr-Moson-Sopron and Vas counties showed the smallest improvement. In the first year of the pandemic crisis, the economic adjustment took place largely in the labour productivity, while employment has been less affected by the negative impacts. Budapest suffered the biggest decline in 2020 (*Figure 2b*) although it was somewhat offset by the improvement in the employment rate.



Source: author's elaboration based on HCSO data

Figure 2b. The decomposition of the per capita GDP change in a NUTS 3 level breakdown in Hungary between 2019 and 2020

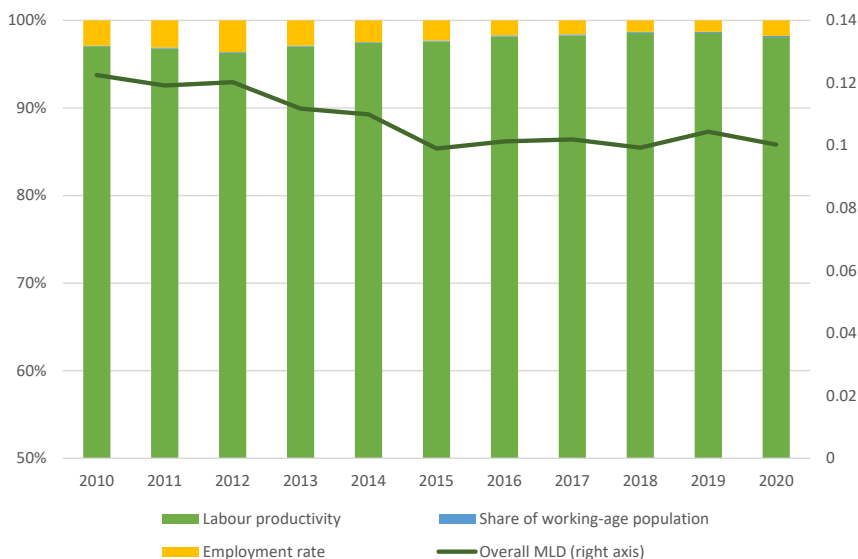
Outside the capital city, employment rates also increased in Veszprém, Somogy, Tolna, Nógrád, and Hajdú-Bihar counties. The sharpest falls were seen in Baranya, Jász-Nagykun-Szolnok, Heves, and Bács-Kiskun counties, so improvement in productivity can be probably explained by the higher number of job losses in lower-status jobs in Baranya and Jász-Nagykun-Szolnok counties.

The territorial dispersion of the growth factors examined above is certainly different in the sense that, e.g., demographic indicators are inherently much more homogenous among the regions than economic indicators. In this vein, we

examine to what extent the inter-regional dispersion of these three underlying factors contributes to the overall cross-sectional dispersion of GDP per capita. To study this, we compute the mean log deviation (MLD), an indicator of inequality in the group of generalized entropy (Eq. 3), one of whose positive properties is that it can be additively decomposed (see Monfort 2020). The calculation of the decomposed MLD index is as follows:

$$\begin{aligned}
 MLD\left(\frac{GDP}{population}\right) &= \sum_{i=1}^N w_i * \ln \frac{GDP_{country} / population_{country}}{GDP_i / population_i} = \\
 &= \sum_{i=1}^N w_i * \ln \frac{GDP_{country} / employees_{country}}{GDP_i / employees_i} + \sum_{i=1}^N w_i * \ln \frac{employees_{country} / active\ population_{country}}{employees_i / active\ population_i} \\
 &+ \sum_{i=1}^N w_i * \ln \frac{active\ population_{country} / population_{country}}{active\ population_i / population_i} = \\
 &= MLD\left(\frac{GDP}{employees}\right) + MLD\left(\frac{employees}{active\ population}\right) + MLD\left(\frac{active\ population}{population}\right),
 \end{aligned}
 \tag{3}$$

where the weights w_i reflect the population weight of each region, and $I = 1 \dots N$ denotes the number of NUTS 3 regions ($N = 20$). The MLD index is obtained by dividing the country-level average by the individual values of the distribution and then taking the average of the logarithms of the resulting values.



Source: author's elaboration based on HCSO data

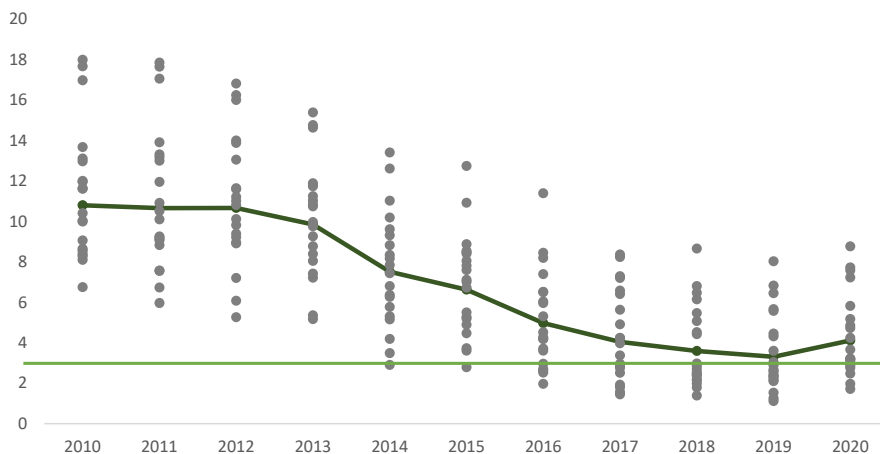
Figure 3. The decomposition of the MLD index and the overall MLD index, 2010–2020

Inequality in GDP per capita in Hungary, as measured by the MLD indicator, increased until 2009 and then started to decline, but this trend stopped in 2015 and has stagnated since then (*Figure 3*). In line with the results of Monfort (2020), in Hungary, like most other EU countries, productivity differentials are largely responsible for the spatial dispersion of GDP per capita. Demographic indicators, by their very nature, make only a marginal contribution to inequalities, and the role of employment rate differentials has been declining markedly since the financial and economic crisis. As a result of the tightness of the labour market, employment rates have converged significantly across regions of the country, but convergence in the efficiency dimension of employment (labour productivity) has not yet been achieved. In line with the overall MLD index, spatial disparities in labour productivity have not decreased since 2015. As a corollary, the spatial rebalancing of the labour market will no longer be a driver of diminishing territorial inequalities; instead, the only source of catching up in the peripheries can be the improving labour productivity, including better capital endowment, technological and institutional efficiency.

Drivers of Growth in the Hungarian Counties between the Two Crises

Smętkowski (2018) highlighted that in the Central and Eastern European countries achieving a high level of development in the context of post-socialist transformation was possible mainly owing to exogenous factors such as the influx of foreign direct investment (FDI) and multimodal transport accessibility. The 2008/09 crisis further strengthened the role of exogenous growth factors, that is, the role of FDI inflow as well as of EU funds. However, the spatial distribution of these growth factors is highly uneven in Hungary. At the same time, recent strands of research confirm the role of endogenous factors of regional economic development in Central and Eastern Europe, as well (Bodnár et al. 2022). Nevertheless, the most important driver of growth in this era was the labour market expansion in Hungary thanks to the work-based society model imposed by the government (Czirfusz 2020). Its spatial distribution was more even; therefore, employment growth appeared as the most important growth factor in the backward areas. In Hungary, the unemployment problem started to turn into labour shortage difficulties in the mid-2010s, but this was also accompanied by increased investment in job creation, especially in low-status segments. The unemployment rate thus fell below 5 percent on average after 2016 (a level between 3 and 6 percent is considered by the literature to be consistent with full employment), but this was already the case in Komárom-Esztergom, Győr-Moson-Sopron and Vas counties in 2014, in

Budapest and Fejér counties in 2015, and in 2016 it was above 5 percent in only 9 counties. In Baranya, Nógrád, and Szabolcs-Szatmár-Bereg counties, the indicator has remained consistently between 6 and 8 percent despite a significant decrease after 2012 (Figure 4).



Source: author's elaboration based on HCSO data

Figure 4. The national-level (solid line) and the NUTS 3-level unemployment rates and the level of full employment (line chart)

The fact that in the last years of the 2010s KSH reported unemployment rates below 3 percent in Budapest, Pest County, the counties of the Central Transdanubian and Western Transdanubian NUTS 2 regions, and in Tolna, Heves, Bács-Kiskun, and Csongrád-Csanád counties indicates a very tight labour market. Moreover, the unemployment rate in Komárom-Esztergom, Veszprém, and Győr-Moson-Sopron counties was below 2 percent. At the same time, the vacancy rate has been gradually increasing since 2013 (from 1.2 percent), reaching its highest level in 2018, when it was 2.7 percent on average across the country. The highest vacancy rates can be found in the city of Budapest and in Pest, Fejér, and Komárom-Esztergom counties, where the vacancy rate is close to or above 3 percent, and in Győr-Moson-Sopron, Somogy, and Jász-Nagykun-Szolnok counties, where the vacancy rate is above 2.5 percent.

Employment rate improved steadily between 2010 and 2019, rising from 50.6 percent to 62.6 percent nationally (in the 15–74 age group), but it only exceeded the 60 percent level in the city of Budapest and in Pest, Fejér, Komárom-Esztergom, Veszprém, Győr-Moson-Sopron, Vas, Zala, Bács-Kiskun, Hajdú-Bihar, and Csongrád-Csanád counties. The lowest employment rates (between 56 and 60%) were recorded in the counties of South Transdanubia, North Hungary, the

North Great Plain, and in Békés County. The trend in spatial disparities (cross-sectional relative dispersion) was clearly downwards during this period, but there still remained a gap of around 12-13 percentage points between the highest and lowest employment rates between the regions.

Table 2. *Selected economic indicators of the Hungarian NUTS 3 regions: averages between 2017 and 2019*

NUTS 3 Region	Employment Rate	Unemployment Rate	Vacancy Rate	Investments-to-GDP Ratio	FDI-to-GDP Ratio	Labour Productivity (HU = 100)
Budapest	66.10	2.69	2.77	12.59	76.05	194.96
Pest	64.04	2.32	3.13	18.62	50.40	76.95
Fejér	64.05	2.67	2.97	14.84	70.53	97.95
Komárom-Esztergom	63.97	1.75	2.73	26.29	111.07	96.44
Veszprém	63.25	1.56	2.30	16.99	42.29	72.99
Győr-Moson-Sopron	66.37	1.36	2.33	17.69	68.55	112.52
Vas	65.05	2.21	2.30	15.69	61.56	86.22
Zala	62.23	2.95	1.73	11.76	13.20	73.06
Baranya	58.31	6.85	1.57	13.65	13.75	70.79
Somogy	53.45	5.65	2.73	21.39	7.74	73.79
Tolna	57.31	2.73	2.23	22.16	14.44	79.94
Borsod-Abaúj-Zemplén	56.87	5.00	1.97	21.89	51.58	78.48
Heves	59.01	3.07	1.90	27.55	47.18	78.63
Nógrád	57.98	7.18	2.03	20.63	24.08	46.90
Hajdú-Bihar	59.46	5.44	1.70	21.64	22.30	74.91
Jász-Nagykun-Szolnok	59.01	5.55	2.60	25.52	39.89	67.74
Szabolcs-Szatmár-Bereg	58.32	8.35	1.77	16.36	55.79	59.01
Bács-Kiskun	61.61	3.18	1.73	19.33	26.11	79.86
Békés	59.28	5.00	1.63	15.90	11.65	61.41
Csongrád-Csanád	60.87	2.80	1.47	16.30	14.82	75.58
Hungary	61.85	3.65	2.47	16.76	59.65	100.00

Source: author's elaboration based on HCSO data

Investments recovered only very slowly in the period following the 2008–09 economic crisis, with the investment-to-GDP ratio only surpassing pre-crisis levels (14%) from 2014, but the real recovery took off from 2017, rising to 18% by 2019 – although regional disparities are persistent and substantial. In Budapest, the investment rate is typically low (between 8 and 14 percent), while outside the central region, the lowest investment activity is found in Zala and Baranya counties (between 8 and 19 percent) and in Csongrád-Csanád County (between 10 and 19 percent). Nevertheless, Budapest accounts for about 25 percent of the national investment volume, Pest County for about 11 percent, the most developed areas outside the capital city for 4–7 percent, but nearly half of the counties account for less than 3 percent of the total investment volume. In terms of investment rates, Komárom-Esztergom, Borsod-Abaúj-Zemplén, Jász-Nagykun-Szolnok, Somogy, Tolna, Heves, Nógrád, Hajdú-Bihar, and Bács-Kiskun counties were at the forefront at the end of 2010 (above 20 percent, but in some places even above 30 percent).

FDI as a share of GDP grew strongly until 2015 (from 61 percent in 2008 to 79 percent in 2015), but it later declined in importance, reaching only 58 percent of GDP in 2019. There are significant territorial disparities in this respect. FDI as a share of GDP exceeds 50 percent on a sustained basis only in the city of Budapest and in Pest, Fejér, Komárom-Esztergom, Győr-Moson-Sopron, Vas, and Szabolcs-Szatmár-Bereg counties. Veszprém and Borsod-Abaúj-Zemplén counties also caught up during the period of high-pressure economy, but the other regions lag far behind, in many cases not even reaching 20 percent. Looking at the distribution of FDI between the regions, almost half of the investment comes to the capital, but the share is decreasing, from 64 percent in the 2008/09 crisis period. A similar decline can be seen in Pest County (its share has fallen from 12 to 8 percent). The biggest change has been in Győr-Moson-Sopron County, where, after a rapid upswing, the role of FDI has been declining since 2016 (its share of the national volume has fallen from 13 percent in 2013 to 5.5 percent in 2019). The biggest increases are seen in Komárom-Esztergom, Borsod-Abaúj-Zemplén, and Fejér counties, with their share rising from 2-3 percent to 4-6 percent in the second half of the decade. At the bottom of the scale, the share of Zala, Baranya, Somogy, Tolna, Nógrád, Békés, and Csongrád-Csanád counties is less than 1% each.

In what follows, we intend to provide some deeper insight into the evolution of the above-mentioned drivers of growth. Our aim is to include variables describing the contribution of both labour market development and investments to regional growth because we are interested in the local consequences of labour market tightness and FDI inflow for economic and labour productivity growth. Our data can be structured into a balanced panel database covering the growth rates of seven variables measured in a NUTS 3 level disaggregation throughout eleven years from 2010 to 2020. Looking at the pairwise correlations between the seven variables suggests that the signs of these correlation coefficients are as expected (*Table 3*).

The negative correlation coefficient between the growth rate of employment and labour productivity growth follows the logic that in the short term the expansion of labour force is not accompanied by a proportional increase in the GDP (see *Equation 1*). Productivity gains in the long run can only be achieved by improving other factors of competitiveness, too (Szilágyi–Debrenti 2020). Interestingly, the growth rate of FDI is not associated with larger per capita GDP growth or labour productivity growth throughout the examined period. We assume that the relationship is valid in certain periods and certain areas, but in general it does not seem to hold.

Table 3. *Pairwise correlations between the growth rates of selected economic variables measured at the NUTS 3 level*

	Per Capita GDP	Labour Productivity	Employment	Unemploy- ment Rate	Vacancy Rate	Investments	FDI
Per Capita GDP	1						
Labour Productivity	0.7608	1					
Employment	0.2096	-0.4343	1				
Unemployment Rate	-0.3704	0.0062	-0.5139	1			
Vacancy Rate	0.3278	0.2678	0.0714	-0.2545	1		
Investments	0.2537	0.1965	0.051	-0.0742	0.1158	1	
FDI	-0.0025	-0.023	-0.0004	-0.0545	0.0501	0.1035	1

Source: author's elaboration based on HCSO data

Note: **italic bold** coefficients are significant at the 5% level.

Exploiting the panel structure of our database (see e.g. Elhorst 2003; Györfy–Madaras 2017, 2021), we ran cross-section fixed- and random-effect models with either the growth rate of per capita GDP or the growth rate of labour productivity as dependent variables. We entered five possible explanatory variables one by one, separately. The fixed- and the random-effect models delivered quite similar results; therefore, we only present the outputs of the fixed-effect models (*tables 4a* and *4b*).

Table 4a. Results of the fixed-effect panel regression models analysing the relationship between the growth rates of selected economic variables and the per capita GDP growth rate at the NUTS 3 level between 2009 and 2020

Dependent Variable: Per Capita GDP Growth Rate					
Variable	(1)	(2)	(3)	(4)	(5)
Employment	0.3099**				
Unemployment rate		-0.0618***			
Vacancy rate			0.0657***		
Investments				0.0430***	
FDI					-0.0031
Constant	2.2679***	2.3785***	2.0807***	2.2527***	2.7547***
N	220	220	220	220	220
R ²	0.0765	0.1660	0.1391	0.0946	0.0342
Adjusted R ²	-0.0164	0.0822	0.0526	0.0036	-0.0628

Source: author's elaboration based on HCSO data

Notes: * p < 0.05; ** p < 0.01; *** p < 0.001.

Table 4b. Results of the fixed-effect panel regression models analysing the relationship between the growth rates of selected economic variables and the labour productivity growth rate at the NUTS 3 level between 2009 and 2020

Dependent Variable: Labour Productivity Growth Rate					
Variable	(1)	(2)	(3)	(4)	(5)
Employment	-0.6871***				
Unemployment rate		0.0016			
Vacancy rate			0.0563***		
Investments				0.0362**	
FDI					-0.0043
Constant	1.9044***	0.9158**	0.3615	0.5160	0.9594**
N	220	220	220	220	220
R ²	0.2092	0.0215	0.0905	0.0599	0.0223
Adjusted R ²	0.1297	-0.0769	-0.0009	-0.0346	-0.0759

Source: author's elaboration based on HCSO data

Notes: * p < 0.05; ** p < 0.01; *** p < 0.001.

The results presented in *Table 4a* indicate that the association between the growth rate of per capita GDP and the growth rates of employment, unemployment rate, vacancy rate, and investments were significant during the analysed period in a NUTS 3 level disaggregation, but the growth rate of FDI does not seem to play a role. The signs of the regression coefficients are as expected. With respect to the relationship between labour productivity growth and the selected five variables, the picture is somewhat different because the role of unemployment growth (or decline) is not significant but employment growth rate is significant and negative (*Table 4b*). Intuitively, when employment increases, output growth may not keep pace with it in the short term, or this result may be a sign that employment growth has taken place in less efficient segments of the labour market. Our findings regarding the lack of positive impact of FDI in regional growth are in line with previous literature such as Gál (2019, 2021) and Pavlínek (2022).

Conclusions

The high-pressure economy in Hungary has triggered a number of positive developments, but these do not include a reduction in territorial economic disparities. Although the most backward regions have been able to make progress in relation to themselves, this is not reflected by a change in their position *vis-à-vis* the national-level average development, as their development started from a low base. The biggest winner in the second half of 2010 was the capital city, Budapest, while the counties with an already strong or strengthening manufacturing sector were able to take their share of the recovery, with the exception of Győr-Moson-Sopron County. It is clear that many of our regions are threatened by the development trap, as non-capital regions with strong economies have also been exposed to adverse international market developments, cross-border activities (e.g. labour migration), and decisions by international and domestic government investors (increasing profit repatriation, government subsidies). In peripheral areas, endogenous resources for development are scarce, and the sources of extensive employment-led growth are in deficit. Based on our analysis using descriptive statistical methods, growth decomposition and regression analysis, we conclude that labour market reserves are becoming increasingly scarce in all regions of the country and that more spatially balanced economic development is crucially hampered by productivity differentials. Similar to the impact of the financial and economic crisis, the most developed regions, relying mainly on manufacturing, suffered the most severe decline during the period of the crisis, but these regions have the ability to recover quickly, while peripheral regions continue to stagnate.

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Socio-demographic Background and Career Consciousness of Students in Agricultural Higher Education in Eastern Hungary

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Abstract. In this study, we compare the socio-demographic background of Hungarian higher education students in the field of agriculture with that of students in other fields, and we also examine students' career consciousness based on data from a large-sample survey conducted in Eastern Hungary in 2019. We found that in the field of agriculture 63.6% of the students were male and 64.8% came from smaller settlements, which may be explained by the nature of the agricultural field. Regarding career consciousness, we found that while agricultural students come to higher education with the hope of obtaining a well-paying, high-prestige job, they usually do not engage in career-oriented activities and achievements during their studies.

Keywords: agricultural field of study, higher education students, socio-demographic background, career consciousness, quantitative analysis

Introduction

This study examines the socio-demographic characteristics and career consciousness of students in agricultural higher education as compared to students in other fields, based on data from a large-sample face-to-face survey in Eastern Hungary in 2019. We analyse by field of study the gender composition, the place of residence at age 14, parents' educational attainment, and indicators of the students' and their families' financial situation. We assess students' career consciousness by examining their motivations to enter higher education after secondary school, their achievement indicators, which could have an indirect

effect on their subsequent career, and their paid and voluntary work for the purposes of career advancement. Our research question asks how the field of study influences students' career consciousness after secondary education and during their university years.

The literature does not offer a single standard theoretical framework for students' career consciousness, and there is no generally accepted scale to measure it. Furthermore, most research studies adopt a psychological approach that examines the effects of self-efficacy, coping efficacy, and decisional anxiety on career planning and career choice (Lent et al. 1994, 2016, 2017; Lent–Brown 2013; Adachi 2006; Krieshok et al. 2009). Our research is novel in that it presents a conceptualization and operationalization of career consciousness that differs from the psychological literature.

In this study, we interpret students' career consciousness more broadly than the mere choice of career (which is in the focus of the psychological literature), and we measure not only career-conscious motivations and attitudes towards higher education studies (as Tuchman 1974) but also career-conscious actions and achievements during the years spent at university. Furthermore, we used self-developed tools to measure career consciousness. Of the four indices created, the first comprised indicators of career-conscious higher education entry, while the second measured overperformance in career-related indicators of academic achievement. The third and fourth indices related to students' voluntary and paid work with the goal of career improvement. Our empirical analysis was based on the Hungarian subsample of a large-sample survey conducted in five Central and Eastern European countries (the detailed description of the database can be seen in the methodological part of this study).

I. Theoretical Background

I.I. Career Consciousness of Students Entering Higher Education

Due to the emergence of post-modern forms of work, individuals' conception of their careers is in transformation (Beck 1992, Dahrendorf 1988). Students also expect different things from higher education than before. The focus has shifted from the mere acquisition of knowledge to a utilitarian view of higher education aimed at career development, which endows universities with the additional goal to make their students more employable (Teichler 2011).

As a result of cultural differences and the social and economic underdevelopment in most sectors in the former communist countries of Central and Eastern Europe

relative to Western Europe, the utilitarian and career-oriented approach is particularly strong among students in this region,¹ and especially in Hungary. Another marked difference as regards higher education in the region and in Western Europe concerns students' employability, which only became a priority of the universities after the Bologna process had been launched following the turn of the millennium. Consequently, goals in connection with career planning and development may be more important for students in Central and Eastern Europe compared to other regions, as for universities their students' employability is not so important (Pusztai–Szabó 2018, Kozma et al. 2020).

The narrow definition of career refers to advancement from one position to the next within one employer, but the broad definition includes changes across employers, as well (Arthur et al. 2005). To examine the career orientation of modern employees, the self-directed ('protean') career concept could be useful, as it focuses on individuals' values and the way in which they understand success careers (Hall 1976, 1996, 2002). Tuckman (1974) conceptualized career consciousness as the calculus of the career prospects and earnings that the qualification (degree) in question offers. This takes place at the end of secondary education, when the financial stance and influences from friends, classmates, family, and teachers may also affect career-related decisions (Nimra et al. 2019, Kazi–Akhlaq 2017).

In Pires's (2009) typology, motivations to enter higher education may be internal, external, and derivative. The first relates to professional considerations such as skill development and career orientation, as well as to networking and the enjoyment of and belief in enhancing knowledge. The second, external type of motivations comprises pressure from friends, parents, other family members, or the employer, but it may also reflect economic reasons such as the ability to collect favours that later may be converted into a good job. Those who enter higher education either to avoid working for a while or out of boredom do so out of derivative motivations.

The career-oriented motivation to enter higher education is thus an intrinsic motivation, which Tuckman (1974) argues to be also related to the human capital model (Mincer 1958, Becker 1994, Schultz 1971). This is because the decision to enter higher education is influenced by the wage premium attainable through the given degree compared to secondary education, as well as the social status associated with the subsequent job.

Regression results by Mohácsi–Fényes (2020), who examined career consciousness concerning the decision to enter higher education studies, showed that women who had a highly educated father and a well-off family, those of rural origin, and business and economics students are more career conscious than the other students.

1 Of course, there could be differences between countries within the region, as well.

I.II. Career Consciousness during University Years and Its Determinants

Students' career consciousness as discussed in the literature (see Tuckman 1974) refers only to the time when they decide to study further in higher education after secondary school, but here we try to measure career consciousness during university years, as well. We have three different indicators. The first one relates to above-average performance in certain areas of academic achievement. In our previous analyses, we used a multidimensional approach to capture students' achievement instead of a unidimensional measure (e.g. academic average) (Fényes 2010, Pusztai 2015). Three main factors were considered: academic achievement (comprising scholarships, conference attendance, academic competitions, publications, and participation in extracurricular activities), international openness (including the experience of studying abroad and obtaining language exam certificates), and further study plans (in particular a further degree or aspirations for PhD). In this paper, we consider that language skills, study trips abroad, participation in academic competitions, conference attendance, and the availability of a CV in Hungarian and foreign languages are all characteristics of a consciously built career, so we decided to include these performance indicators to measure students' career consciousness.

Our previous studies found that a favourable socio-economic status, especially urban origin and the mothers' higher level of education, increased students' achievement (measured by an index adding different elements, listed above) during university years. In addition, older students and women were also found to have higher achievement levels. When each achievement indicator was separately considered, women and well-off students were found to have better language skills on average, with men performing better in scientific and academic areas (Fényes 2010, Pusztai 2015).

The two other indicators of career consciousness during university years show students' paid and voluntary employment for career development purposes. According to Mincer (1958), paid and voluntary employment alongside higher education studies constitutes a human capital investment due to higher productivity and wages attainable later on, potentially also featuring capital conversion in the Bourdieuan sense (1986). In searching for a job following graduation, students can convert into financial benefits the social and knowledge capital (including skills related to the labour market and professional knowledge) that they accumulated during the university years. In our study, we consider as career-oriented those students (in addition to the previous indicators discussed above) who do paid or voluntary work related to the field of study and those who are motivated to work by gaining professional experience, expanding their social networks, improving professionally, and gathering additional items to their CVs.

According to our previous findings, a significant share of students were motivated to undertake paid employment by obtaining work experience as opposed to merely short-term financial considerations. Professional, experience-oriented motivation was increased by more frequent and more complex contacts with parents and external friends (i.e. not from the university), self-funded status, and older age. It was also found that work experience was more important for students than professional knowledge or networking (Fényes 2021, Mohácsi–Fényes 2022).

Previously, we also examined students' motivations for volunteering, and we found mixed motivations in this regard, which included the modern motives of work experience such as networking, knowledge expansion, professional development, and CV improvement, as well as the traditional motive of wanting to help. We identified a greater presence of career-building objectives among students in close contact with their external friends, female students, and those who studied something other than engineering or sciences. Disadvantaged students, those in close contact with lecturers, and teacher education students were more likely to volunteer in a field related to their studies (Fényes–Mohácsi 2022).

II. Methods

The Persist 2019² database consists of the results of a large-sample face-to-face student survey (N = 2,199) conducted in the academic year 2018/19.³ The survey was carried out in higher education institutions in Eastern Hungary⁴ and in four other countries⁵ (Slovakia, Romania, Ukraine, Serbia). The Hungarian subsample (N = 961) examined in this paper was collected using quota sampling and is representative with respect to faculty, field of study, and form of funding. The sample consists of full-time bachelor's students in their second year and of second-year or third-year students from undivided (five-year) programmes that offer a master's degree.

Career consciousness is measured by four indices. The index showing *career consciousness at the entry to higher education* is constructed from three binary (0,1) variables for the following motivations for enrolment in a higher education study: finding a job that pays well, having a recognized occupation, and finding

2 The title of the research project was *The Role of Social and Organizational Factors in Student Attrition* in the following PERSIST 2019.

3 Data collection was carried out by the CHERD-Hungary research group, and the authors are the members of this group.

4 The University of Debrecen, the University of Nyíregyháza, Debrecen Reformed Theological University, Saint Athanasius Greek Catholic Theological College.

5 Babeş–Bolyai University (BBU), Emanuel University of Oradea, Ferenc Rákóczi II Transcarpathian Hungarian College of Higher Education, Constantine the Philosopher University in Nitra, Mukachevo State University, the University of Oradea, Partium Christian University, Sapientia Hungarian University of Transylvania, J. Selye University, the University of Novi Sad, Uzhhorod National University.

a good job easier. The *higher education achievement index* is constructed from seven binary (0,1) variables corresponding to holding conference presentations, participating in academic competitions, holding intermediate or advanced language certificate, having a Hungarian or foreign-language CV, and participating in study trips abroad. The *career-oriented paid work index* is constructed from three binary (0,1) variables measuring the fit of the work to the field of study and the perceived importance of networking and professional experience acquisition during paid work. Finally, the *career-oriented volunteering index* is constructed from five binary (0,1) variables showing the fit of the voluntary work to the field of study and the existence of motivations in relation to networking, professional experience acquisition, professional and knowledge development, and CV improvement.

The examined social background variables are gender, the number of school years completed by the mother and the father, the type of settlement of the place of residence at age 14, and four indicators assessing the respondent's financial situation. The family's financial situation was measured by the possession of durable consumer goods⁶ (objective financial situation index: 0–9) and by a relative financial situation indicator, which compares the family's financial situation to the families of the student's peers (on a 1–5 scale, where 3 is the average situation). To capture the students' individual financial situation objectively, we created a composite index showing the possession of durable goods⁷ (0–6) and a subjective indicator of individual financial situation⁸ exploring whether the student can afford a significant purchase or is unable to cover even the basic expenses (1–4). Students' fields of study are divided into six categories as follows: 1. agriculture, 2. humanities and social sciences, 3. business and economics, 4. STEM (sciences, computer science, and engineering), 5. other non-classified teacher training, 6. other fields (e.g. law, medicine, health, sports, and arts).

III. Results

In the following, we present the results of our empirical analysis, which focuses on higher education students in the field of agriculture in Eastern Hungary. We first present the general characteristics (i.e. gender ratio, social background) of

6 Components of the index: Does the family possess an apartment or house, a five-year-old car or younger, a flat-screen television, a personal computer or laptop with broadband Internet access at home, a tablet or e-book reader, mobile Internet (on the phone or computer), a dishwasher, an air-conditioner, and a smartphone?

7 Components of the index: Does the student possess an apartment or house, a car, an above-average smartphone (e.g. iPhone), an above-average computer or laptop, a tablet or e-book reader, and savings for house purchase?

8 1. Often I do not have enough money for basic everyday necessities. 2. Sometimes I do not have enough money for everyday expenditures. 3. I have everything I need but cannot afford larger expenditures. 4. I have everything I need and can also afford larger expenditures.

students studying in this field and then compare the four indicators of career consciousness by field of study.

As we can see in *Table 1*, there are significant differences in the gender ratios by field of study. While the average proportion of women in the sample was around 60%,⁹ it was only 36.4%¹⁰ in the agricultural field of study, suggesting that agricultural education is a male-dominated field, with the share of men well above average (63.6%). As expected, men were overrepresented in STEM fields (sciences, engineering, computer science), and women were overrepresented in the fields of humanities and social sciences, business and economics, and teacher education.

Table 1. *Gender ratios by field of study in the Eastern Hungarian subsample (chi-squared = 65.859, p = 0.000, N = 937)*¹¹

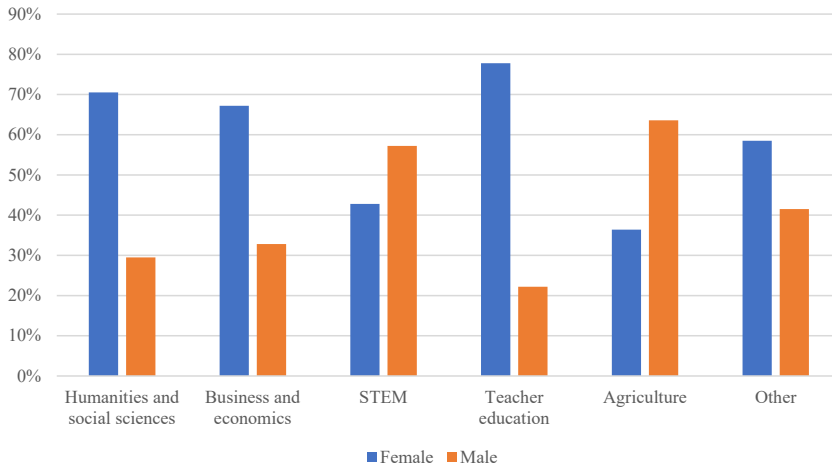
Gender	Humanities and Social Sciences	Business and Economics	STEM	Teacher Education	Agriculture	Other	Total
Female	98 <u>70.5%</u>	86 <u>67.2%</u>	101 42.8%	84 <u>77.8%</u>	24 36.4%	152 58.5%	545 58.2%
Male	41 29.5%	42 32.8%	135 <u>57.2%</u>	24 22.2%	42 <u>63.6%</u>	108 41.5%	392 41.8%
Total	139	128	236	108	66	260	937

Source: authors' calculations based on the Persist 2019 database

Significant differences were also found in connection with the settlement type of the place residence at age 14 by field of study. While on average 31% of the students came from a county seat, the proportion was only 19.7% for agricultural education. The sample had no agricultural students from the capital, where only around 3% of the total sample was from. Smaller towns (not county seats or the capital) were the most common places of residence in the total sample (40.8%), and even more so for students enrolled in agricultural education (48.5%). The proportion of students from villages was 25% in the total sample and somewhat

- 9 In the Hungarian higher education system, the proportion of women is around 54% (see KSH 2022), but in our sample it is higher (60%) due to the fact that in Eastern Hungary the composition of the study areas in higher education differs from the country average; for example, there are more students studying pedagogy, which is a female-dominated field of study.
- 10 In Hungarian higher education, the rate of women in the agricultural field of study is around 48% compared to the average rate, which is 54% (KSH 2022); however, in our sample, this is just 36.4%, so in this region of Hungary the agricultural field of study is more male-dominated than the national average.
- 11 In *tables 1* and *2*, the adjusted residuals are greater than 2 for the proportions underlined once (meaning more people than expected with a random distribution) and less than -2 for the proportions underlined twice (meaning fewer people than expected with a random distribution) respectively.

higher (31.8%) for agricultural training. Overall, higher education students in agricultural fields were mostly of rural origin, coming from smaller towns or villages, which is consistent with agricultural training, but it reveals a relative social disadvantage in terms of residence (*Table 2*).



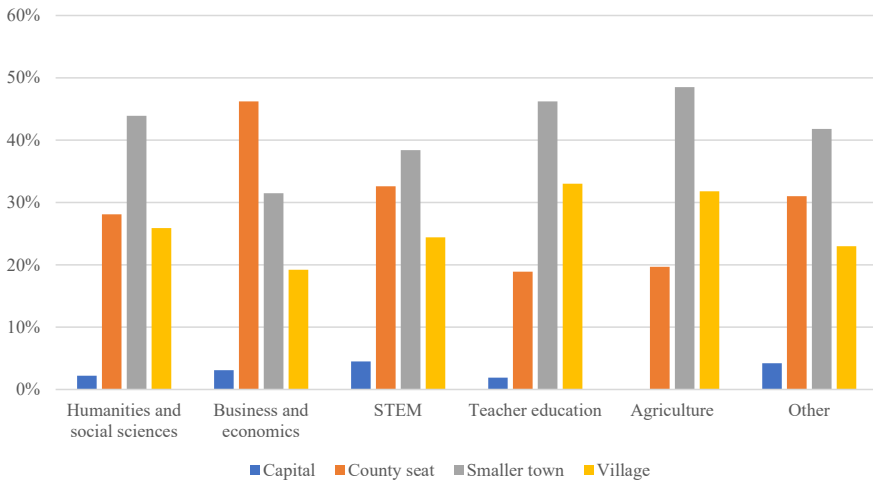
Source: authors' calculations based on the Persist 2019 database

Figure 1. Gender ratios by field of study (percentages)

Table 2. Place of residence at age 14 by field of study in the Eastern Hungarian subsample (*chi-squared* = 34.593, *p* = 0.003, *N* = 944)

Settlement	Humanities and Social Sciences	Business and Economics	STEM	Teacher Education	Agriculture	Other	Total
Capital	3 2.2%	4 3.1%	11 4.5%	2 1.9%	0 0%	11 4.2%	31 3.3%
County seat	39 28.1%	60 46.2%	79 32.6%	20 <u>18.9%</u>	13 <u>19.7%</u>	81 31%	292 30.9%
Smaller town	61 43.9%	41 <u>31.5%</u>	93 38.4%	49 46.2%	32 48.5%	109 41.8%	385 40.8%
Village	36 25.9%	25 19.2%	59 24.4%	35 <u>33%</u>	21 31.8%	60 23%	236 25%
Total	139	130	242	106	66	261	944

Source: authors' calculations based on the Persist 2019 database



Source: authors' calculations based on the Persist 2019 database

Figure 2. Place of residence at age 14 by field of study (percentages)

Students' social background was measured by the years of education completed by their mothers and fathers, the objective financial situation of the family (1–9 index based on the possession of consumer goods), the relative financial situation of the family compared to families of the peers (1–5), and, finally, students' subjective (whether they had savings and could afford everyday expenses: 1–4) and objective financial situation (0–6 index). While students' subjective financial situation did not differ across the various fields of study, significant differences were found for all other indicators.

Among students of business, economics, and other fields (e.g. law, medicine, health, sports, arts), all the above-listed indicators were higher than average, suggesting a favourable social background. In contrast, all values were below average for humanities and social sciences, STEM (engineering, computer science, sciences), and teacher education. As for students in agricultural education, their overall social background (i.e. cultural and financial resources) did not stand out from the average. In more detail, agricultural students were above average in terms of the fathers' educational attainment and the family's relative financial situation and below average in terms of the mothers' educational attainment as well as the family's and the student's access to durable consumer goods. Traditional parental roles, with fathers being better educated than mothers, were common among agricultural students, in contrast to other fields, where the opposite was found. This may be explained by the fact that agricultural students were predominantly from small settlements, where parents often work in agriculture and the traditional gender division of labour prevails. It is an interesting finding that students in agricultural higher education perceived their families as better off financially compared to their peers, even

though objective financial indicators for both students and their families showed the opposite. This may be due to the discrepancy between subjective perceptions and the actual situation, which is often found in national surveys, as individuals compare their financial situation to their own (in this case: less developed, rural) immediate community and social groups (*Table 3*).

Table 3. Differences in selected social background indicators by field of study in the Eastern Hungarian subsample¹²

Field of Study		Mother's Educational Attainment	Father's Educational Attainment	Family's Objective Financial Situation (0–9)	Family's Relative Financial Situation (1–5)	Individual Objective Financial Situation (0–6)
Humanities and social sciences	Mean	12.96	12.41	6.42	3.15	1.65
	N	137	135	125	137	135
	SD	2.18	2.082	1.42	0.71	1.16
Business and economics	Mean	<u>13.47</u>	<u>13.27</u>	<u>6.71</u>	<u>3.36</u>	<u>1.87</u>
	N	127	126	120	127	125
	SD	2.48	2.63	1.70	0.72	1.59
STEM	Mean	13.31	12.85	6.59	3.23	1.64
	N	239	238	210	242	226
	SD	2.53	2.67	1.57	0.68	1.43
Teacher education	Mean	12.70	11.97	6.23	3.20	1.47
	N	107	107	97	107	102
	SD	2.45	2.17	1.64	0.64	1.29
Agriculture	Mean	12.80	<u>13.27</u>	6.47	<u>3.29</u>	1.59
	N	65	63	55	66	64
	SD	2.20	2.71	1.73	0.72	1.27
Other	Mean	<u>14.30</u>	<u>13.88</u>	<u>6.83</u>	<u>3.36</u>	<u>1.95</u>
	N	260	259	248	262	250
	SD	2.51	2.64	1.64	0.75	1.49
Total	Mean	13.45	13.06	6.60	3.27	1.74
	N	935	928	855	941	902
	SD	2.50	2.60	1.61	0.71	1.42
ANOVA sign.		0.000	0.000	0.028	0.039	0.027

Source: authors' calculations based on the Persist 2019 database

¹² The underlined values are above the mean of the total sample.

Finally, we also examined students' career consciousness by field of study, based on the four indices of career consciousness presented earlier. We identified significant differences across the various study fields. Career consciousness upon entry, measured by career-related motivations for higher education, was below average for students in humanities and social sciences and for teacher education students, whereas it was above average for students of business, economics, STEM fields (engineering, computer science, sciences), other fields, and agriculture.

Table 4. Differences in the four indices of career consciousness by field of study¹³

↓Field of study		Career-Conscious Higher Education Entry Index (0–3)	Career-Oriented Voluntary Work Index (0–5)	Career-Oriented Paid Work Index (0–3)	Achievement Index (0–7)
Humanities and social sciences	Mean	2.24	<u>1.56</u>	<u>0.84</u>	<u>1.69</u>
	N	140	140	140	140
	SD	0.90	1.96	0.97	1.27
Business and economics	Mean	<u>2.72</u>	0.83	<u>0.85</u>	<u>1.73</u>
	N	130	130	130	130
	SD	0.60	1.46	1.01	1.08
STEM	Mean	<u>2.45</u>	0.75	<u>0.79</u>	1.30
	N	247	247	247	247
	SD	0.82	1.43	0.97	1.24
Teacher education	Mean	1.98	<u>1.66</u>	<u>0.80</u>	1.07
	N	109	109	109	109
	SD	1.02	1.94	1.01	1.14
Agriculture	Mean	<u>2.55</u>	0.82	0.57	1.27
	N	67	67	67	67
	SD	0.84	1.50	0.82	1.07
Other	Mean	2.43	<u>1.19</u>	0.50	<u>1.50</u>
	N	268	268	268	268
	SD	0.91	1.72	0.83	1.17
Total	Mean	2.40	1.11	0.71	1.44
	N	961	961	961	961
	SD	0.88	1.70	0.94	1.20
ANOVA sign.		0.000	0.000	0.000	0.000

Source: authors' calculations based on the Persist 2019 database

13 The underlined values are above the mean of the total sample.

In the ranking of fields, agricultural students were directly followed by business and economics students, suggesting that higher education entry in these two fields is predominantly motivated by a well-paid job, a recognized occupation, and an easy job search. In contrast, students in humanities and social sciences performed above average in terms of the other three career consciousness indices (career-oriented paid and voluntary work, high achievement in certain career-related higher education achievement indicators). As for other fields of study, economics and business students were characterized by career-oriented paid work and higher achievement, teacher education students by career-oriented paid work and voluntary work, students in other fields by career-oriented voluntary work and career-related achievement indicators, and STEM students by career-oriented paid work only. In agricultural education, however, neither career-enhancing activities during university years (career-oriented voluntary and paid work) nor career-related achievements (e.g. participation in academic competitions and conferences, intermediate or advanced language qualifications, CV in Hungarian or a foreign language, study trips abroad) were common, i.e. their means were below average (*Table 4*).

IV. Summary and Conclusions

Our study investigated the general characteristics and career consciousness of higher education students in the field of agricultural education as compared to students in other fields of education, based on data from a large-sample survey conducted in Eastern Hungary. In terms of socio-demographic indicators, agricultural education was found to be a male-dominated field, with an above-average proportion of male students (63.6% were male in this field in our sample compared to the average 41.8%), which can be explained probably by the nature of the agricultural jobs. Unsurprisingly, agricultural students' most common places of residence at age 14 were smaller towns (48%) and villages (32%), with only 20% coming from county seats or the capital. Agricultural students' social background was about average, with the fathers better educated than the mothers. This may be related to rural origins, as in small settlements traditional gender roles are still prevalent and women do not have high educational attainment (see Csurgó 2002). In addition, many of those studying in agricultural higher education presumably follow their parents' example in choosing this field. In typical agricultural family businesses in Hungary, it is usually the man who runs the business, while the wife, who often has a lower level of education, helps in other tasks (Csurgó 2005). Our further result is concerning the objective indicators of students' and their families' financial situation, according to which agricultural students possessed fewer durable consumer goods than the average, which may also be explained

by the smaller settlement of origin. However, agricultural students assessed their families' relative financial situation more favourable than their peers in other fields of study. We explained the discrepancy between objective and subjective indicators by the fact that people compare themselves mostly to their immediate environment, and therefore a subjective classification may be more favourable than objective indicators (see Merton's (1968) reference group theory).

In addition, we also examined students' career consciousness using the four indices presented in the theoretical section, which again revealed significant differences across the various fields of study. The situation of students in agricultural education was special because they were the second most career-conscious group after business and economics students upon entering higher education but performed below average in all three indicators related to their university years.

A further research question could be formulated as follows: Why career-conscious attitudes upon entry do not translate into career-conscious actions or achievements during the actual studies among students studying in agricultural education? – a question that can be analysed with the help of qualitative interviews. A deeper analysis could address these issues: (1) whether students in agricultural education are certain that they can achieve their initial career goals (a well-paid and prestigious job and easy access to work) and that is why they do not need to attain extra achievement during their university years; (2) why is career-oriented paid and voluntary work not common among them? (3) why they underperform in terms of career-enhancing achievements.

A limitation of our research is that we used a bivariate analysis to investigate the link between the field of study and career consciousness. In a multivariate model, it would be possible to isolate how agricultural students' career consciousness is affected by their different background characteristics compared to other students (e.g. a higher share of men and rural students). In a sample including five Central and Eastern European countries, regression results by Fényes–Mohácsi–Pusztai (2021) showed higher career consciousness upon entry among rural students and more career-conscious actions and achievement during university years among women and urban students. This may partly explain our finding that students in agricultural education are career conscious upon entering higher education but later in their university years they lag behind in terms of career-conscious actions and achievements, at least according to the indicators we measured.

A further explanation could be that voluntary and paid employment for the purposes of career improvement depends not only on the individual's career consciousness but also on the availability of jobs in the field; and in the field of agriculture such opportunities can be limited.

In our research, we have not yet succeeded in developing a single measure of career consciousness, as we had to adapt to the possibilities of the survey

conducted. However, our study can be seen as a first step towards a more general indicator of career consciousness that takes into account economic aspects related to the labour market as opposed to psychological measurements. In our study, career consciousness captures career decisions of a rational nature, so it would be an interesting further area of research to investigate non-rational attitudes influencing students' career decisions, taking into account the potential impact of other actors (e.g. parents, teachers, peers).

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Exploitation of Narrow-Gauge Railways for Tourism in the South Transdanubian Region

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Abstract: Since the 1980s, almost all of the Hungarian narrow-gauge railway lines underwent a complete change of function. About 120-140 years ago, narrow-gauge railways were created mainly for economic purposes. Nowadays, with a few exceptions, freight operation is completely eliminated and replaced by tourism. In my study, I deal with two questions: on the one hand, I will examine the place of the existing narrow-gauge railways in the tourism system. In this context, I will present the tourism potential of narrow-gauge railways. These include, for example, the availability of narrow-gauge railways, their inclusion in the wider tourism system, the material conditions of the basic infrastructure of narrow-gauge railways, etc. On the other hand, by presenting four railway lines from South Transdanubia, I will examine how well the opportunities offered by tourism have been exploited at the local level, what the impact of narrow-gauge railways is on tourism, and what the tourism-related significance of these lines is at all. Based on my analysis, it can be concluded that the narrow-gauge railway sector is developing within the tourism system, and compared to the period before the COVID-19 pandemic (2020–2021), investments, technical developments, and attendance have also increased. It is also clear from the South Transdanubian cases that the narrow-gauge railway system is becoming more and more important especially where it can be connected to other tourist attractions (natural parks, forest schools, etc.), which is also evident in the attendance indicators.

Keywords: narrow-gauge railway, tourism, infrastructure, attraction, milieu, South Transdanubia

Introduction

Nowadays, Hungarian narrow-gauge railways are experiencing a renaissance. Never before have they received attention and such a level and kind of state development funding as in the last few years. The timing and allocation of funds was decided by a government resolution, which provides a budget of twenty billion

Hungarian forints in two phases for the development of narrow-gauge railways for tourism purposes. Phase I provides for tasks from 2018 to 2020 and phase II for tasks from 2020 to 2022. Today, we are living the third golden age of Hungarian narrow-gauge railways. At a professional conference held on 9 March 2022, Government Commissioner Máriusz Révész, responsible for the issue, predicted as target date the year 2025 for the complete reconstruction of the narrow-gauge railway lines for tourism purposes (Pavletits 2022).

The construction of the Hungarian railway network began in 1846. Before the First World War, the length of the railway network was 22,869 km, of which 21,258 km were ordinary (1,435 mm) and 1,611 km narrow-gauge (Kaposi 2007, Czére 1989). In addition to traditional railways, there was an increasing demand for narrow-gauge railways connected to the main lines. Most of our narrow-gauge railway lines were built for freight transport, and passenger traffic started to increase as demand increased, while some lines were created specifically to serve tourism and hikers (Jéger 2010). These can serve tourism purposes in several areas, but tourism cannot maintain the railway lines. For some railways, the number of passengers is more than 200,000 per year (Szilvásvárad, Lillafüred), but the ticket revenues do not cover the costs of operation, so the operator has to supplement it from its own resources. The deficit of narrow-gauge railways is compensated by the profits generated in other areas. The railway can only extract the cost of its own operation in areas where there is also freight transport.

Goals, Sources, and Methodology

Since the 1980s, the Hungarian narrow-gauge railway network has almost completely undergone a change of function. In the following decade, with a few exceptions, the former transport of goods ceased completely, and tourism took its place. Therefore, narrow-gauge railways must be placed in a new aspect. In order to be able to determine their tourism potential, we need to examine several factors. Such is accessibility, the role of narrow-gauge railways in the basic and dynamic infrastructure, and the attractiveness of narrow-gauge railways. The aim of the study is to analyse the touristic significance of the narrow-gauge railways operating in Southern Transdanubia, to present the narrow-gauge railways as tourist attractions, their location in the static and dynamic infrastructure, and their role in shaping the attractiveness, seasonality, and tourist milieu.

At the beginning of the research, the primary task was to collect and process the necessary literature. Using both primary and secondary sources, I gained knowledge not only about domestic narrow-gauge railways, but I was also able to gain an insight into the operation of railways in other parts of the world with the help of the literature I collected and my numerous trips to visit narrow-gauge

railways in other countries. The collection of material for writing this study began already during my university studies. As an introduction, I would like to mention my numerous publications published in Hungary's largest railway magazine, *Indóház*, which deals partly with the past and present of narrow-gauge railways both in Hungary and in other countries.

The Central Archives of MÁV Hungarian State Railway and the Transport Museum are indispensable sites of sources, where countless original documents are preserved, partly digitized and partly boxed, most of which have not yet been in the hands of either researchers or railway enthusiasts. The processing of archival sources is of primary importance for the research of the topic, so in my thesis I tried to get to know the available documents as widely as possible.

The Touristic Importance of Narrow-Gauge Railways

The attractions offered by ecotourism are based on natural conditions. The South Transdanubian region is rich in natural attractions. Although narrow-gauge railways are not among the classic structural elements of ecotourism, a significant part of them today operate in nature reserves or adjacent to them. Tourist traffic can be improved by the development of the narrow-gauge railways and its surroundings, in which not only the existence of attractive elements but also their value (Princz-Jakovics–Vasvári 2018) play an important role. In the region under review, narrow-gauge railways are of particular importance, as it is the home to nearly a quarter of the national narrow-gauge railway lines, and the unique open-carriage rides are used annually by about 125-150 thousand passengers, enjoying the small wonders of industrial history and nature. The operators of the narrow-gauge railways are trying to serve the needs of passengers and to maintain the equipment (Szász 2015).

The touristic role of the narrow-gauge railways was already significant between the two world wars – just think of the two Ganz trains of Lillafüred State Forest Railway, which were built in 1929 in the largest factory of Hungary in order to boost the tourism of the Bükk Mountains. This was at the time of the construction of the Lillafüred Palace Hotel. No wonder that the executive of the Forest Treasury and the Forest Railway at the time immediately sensed the change in the nature of the settlement and its tourism-related significance, so they began to push for the purchase of new vehicles, which were more suitable for passenger transport and the future splendour of Lillafüred. The Ministry of Agriculture also granted the request and ordered the trains from Ganz and Partner Danubius and Orenstein and Koppel. They declared that all the equipment of the railway is directly for the service of tourism and is one of the most important factors. From the construction and quality of the track through the station buildings and the condition of the

carriages to the train schedule and the tariff, everything had to serve the purposes of tourism (Partisan 1937).

After WWII, railway developments served the mining and agricultural industry, but pioneer railways were also built in several parts of the country. The pioneer railways were actually for tourism purposes, even if ideology was the official reason for building them. In the course of research, it became certain that a total of 22 pioneer railways were in operation in Hungary for a longer or shorter period of time (Balogh 2021). These places could be designated on the basis of tourism. How lucky these places were shows that today, with the exception of Budapest, only Nagycenk is still operating (Tóbiás 1996). They began to attract attention again in the 1960s and 70s, but the change of function of the Hungarian narrow-gauge railways had to wait until the 1980s. Over the next decade, with a few exceptions, freight traffic was completely abolished and replaced by tourism. In the second half of the decade, tourism clearly dominated the operating forest railway lines. In 1995, apart from the narrow-gauge railway lines of MÁV Hungarian State Railways and privately managed narrow-gauge railways, the 14 forest railways carried 630,000 passengers, compared to 825,000 by 2000. By the turn of the millennium, freight transport would cease everywhere except for Csömödér and Gemenc, and tourism took its place (Jéger 2010).

Some lines are specifically designed for tourism and to transport hikers. They can serve tourism in several regions, but tourism cannot maintain these railway lines. In the case of some high-traffic narrow-gauge railways, the number of passengers is between 100,000 and 1,000,000 per year (ÁÉV Szilvásvár, Lillafüredi ÁÉV, Mátravasút, MÁV Children's Railway), and the ticket revenues do not cover the costs of operation, so the deficit of narrow-gauge railways is compensated by profits from other operations. The railway can only extract the cost of its own operation in areas where there is also freight transport; for example, at the Csömödér Sate Forest Railway, a significant part of the profile is supply of wood of the forest, which is able to compensate for the loss of passenger transport.

Research Questions

There are several factors that need to be addressed if we are to determine the tourism potential of a given area. One of these is accessibility, which shows what extra effort a hiker needs to put into getting to the particular attraction (Jéger 2010). If we consider narrow-gauge railways as attractions in themselves, we need to look at how to reach them most conveniently and quickly from a given point. It greatly improves the number of visitors to attractions if they are accessible by direct or minimal transfer (Michalkó 2007). Lillafüred, which belongs to Miskolc, was accessible from Budapest by rail by a single transfer trip in the 1930s. It has hosted

several prestigious events because of its location and good accessibility. Today, it is necessary to transfer by rail at least twice, and travel conditions have deteriorated significantly compared to the beginning of the 20th century (Jéger 2010).

In general, the Hungarian railways operating today are remnants of the former lines, part of them having been shut down. In several cases, the closed sections connected the lines running largely in the depths of forests with the national railway network (Felsőtárkány, Pálháza). Thus, the number of narrow-gauge railways that are directly connected to the national network has decreased significantly. The number of those located along the highways is even lower. In many cases, this fact also hinders the popularity of the attraction since the lines are sometimes in hidden valleys, and they are accessible only by tertiary or lower-level roads. In this respect, it could be a solution to extend the narrow-gauge railways to the main roads or the national railway network, thereby providing better access (Jéger 2010). An excellent example of this is the Gödöllő Forest Railway, which is being built in the vicinity of the capital, on a territory with a successful tourist attraction – the Gödöllő Arboretum – and will have a railway connection according to the medium-term plans (Pavletits 2018).

The aim of the study is to analyse the touristic significance of the narrow-gauge railways operating in South Transdanubia, to present the railways as tourist attractions, their place in the static and the dynamic infrastructure, and their role in shaping attractiveness, seasonality, and tourism milieu.

Narrow-Gauge Railways as Tourist Attractions

One of the features of late-19th-century civil transformation is the appearance of tourism, whose transport connection was strengthened at the turn of the century. More and more people took the train to the coast, but the number of trips to Lake Balaton for tourism purposes also increased significantly (Majdán 2014).

It is not enough to consider accessibility alone, we also need to look at how narrow-gauge railways can integrate in the tourism system. In a tourism approach, we can look at the attractions in several ways. The basic infrastructure, attractiveness, and tourism infrastructure are all interdependent material conditions of tourism (Michalkó 2007). These factors can be clearly identified on the narrow-gauge railways, but we should mention something else as an attraction. Every narrow-gauge railway can be classified into an infrastructural category of tourism, some lines to even more, so they participate in tourism on several levels. I present this categorization with basic infrastructure ranging from attractiveness to dynamic infrastructure.

The Narrow-Gauge Railway as Part of the Basic Infrastructure

The primary goal of infrastructure development is, of course, to improve the quality of life of the local residents, but it is also a prerequisite for the development of rural tourism. The development of rural tourism began in Hungary as early as the 1930s, and after the forced break during socialism, it began to develop spontaneously again in the early 1990s (Kovács 2003). The basic infrastructure in tourism means the existence of the necessary conditions for viewing the attraction. The most important elements are transport (Buday-Sántha 2007), communication, and the existence of utilities (Michalkó 2007). This means that narrow-gauge railways should be examined as static and dynamic elements of basic transport infrastructure.

Static Basic Infrastructure

Several Hungarian narrow-gauge railways also play a role in the basic infrastructure. In many cases, the area they explore cannot be approached otherwise, except on foot. However, in many cases, hikers can only walk along the railway tracks. A good example among the Hungarian narrow-gauge railways is the Mahóca wing line of the Lillafüred State Forest Railway in East Bükk, which nowadays can only be used on a very short section, according to a special train schedule. The role of the Hortobágy narrow-gauge railway is also important, as it serves the local fish farm and handles the traffic between the lakes regarding fishing and feeding. This method is not unique, as there are several narrow-gauge railways in Hungary (Tömörkény, Lake Fehér). Hortobágy stands out from them because the management of Hortobágy National Park has created a new attraction without a new infrastructure investment, using the railway. For tourists, it offers the opportunity to get an insight into the everyday life of the fishponds and the bird life of the region.

However, the infrastructure of narrow-gauge railways includes not only the railway lines but also the buildings. The latter can be an integral part of tourism. The static elements of tourism include those that are stationary and thus serve the exploration and sale of attractiveness. These are mostly buildings (Michalkó 2007), but in the case of narrow-gauge railways, we can also include the build-ups of the lines. In many cases, the railway stations themselves, the station buildings have an attraction thanks to the fact that most of them were built in the first decades of the 20th century and can still be seen in their original condition. Such are, for example, the station of Lillafüred State Forest Railway at Lillafüred or the depot of the Almamellék State Forest Railway,

which is the heritage of the former Kaposvár–Szigetvár railway. Both buildings host an exhibition of the past and present of the railways. A similar attraction is the pavilion of the Millennium National Exhibition, which is currently under reconstruction and will be the adornment of the Pörböly Ecotourism Centre. Of course, not only former buildings can be part of the static infrastructure. Another sight in Pörböly is the forest school presenting the fauna of the floodplain power and the Budakeszi Wildlife Park in the immediate vicinity of the Budapest children's railway, which has also a stop on the line.

In the case of several Hungarian narrow-gauge railways, we can find forest schools, which are important elements of environmentally conscious education. There are special elements related to static infrastructure such as bridges and tunnels. The youngest bridges are located at the Kemence Forest Museum Railway. However, the most interesting and spectacular bridges can be found on the line of the Lillafüred State Forest Railway (LÁEV): they are not only noteworthy from a touristic point of view but also for bridge engineering. The Deep Valley Bridge stands out from the structures of the Hungarian railways with its size, while the Arc Bridge on the southern side of Lake Hámori is unusual and unique in its form. Also on the line of LÁEV are the two longest tunnels of our narrow-gauge railways, both in Lillafüred, before the station and immediately following it. This solution is a special experience, as when arriving at the station and leaving it, tourists are enriched with an experience that they do not get anywhere else. Hárshegy Tunnel of the Pioneer Railway in Budapest was built in 1950 with a similar purpose, which, in addition to overcoming the upward slope more efficiently, enriches the rail journey with new experiences.

Dynamic Infrastructure

However, the most important role of narrow-gauge railways is as part of the dynamic infrastructure: the vehicle transports passengers to attraction points or forms part of the local transport, and because of its nature it attracts tourists (Michalkó 2007). This stems from the fact that the narrow-gauge railways, which are still in use today, were built almost without exception for the exploration of forests. One of the most beautiful lines exploring the forests is the Lillafüred State Forest Railway, which winds through the forests of the Bükk Mountains, starting from Diósgyőr to the end of both lines, for a total length of more than 20 kilometres. Equally exciting is the line of the other Bükk narrow-gauge railway, the Szilvásvárad State Forest Railway, which runs through the famous Szalajka Valley. The valley can be walked or even travelled by car, the railway being only one alternative here. Thanks to this, it is not so much the narrow-gauge railway itself but rather the Szalajka Valley and its beauty that are attractive to tourists; so, in this approach, the railway fully meets the requirements of dynamic infrastructure.

We cannot forget about the narrow-gauge railways of Somogy: both Almamellék and Mesztesyő railway lines were built for the exploration of forests, and their remaining lines still run today. They are also part of the dynamic infrastructure of tourism.

A further important part of the dynamic infrastructure is the special fleet of vehicles of each narrow-gauge railway. MÁV Zrt. Széchenyi-hegyi Children's Railway and the Csömödéri State Forest Railway have a forest knowledge lab wagon for kindergarten and primary school groups. Bicycles and stroller transport wagons also run on MÁV's two narrow-gauge lines, Balatonfenyves and the Budapest Children's railway. An earlier example is also known: the Lillafüred State Forest Railway acquired a saloon car in 1929, which transported illustrious guests to the Palace Hotel. Among other things, several members of the Bethlen government travelled regularly with this saloon car (Fodor 2003).

Appearance of Attractiveness and Seasonality

Attractiveness is difficult to define, accurately describe (Michalkó 2007) because there are a lot of subjective elements in it. In the multitude of narrow-gauge railways, the real attraction is that their peculiarity draws more attention from tourists and hikers than other similar railway lines. Here again, we can mention elements of static infrastructure that can attract tourists, or even areas explored by railways as natural values. In addition, it is more important that almost all narrow-gauge railways have some kind of attractiveness. Some have only local-level, some have regional attractions, but we also have some small ones that have a national attraction (Michalkó 2007). We can conclude that attraction is a common feature of all narrow-gauge railways. Even in countries such as Switzerland, where narrow-gauge railway is an integral part of the country's rail network, there are several lines that are also extremely popular with tourists (Pavletits 2019). There are narrow-gauge railways in Hungary with a great tourist attraction, but their attractiveness is not the same. There are railways that offer sights on their own. Such narrow-gauge railways are the museum railways, two in Hungary, the Nagycenki Széchenyi Museum Railway owned by the Museum of Transport and the Kemence Forest Museum Railway operated by the Circle of Friends of Narrow-Gauge Railways.

A special attraction is the steam locomotives and the nostalgia carriages they are hauling, which will slowly be found on all our narrow-gauge railway lines. In addition to the masterpieces of the Hungarian mechanical engineering industry, in many cases steam locomotives purchased and renovated from abroad, mainly from Transylvania, travel the kilometres on the various networks of the country. Among the steam locomotives, one should be highlighted due to its historical and technical uniqueness: the LILLA, which is the only steam locomotive with a service car operating in Hungary is owned by Lillafüred State Forest Railway. Due to lack

of resources for its renovation, the locomotive is currently put on display at the exhibition at Majláth station. It is the only steamer in Hungary that operates where it originally served. In this case, the LÁEV has an attraction of national importance.

In addition to steam locomotives, an important memory of the past of Hungarian narrow-gauge railways is the motorcar operating today in Budapest, at the Children's Railway and the related sidecars, which began their service in 1929 at the Szinvavölgy Forest Railway (SZEVE), the predecessor of the Lillafüred State Forest Railway (Szécsey 1999). These vehicles are one of the biggest attractions of the Children's Railway in addition to the nostalgia trains towed by steam locomotives.

Diesel locomotives can also be of interest on the line of the previously mentioned Kemence Forest Railway, as these are not the C50, Mk48, or Mk45 locomotives commonly used in Hungary, but they use engine locomotives purchased from closed mines and various economic railways, of which there are sometimes only one or two working copies in the country. Among the diesel locomotives, one more curiosity should be mentioned: the B26 series locomotive operating in Lillafüred, which was salvaged by the railway management when the sugar factory in Szerencs was liquidated. This is the last remaining and still operating locomotive of this type in Hungary. So, if we look at the Hungarian narrow-gauge railway from the perspective of technical curiosities, we can say that the Nagycenki Széchenyi Museum Railway, the Kemence Forest Museum Railway, the Budapest Children's Railway, and the Lillafüred State Forest Railway are more attractive than the rest.

In addition to attractiveness, it is important to talk about seasonality. This is an important element of tourism. Not all attractions offer the same experience in summer as in winter; they do not have the same attractiveness for each season. This is especially true for outdoor attractions such as our narrow-gauge railways. Not only the railways themselves are seasonal but in many cases the sights they explore or that can be accessed with them. Whether it is Szalajka Valley or Gemenc, they offer a much greater experience in summer than in winter. Thus, it can be said that seasonality appears almost without exception with narrow-gauge railways. On most lines, this is present to such an extent that during the winter period traffic is completely suspended. During the winter, there are only a few lines with regular scheduled plans; however, most of the trains are operated on the lines ordered, which are primarily requested by railway enthusiasts from the operators. There are very few narrow-gauge railways in Hungary that are operated during the winter scheduling period. For example, Balatonfenyves Economic Railway, which performs the only public function, and Széchenyi Mountain Children's Railway, which is also managed by MÁV, the Hungarian State Railways. Children's Railway welcomes tourists all year round, with a Monday outage during the winter scheduling period. Based on its position, it can be accessed all year round, and the experience of train travel is unforgettable at all times of the year. Although there are no seasonal attractions along the line, the trip itself is a great experience. Even on a weekday afternoon, people living in the capital

and in the Budapest agglomeration can easily use the trains between Hűvösvölgy and Széchenyi Hill. A special advantage of the railway is a scheduled nostalgia train running all year round, both with steam traction and motorcars.

The privately owned Mecsek narrow-gauge railway, which runs between the Pécs amusement park and the zoo, also runs seasonally on weekdays, while on Sundays and public holidays we can board trains in all seasons.

All forest railways run seasonally. The highest traffic in the winter period is carried out by the narrow-gauge railway running between Kismaros and Királyrét, which runs five pairs of trains on free and public holidays in the late autumn and winter months (November–February). This is also due to the relatively high number of passengers: 110,000. Due to the proximity of Budapest and the good availability of Kismaros, the line has a fortunate position. Good basic infrastructure allows the multimillion metropolitan and agglomeration population to visit the narrow-gauge railway even on winter weekends. Gemenc Forest Railway also runs seasonally, but seasonality here does not mean winter and summer. The railway is also in operation in winter, and the traffic is continuous every day, if only with a few rigs. The operation of the railway plant is affected by the flood of the Danube. In the event of floods, part of the track is usually submerged, so during the spring and autumn floods there is a temporary outage on the line.

However, most narrow-gauge railways do not have any passenger transport during the winter months, and thus there is no traffic. Only a few special trains will wear out the track at this time. This has long been a common practice on many railways, but financial difficulties, a decrease in funding, the impact of the crisis, and the increasing shortage of tourists during the winter period also led to the shutdown of Lillafüred State Forest Railway in the winter of 2009/2010. In the case of the traffic of narrow-gauge railways, the most important factor is attractiveness, which directs the attention of hikers and tourists towards the railway. If more attractions are near the lines, and the attractiveness of the railway itself is bigger, a greater passenger traffic can be generated. Seasonality is also very marked in the traffic data. In many cases, the number of sights decreases in winter, thereby reducing the attractiveness of the railways, so trains carry far fewer passengers during the winter period than in summer.

Tourist Milieu

By tourist milieu, we mean the attractiveness of the destination, the totality of the experiences received there (Michalkó 2005). If we want to put the narrow-gauge railways into this context, we will examine the impressions that the tourist gains when travelling by the railway. For a tourist to visit a particular destination over and over again, we need to provide a more-than-average experience that they cannot get anywhere else. The tourist milieu can also manifest itself in psychological terms:

the uniqueness of the landscape, its beauty undoubtedly has a spiritual effect on the traveller. Narrow-gauge steam train nostalgia journeys certainly operate with these spiritual effects.

Narrow-gauge railway travel in itself offers unforgettable experiences. It is also important to stimulate the geographical characteristics of the destination. The upper terminus of Felsőtárkány Forest Railway offers an excellent hiking opportunity for Hungary's one and only geyser, the Red Stone Spring, which is undoubtedly a unique geographical phenomenon when melting in the spring. There are several railway lines that stand out from other lines with their technical characteristics, such as Kemence Museum Railway with its vehicle collection or Nagybörzsönyi Forest Railway with the peak inverter. The recently re-commissioned water crane of Széchenyi Mountain Children's Railway also enhances the experience of travel by the fact that the water supply of steam locomotives is carried out exclusively in the country using the original method.

But in the same way, a tourist who travels from a mountainous area to the Hortobágy narrow-gauge railway, for example, which winds among fishponds (Fodor 2006), or from the lowlands to the Slovenian Postojna Cave Railway or the Csorba Lake with the cog railway, may have a greater milieu than others (Pavletits 2015).

The tourist milieu is perhaps even more complex and objective than other attractions in terms of narrow-gauge railways. This is due to the fact that they operate in different regions of the country, in different geographical environments. Thus, the milieu of the Pálháza Forest Railway, of the Trans-Börzsöny forest, and of the the Csömödér State Forest Railway are all different from one another. These are not comparable with each other; however, in the number of passengers, it is somewhat traceable where the tourist attraction is present. The local infrastructure and transportation options that help exploring the sights are also important. The importance of this was recognized by the two-stage financial support (2017, 2020) of the Hungarian Government, which helped the development of domestic narrow-gauge railways with billions of forints.

Development of Narrow-Gauge Railways as Tourism Products

Among the narrow-gauge railways in Hungary, we can find some examples to be followed for improving their touristic utilization. An example of this is the extension of periodic operation with thematic messages. The Santa Claus trains in December are good examples of how to combine attraction and transport function. During the transformation of narrow-gauge railway lines into thematic routes, this route consists of several elements or sections, which can be visited or viewed by stopping at its various stations. All this can be created by adding additional stops, placing information

boards at the stops presenting attractions, and recommending activities by designating alternative pedestrian and bicycle paths between the stops, thus helping to acquire and store the experience, as well as to increase the length of stay. In connection with the above, pedestrian, bicycle, and ski routes can be created or marked out along the shorter lines, which give visitors the opportunity to combine the individual sections and walk around the area. It is necessary to make the railway carriages suitable for bicycle transport or to create bicycle rental services. An example of a circular route is Gemenc Forest Railway, where after taking the train in the Gemenc Forest, one can transfer to a Danube cruise ship at the Gemenc-Dunapart station and return to the place of departure.

Narrow-Gauge Railways Used for Tourism Purposes in the South Transdanubian Region

In our thesis, we present the past and contemporary use of Almamellék State Forest Railway, Gemenc State Forest Railway, Balatonfenyves Economic Railway, and Csömödéri State Forest Railway.



Source: edited by Ádám Jakóts

Figure 1. Public narrow-gauge railway lines of Hungary in 2021

Almamellék State Forest Railway

Almamellék is located in Zselic, 16 kilometres from Szigetvár and 4 kilometres from the Szentlászló branch of Route 67. One of the country's 600 mm forest railways starts from this settlement. The territory of South Transdanubia has never been one of the more developed areas of Hungary. In the 18th and 19th centuries, the region encompassing Baranya, Somogy, and Tolna counties and the southern part of Zala County was essentially agricultural, this industry dominating both its occupational structure and economic output (Kaposi 2019). For a long time, the area had been in the hands of large landowners – Festetics, Széchenyi, Batthyány, Esterházy, and Hunyady (Kaposi 2019/b).

In addition to the ancient aristocratic dynasties, let us not forget the Biedermann family, whose members, as Viennese bankers and wholesalers, were transferred within the estate with huge loans to the Batthyánys. Count Gusztáv Batthyány squandered the huge loans he had taken out for his costly life in England and could not repay them, so he was forced to sell his estates of Mozsgo and Üszög, some 63,000 acres, to the creditor Biedermanns (Kaposi 2019/b). The huge estate was divided into several branches later. The most successful member of the family was Baron Rezső Biedermann, who from the 1890s built a model farm with a Szentegát centre based on Western farming principles. In addition to the modernization of farming, he also developed the most economical method of transport of the time: in 1896, he convened the general meeting of the Szigetvár-Kaposvár Local Interest Railway Co with the most influential farmers in the area, where he became one of the vice-presidents of the board of directors (Kaposi 2019/a).

The Kaposvár-Szigetvár railway line was opened on 8 November 1900. This also affected the village of Almamellék, where the Biedermanns had a huge estate. In 1901, Biedermann established a 600 mm forest railway with a trail of 7.2 km between Almamellék and Németslukafa. Initially, the track was operated by horse towing, which met the requirements of the time for forest railways. The superstructure consisted of lightweight rails weighing 5-7 kg/m adapted to the load (Jéger 2009). In the same year, the 0.4 km Szentmártonpuszta branch was built. The wood, which was extracted from the forests of Lukafa and Sasrét, was carried by rail to the Almamellék railway station. The railway also supplied agricultural crops, as well as products of the Németslukafa potash burner charcoal pile and glass huts. The four-kilometre wing line of Terecsenypuszta was laid in 1915 and the two-kilometre Csikórét line in 1935. In 1925, the line was extended from the Lukafa junction to the hunting lodge in Sasrét.

In 1945, the 10.7 kilometre network of the forest railway became the property of the Hungarian State Forestry, and the branch of Szentmártonpuszta became the property of the Görösgal State Farm. Mechanical traction was not converted until 1955 (Jéger 2009). The hunting castle–sawmill section was opened in 1962.

Passenger transport on the main line was authorized on 12 April 1961 from Almamellék to the hunting castle, on 27 May 1962 to the sawmill, and on the one-kilometre Lukafa wing line on 1 October the same year. In 1959, a two-axle, plank-walled, closed passenger car was purchased from the Economic Railway of Iregszemcse. The two modern ‘Dunakeszi cars’ (manufacturer: MÁV Dunakeszi Vehicle Repair Company) were put into operation in 1966. One came from the Gemenc Forest Railway, the other directly from Dunakeszi. Four-axle passenger cars have a stove and electric lighting. The first of the three C50 diesel locomotives was acquired in 1962 and the other two in 1970.

In the spirit of the 1968 transport policy concept, the wing line of MÁV Kaposvár–Szigetvár was closed on 31 December 1976. Due to the termination of the main railway connection and the construction of forest exploration roads, the transport of timber has been steadily decreasing; since 1992, there has been only passenger traffic. The branch of Szentmártonpuszta was picked up in 1972, the wing line in Csikórét in 1983, and Terecsenypuszta in 1984.



Source: Péter Pavletits (28.06.2018)

Figure 2. Freight train front of the former MÁV station of Almamellék

In 1994, two locomotive depots were established in Almamellék, and in 1995 train stops were erected in Almamellék and Sasrét. In Almamellék, the former MÁV station building was rebuilt in 1999, and in 2000 an exhibition on forestry and railway history was organized on its ground floor. In 2001, the fleet of vehicles was expanded with two Maszolaj cars (manufacturer: Hungarian–Soviet Oil Co. Budapest Machine Factory), and the four-axle trucks were converted into homemade passenger cars. The renovated Almamellék Forest Railway was opened on 26 September 2017. The Hungarian state and Mecsek Forestry Ltd., which

operates the railway, spent one hundred million forints on the static infrastructure development in Almamellék. Within the framework of the investment, the façade of the station building of Almamellék regained its original form. The former MÁV wooden warehouse was renovated. A three-track wooden locomotive and carriage depo was built. A complete track reconstruction was carried out on the territory of the station. In Szentmártonpuszta, the Tomega Vital Castle Hotel, which was once the summer residency of the daughter of Baron Rezső Biedermann and his family, invites tourists for a longer stay.

In addition to the static infrastructure, of course, the dynamic infrastructure was also developed: the three C50-type diesel locomotives, the two closed and the two open passenger cars were also renovated. The stops were equipped with a high platform, information board, and solar-powered space lighting. The trains run on the seven-kilometre main line along the Almamellék–Sasrét–Sawmills route, and since 2005 they have been running periodically to Lukafa, but only by special arrangement. The terminus of the narrow-gauge railway in Almamellék is an excellent example of a tourist milieu – it has a national attraction. In Sasrét, Kikerics Forest School and the former hunting castle, which operates as a guest house, await their visitors. The 1.5-km-long nature trail of Sasrét and the 2.5 kilometre Csodaszarvas (En: Miraculous Hind) nature trail of the 800 hectare wildlife garden show the flora and fauna of Zselic.

Gemenc Forest Railway

On the right bank of Danube River, on the western edge of the Great Plain, in Sárköz, there is one of the two narrow-gauge railways in Hungary, where freight transport continues to operate this day. The wood extracted in the forest is transported by the forestry on an iron track to Pörböly railway crossing station, which is connected to the Bátaszék–Baja–Kiskunhalas main railway line 154 of MÁV (Hungarian State Railway). The narrow-gauge railway is the only way since the river floods the forest after heavy rains in autumn, icy floods in winter, or melting in the spring. In addition to the summer months, only a relatively short, 8-kilometer section can be reached by train from Pörböly station to the fabulous Malomtelelő (approx. Mill Wintering) stop.

The archbishop's estate in Kalocsa used an equestrian railway already in the late 1800s, planned by forest master Károly Mattanovics. Since 1914, most of the horses were used in the First World War; therefore, a forest railway should be built in Gemenc to facilitate the rapid transportation of forced production. The current railway track of the Gemenc Forest Railway was built in several stages: the construction of the Gemenc–Keselyűs (Vulture) line began in 1955, followed by the Gemenc–Fás-Danube section in 1956 and the wing line leading from it to

Gemenc–Ásásduna, to the Somfova forest section in 1963. In 1965, the section between Pörböly and Nyári Legelő (Summer Pasture) was completed. By 1966, the track had reached from Keselyűs to Pörböly, and also the big railway loader (Tóth-Hajós 2002). The floods of the Danube play a major role in the maintenance of the line, which often wash away part of the track. After the floods, the sections to be rebuilt will receive a new embankment and, if necessary, a new superstructure (Jéger 2009). In 1968, Gemenc's isolation was dissolved due to its status of a government hunting ground, and state leaders urged the transport of passengers for tourism purposes on the forest railway (this is when the branch called the Szomfova Delta was built). As a result of booming tourism, the track was extended from Keselyűs to Bárányfok, creating a 30 km main line by 1982. In 2007, the Ecotourism Centre was built at the starting station of the forest railway in Pörböly, which awaits tourists with a wide range of services. There are scheduled trains every day from Pörböly to the forest. On weekends during the tourist season, a steam engine also tows the carriages. Gemenc State Forest Railway also runs on schedule during the winter period, with closed, heated carriages.



Source: Péter Pavletits (26.02.2014)

Figure 3. *Train at Malomtelelő railway station*

Parallel with its main profile, the narrow-gauge railway of Gemenc plays a role in the care of animals living in the nature reserve. The third function of the railway is, of course, to serve the tourism of the floodplain forest. The only public transport of the Gemenc Park Forest is the narrow-gauge railway, which also offers tourists the opportunity to visit the otherwise inaccessible area. The true value of Gemenc, the untouched floodplain forest and its wildlife can be discovered in addition to the narrow-gauge railway as well as in the framework of a walking or cycling tour

since the Szekszárd–Baja section of the Great Plain Blue Tour also leads through the floodplain forest. The forest railway at the Lassi railway station connects to the route of the Great Plain Blue Tour, which is a section of the National Blue Circle, in addition to the National Blue Tour and the Pál Rockenbauer South Transdanubian Blue Tour. The section can be completed by bicycle as well, so on the paths of the floodplain forest, besides wild animals, we can often meet tourists riding a bicycle.

Nature trails are the most successful members of the structural elements of ecotourism in Hungary. About 13% of the Hungarian nature trail, estimated at around 420, is located in the South Transdanubia, mainly in the management of the South Transdanubian National Park (DDNP), which is proportionally above the national territorial average (Szász 2015). The Molnárka interactive nature trail leads from Malomtelelő to Lassi. Walking along the nature trail, we can get acquainted with the fauna and flora of Gemenc Forest and the changes of the Danube bed. From the observation tower – 200 meters from the train station –, one can observe the protected water birds or the wild animals of the swamp meadow. The telling name of Lassi train station was once used in the ‘slowing’ sense by the former foresters, water millers, and fishermen, and in its inn the locals quenched their thirst with a drink or two and their hunger with the Baja-style fish soup. The narrow-gauge railway here is joined to the route of the Great Plain Blue Tour.

The Gemenc narrow-gauge railway is also important for the existent dynamic infrastructure. REZÉT, the nostalgia steam locomotive of the railway was built in 1954 in Reșița, Romania, as a clone of MÁV’s 490 series narrow-gauge steam locomotive. It takes its name from one of the backwaters of the Danube, the Rezeti-Danube. The name Rezet, like so many other names here, has Slavic origin and probably comes from the term ‘cutting through’. The locomotive arrived in Pörböly on 2 May 2000 and received a complete renovation in 2021 (Pavletits 2020).

Balatonfenyves Economic Railway

Balatonfenyves is located in Somogy County, 19 km from Keszthely, on the southern shore of Lake Balaton. The city, which is surrounded by the M7 motorway and the Southern Railway built in 1861, has been an independent settlement since the millennium, surrounded by the Buda-Nagykanizsa heritage MÁV 30 Budapest–Gyékényes main railway line. The last economic railway of the country, which even serves the local public traffic, departs from the city’s MÁV train station to Nagyberek.

Until the 1850s, Nagyberek was the floodplain of Lake Balaton, which was gradually separated from the open water by the waves. In the fields behind the resulting sandspits, the formation of moorland wildlife began, large-scale reed beds were created, and tree species characteristic of these habitats, such as willow

or alder, appeared. Another major change was brought about by the draining operations that began in 1864. The main goal of these was to extract new, cultivable areas of production by blocking the waters coming from Lake Balaton and the inner Somogy parts. The work was much delayed, only one canal was completed in 1864, the drainage plan covering the larger areas was not completed until 1896, and the work began only ten years later, in 1908. Between the two world wars, the resulting lands were gradually cultivated, but the lack of lime caused by the wetland soil did not really favour the cultivation of crops. After the Second World War and the socialization of Balatonnagyberek State Farm founded in 1949, ambitious plans were formed for the utilization of Nagyberek (Molnár 2014).

On 13 October 1950, as per the proposal of the state farm, there began the laying of the track of the 760 mm economic railway. This was not the first narrow-gauge railway of Nagyberek, as between the two world wars Imre Grange was connected with Balatonfenyves by a horse railway with a gauge of 600 mm (Jéger 2009). The marshy area was meshed with tracks perpendicular to each other. From the granges of the area, it transported agricultural crops, peat, and lime mud to the Balatonfenyves MÁV railway station. In 1953, the steam locomotives were replaced by diesel locomotives. In 1954, the locomotive depot and the repair yard were built in Balatonfenyves. The scheduled passenger transport began on 10 June 1956 (Balogh 2010).

On 1 April 1960, it was attached to the Hungarian State Railways, just like all other narrow-gauge economic railways. Since the 1970s, the volume of freight transport has been steadily decreasing. In the 1980s, its touristic importance grew, as more and more people visited Csisztapuszta Thermal Bath. In 1985, steam-powered nostalgia trains for Csisztapuszta were put into operation. In 1987, the line was extended by about 1 km to allow passengers to get even closer to the thermal bath. In 1990, the other sections of the narrow-gauge railway track either were used only for freight transport or were out of service or were picked up. At the beginning of the 2000s, traffic on the Csiszta line was stopped due to the deteriorating track and substructure, so the thermal bath in Csisztapuszta could only be reached by road.

Until the 20th-century draining operations, the landscape was dominated by a marshland similar to Little Balaton. It was declared a nature reserve in 1977 and has become part of the Natura 2000 territory. Nagyberek has rich natural values, with many (highly) protected water birds, 60-70 types of herbs, and a significant wildlife population. The first stop of the narrow-gauge economic railway is Imre Grange. In high season, the train runs with open and bicycle carriages. At its centre is Hunyady Grange, with the Community House, Agrotourism Centre, and Furnace Garden operated by Balaton Nagyberek Foundation. Nature lovers can choose from the 'Berek Safari' (off-road, boot, cycling and kickbike) tours starting from the grange, with professional guided tours. The tours introduce visitors to

the natural values, the flora and fauna of Nagyberek, and the Fehér-víz primaeval bog, which can be visited individually or in groups.

In the last three years, the static infrastructure of the narrow-gauge railway network has been rebuilt in two stages in the service of tourism. In 2018–2019, the main line tracks were rebuilt for a total length of 2.3 km, mostly from government support and partly from own resources. In 2021, the wing line between Imre Grange and Csisztafűrdő was rebuilt, where rail transport had been suspended since 2002. At Csisztafűrdő, out of the HUF 650 million awarded from the Regional and Urban Development Operational Programme, a station serving cycling tourism was built, which has significantly increased the destination's attractiveness.



Source: Pavletits Péter (26.11.2022)

Figure 4. Train arrives at Csisztafűrdő

Csömödér State Forest Railway

With its track length of 110 km, Csömödér State Forest Railway is the longest narrow-gauge railway in Hungary. Its special feature is that it is perhaps the only narrow-gauge railway in the country whose main source of turnover is still freight transport. Passenger trains run only between Lenti and Kistolmács (33 km) from late April to late September, carrying between 22,000 and 23,000 passengers each year.

Since Prince Esterházy's estate in Alsólendva did not have sawmills for a long time, the removal of wood from the forests on carts was extremely difficult on the poor-quality forest roads. The exploration of the forests was urged by the Italian battlefield near one of the World War I locations, which required a huge amount

of wood, but this could only be reasonably harvested with the involvement of adequate transport (Szilvásy–Kovách 2020).

The construction of the narrow-gauge railway was started in the summer of 1917 between Csömödér and Budnya by two treasury suppliers, Rezső Scheffer and Miksa Mayer. With this construction, a connection was established between the sawmill in Csömödér and the forest areas of Prince Esterházy's estate. Horse-drawn cars were soon replaced by mechanical power, as steam locomotives were added to the narrow-gauge railway. The railcar going by the moniker Muki, manufactured in Berlin in 1917, and the steam locomotive from the Mátra narrow-gauge railway, named Karcsi (Thorday 1989) and manufactured in the Wiener Lokomotive Factory in 1918, arrived here. In the first half of the 20th century, wing lines were constantly being built – in 1920, the Pördefölde–Hosszú-rét and in 1922 the Törösznek–Oltárc. In 1930, oil was found in the vicinity of Bazakeretty, thus expanding the range of goods to be transported. In 1945, together with the sawmill, the railway line fell into state hands.



Source: Peter Pavletits (10.07.2007)

Figure 5. *Steam train at Csömödér State Forest Railway*

The scheduled passenger transport began in 1954 on the 18 km section between Csömödér and Kistolmács. In 1962, the first diesel locomotive was acquired, which was one of the C50 types still in service today. In 1965, steam locomotives were permanently withdrawn from daily use. In the 1970s, maintenance did not get the necessary attention, so the consistency of the railway plant deteriorated, but they realized in time that it was still the cheapest means of transport in this region. In the 1980s, the renovation of the tracks began, and with it a development programme that continues even nowadays. Thanks to this, the narrow-gauge railway regularly

transports passengers over 32 km. In September 2000, the section between Lenti and Csömödér was inaugurated, thus extending the usable track length to 109 kilometres.

Zala Forest Ltd. operates the narrow-gauge forest railway. The company is continuously modernizing the railway plant and expanding its related tourist services. An exhibition of hunting, sawmill, forestry, and railway history has been established in Lenti. In Csömödér, the 'Zakatoló' Forest School was created with a special railway carriage. The railway line was extended in Kistolmács, and a new stop and reception building was built, so the attractiveness of the destination (tourist milieu) increased here as well. The railway line is connected to a number of cycling and walking trails, which touch the Gőcsej pine region, Kerka Valley, and the Gőcsej beech region. The Arboretum of Vétyem and the Budafa Arboretum with the Makk Adventure Playground can be reached by the narrow-gauge railway. Kistolmács, the end station of the forest railway is a great fishing spot. Some of the built heritage of the county can also be reached from the various stops of the narrow-gauge railway: the Mányoki Chapel, the Andrásy-Szapáry Castle, and the water mill are the primary sights (Szilvási–Kovách 2020).

When travelling on nostalgia trains transmitted by the ÁBEL tank engine, the specificity of the landscape also prevails here, which undoubtedly has a spiritual effect on travellers.

Conclusions

In my study, I examined the tourist milieu, attractiveness, and seasonality of the Hungarian narrow-gauge railway lines. The examination of the tourist milieu of the narrow-gauge railways has proven that it can only be developed if the narrow-gauge railway network is treated as part of a complex tourist package. The utilization of the railway lines is well established and shows close correlation with the time of access from Budapest. It can be concluded that the narrow-gauge railways and their surroundings are tourist attractions, which can be further enhanced by effective marketing activities. Each year, more and more people travel on narrow-gauge railway lines, often just looking for the ones that offer a more exciting experience. Thus, a kind of competition arises between the railway lines close to each other. The case of Gemenc and Almamellék exemplifies that in places where there are other attractions and the area is also known for other sights, narrow-gauge railways can carry a significant traffic. Despite the fact that tourism has taken the lead among the services of narrow-gauge railways today, it is important to expand the current offer in the long term. First of all, narrow-gauge railways need to be given space again in transport tasks. In many cases, it would be much more cost-effective and environmentally conscious to transport

timber and other goods on narrow-gauge railway lines instead of public roads. But in the same way, narrow-gauge railways should again become part of public transportation while also enhancing tourist traffic. The development of the lines and the re-establishment of former connections can further increase the importance of domestic networks. With the resources currently available, this is certainly possible.

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