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Ex-Post Territorial Impact Assessment of the European Union Funds Used in the 2014-2020 Programme Period

Since its accession to the European Union (2004), Hungary has been allocated a considerable amount of EU funds intended to promote regional development and convergence. The first part of this study reviews the literature dealing with the use of EU funds. Then a developed model of ex-post impact assessments is presented. The validity of the model is examined based on the use of the cohesion resources in the 2014-2020 planning period in Mezőkövesd District, Borsod-Abaúj-Zemplén County, Hungary. The results are presented in a spider-web diagram and quantified with the help of an aggregate index.

*Keywords: EU cohesion funds, complex index, impact assessment, Mezőkövesd District.
Code: R11; R58*

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1. Research objectives, basic questions and literature review

The documents of the European Union pay particular attention to reviewing the results (outputs) related to the Community's cohesion policy. This expectation is echoed in the documents of not only the governmental organisations of the member states, but also of the European Court of Auditors and the European Commission (EC, 2015, 2016). The need for reviewing the results is also reflected in the analyses of some institutes (WIFO, 2009, 2020) and researchers (Alecke et al, 2010; Allard et al, 2012; Kocziszky, 2006, 2009; Fier et al., 2005) dealing with the use of EU funds, the European Regional Development Funds and the European Social Fund. However, the need to carry out an impact assessment of the use of resources has only been formulated in recent years. At the end of each planning period, both the donor (the EU) and the beneficiary are expected to prepare an ex-post assessment of the use of funds at the project, programme and regional levels.

Apart from the positive impacts of the funds used, the analyses also draw the decision-makers' attention to several negative impacts. The mid-term review conducted by the European Court of Auditors also deals with this issue. The document highlighted that the developments financed by the European Development Fund (ERDF) and the European Social Fund (ESF) are generally output-oriented and the performance monitoring also follows this approach, however, mostly without a thorough impact assessment of the results (ESF, 2018).

The need for carrying out an impact assessment was more clearly formulated in the 2014-2020 programme period. However, the relevant methodological recommendation was insufficient. Based on the methodologies used, the studies published over the past decade can be classified into four groups:

- a) The verbal cause-and-effect chain analysis, which shows the potential causes and their effects (Ishikawa diagram). Most analyses use this type of methodology (ERDF, 2015).
- b) Descriptive statistical analysis (shift-share analysis), which compares the change in the local weight of some social and economic interventions with similar processes in a larger unit (county, region, country). (Batog et al., 2004).
- c) Econometric methods, used for conducting multi-variable analysis based on autoregressive or vector autoregressive models.

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Potvorsky investigated the impact of state aid in 27 countries. The findings show that state aid has a moderate effect on real growth rate and employment rate, whereas the subprime deferred value of the real growth rate has a favourable impact on state aid (Potvorszky, 2016).

Spatial computable general equilibrium models (SCGE), which are the extended models of economic models, are applied to investigate impacts of government and regional interventions with special attention to the equilibrium criteria of the economy. In the Hungarian literature Varga was the first to apply the spatial computable general equilibrium model for the impact assessment of regional development policy (Varga, 2007; Jánosi et al., 2010).

- d) The combination of descriptive statistics and econometrics, which was used by Austrian Institute of Economic Research (WIFO) in 2020 to evaluate the effectiveness of the cohesion fund resources in Austria when the country celebrated its 25th anniversary of accession to the EU (Mayerhofer et al., 2020).

The objective of this study is to conduct an impact assessment of the EU resources allocated to a particular administrative unit (Mezőkövesd District) in the programming period 2014-2020. Special attention is paid to the degree to which the state and local governments are engaged and the application opportunities of enterprises and in particular to investments that

- increase the economic output of the area;
- improve the fulfilment of headline objectives related to territorial development (increase in employment, economic development, market competitiveness, etc.);
- have a favourable impact on the well-being of people living in the area.

During the analysis, the study focused on the following questions:

- What impacts can generally be identified in the regions under investigation where EU resources were used?
- How can an individual impact factor be quantified?
- How can an overview of social, economic and environmental impacts be provided?

First, this study presents a research model. Then the results and impacts of the development resources allocated and used in the programme period 2014-2020 are analysed.

2. Research methodology and model

Impact can generally be defined as the intervention result of a specified change or influence on someone or something. Based on this definition, regional development interventions influence the living conditions of people residing in a specified area, the changes in economic, social and environmental conditions, improve them and allow the conditions before and after the interventions to be compared. It should be noted that in the majority of national regional development documents the term ‘impact’ is used as a synonym for the term ‘outcome’.

While the beneficiary of the outcome is mostly a restricted group of people, the impact is experienced at a community level. It is obvious that individual benefits do not automatically result in benefits at a community level, which may lead to community protests against certain developments.

Considering the aforementioned ideas, it can be claimed that impact is a complex concept that can be measured both at regional (micro-, meso- and macrolevel) and sectoral levels in a net (direct) and a gross (cumulative) form.

The weak point of impact assessments is that they fail to consider that changes are influenced not only by external (exogenous), but also by internal (endogenous) factors, which can either strengthen or weaken the consequences of external factors. The applied methodology and data shortage may hinder the attempts to separate the latter.

The five steps of the analysis are as follows (Figure 1):

- a) The characteristics of the region under investigation and the beneficiary projects (inputs) were taken into account.

- b) The output and impact indicators suitable for measuring regional interventions were compared.
- c) The results (outputs) of the indicators of the beneficiary projects were quantified based on the ex-post analysis (2014-2020).
- d) The impacts (outcomes) generated by outputs were quantified.
- e) Finally, general conclusions were summarised.

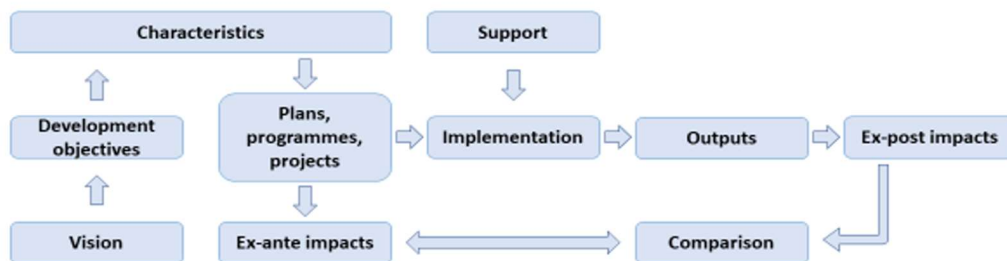


Figure 1: Logical process of the research

Source: authors' elaboration

The first part of the research is exploratory. First, the collected data were systematised and statistically processed, which allowed quantitative analyses to be conducted.

2.1 Input indicators of the model

When the input, output and impact indicators were compiled, the focus was on data relevancy, availability, and interpretability at the territorial level. The input indicators (in accordance with the quantification of the indicators on the output side) were classified into four groups (Table 1):

Table 1: Input indicators of the model

Source: authors' elaboration

Name of the main group	Sources
Economic indicators	Hungarian Central Statistical Office (HCSO)
Social indicators	Hungarian Central Statistical Office (HCSO)
Environment indicators	Hungarian Central Statistical Office (HCSO)
Support indicators	Integrated Territorial Programme
- projects won - resources awarded	

2.2 Output indicators of the model

The study investigated 12 output indicators belonging to the three main groups (environment, economic, and social) of the model. (Table 2)

Table 2: Output indicators of the model

Source: authors' own elaboration

Main group	Name of the indicator	Interpretation of the indicator	Source of the indicator
Environment	Proportion of dwellings supplied with public water (%)	Proportion of dwellings in a specified settlement supplied with public water compared to the total dwellings	Hungarian Central Statistical Office (HCSO)

	Proportion of dwellings connected to the public sewage network (%)	Proportion of dwelling in a specified settlement connected to the public sewage network compared to the total dwellings	Hungarian Central Statistical Office (HCSO)
	Amount of public waste per capita removed from a specified settlement by public utility company (kg/capita)	Total amount of solid waste generated in a specified settlement and removed from the owner by public utility company	Hungarian Central Statistical Office (HCSO)
	Amount of treated waste per capita in a specified settlement (kg/capita)	The proportion of the waste per capita treated to recover materials or energy in a specified settlement	Hungarian Central Statistical Office (HCSO)
	GHGs emission (CO ² equivalent)	Annual emissions reduction in GHGs of modernised facilities due to the project	Project portal
	Renewable energy resources (MW)	Total amount of energy produced by equipment and appliances operating on renewable energy sources	Project portal
	Renewed or newly developed green areas (m ²)	Renewed or newly developed green areas and related natural or developed water areas from project sources in a settlement	Project portal
Society	Number of crimes per hundred thousand inhabitants	Data collection unit registered and used by investigative authorities in a specified settlement	Hungarian Central Statistical Office (HCSO)
	Demographic situation	Number of children aged 0-14 per hundred inhabitants aged 65 and over Number of classes (years of education) completed by inhabitants over the age of 7 (class number)	Hungarian Central Statistical Office (HCSO)
Economy	Number of tax payers per thousand inhabitants	Number of tax payers per thousand inhabitants in specified a settlement (tax payer/thousand inhabitants)	Hungarian Central Statistical Office (HCSO)
	Number of enterprises per thousand inhabitants	Number of enterprises per thousand inhabitants in a specified settlement (enterprise/thousand inhabitants)	Hungarian Central Statistical Office (HCSO)
	Earnings	Income forming the tax base of personal income tax per capita (thousand forint/capita)	Hungarian Central Statistical Office (HCSO) Summary table
	Gross migration difference per thousand inhabitants	The difference between the rate of inhabitants joining and those leaving the specified settlement in a given year, measured per thousand inhabitants.	Hungarian Central Statistical Office (HCSO)

Correlation studies verified that there is a cause-and-effect relationship between each indicator.

2.3 Impact indicators

The effects of development interventions can be evaluated on the basis of three aggregated indices: economic sub-index, human development sub-index and environmental sub-index.

- a) A change in an economic impact expresses the impacts of structural and added-value changes of the developments, which influence both inputs (labour force structure, etc.) and outputs (export structure, etc.) (Kocziszky, 2011a).

In order to determine the partial index (GRI) of economic impacts for a given period, the following relationship was used in the model:

$$GRI = [(f_1 \times b_1) + (f_2 \times b_2) + (f_3 \times b_3)] / 3$$

where:

f_1 represents the primary sector,

f_2 = secondary sector ,

f_3 = tertiary sector,

f = employment rate of a specified sector,

b = gross nominal wage in a specified sector.

Considering the above, the index value can be determined as follows:

$$GRI (\%) = GR(t_1) / GR(t_0)$$

- b) Change in the Human Development Index (HDI)

The Human Development Index is a summary measure of three factors (life expectancy, education and income). As for the specified area, this can be calculated as follows (Lipták, 2017):

$$HDI = \sqrt[3]{I_1 * I_2 * I_3} ,$$

where HDI represents the Human Development Index,

I_1 = Number of children aged 0-14 per inhabitants aged 60 and over

I_2 =average education

I_3 = income index forming the tax base of PIT per capita.

- c) The model considers the results of changes in the form of an aggregated index and uses seven indicators (number of dwellings supplied with public water, number of dwellings connected to a public sewage network, amount of waste removed from a settlement, use of renewable energy sources, size of green area):

The aggregated index can be determined in three steps. First, the individual values are normalised by

$$I_n = (X_i - X_{\min}) / (X_{\max} - X_{\min})$$

where

X_i reflects the individual value of the specified settlement,

X_{\min} = minimal value,

X_{\max} = maximal value.

Then the indicator average can be calculated based on the normalised value:

$$\bar{X} = \left(\sum_{i=1}^n X_i \right) / n$$

In the third step the aggregated index value can be computed:

$$J = \sqrt[7]{X_1 * X_2 * \dots * X_7}$$

All three groups of indicators can be expressed as a percentage, which makes comparison of partial results (sub-indices) in space and time easier. An aggregated index can be calculated from the simple average of the three values, which allows a comprehensive evaluation of the development interventions.

3. Ex-post impact assessment of territorial developments

In the programming period 2014–2020 the interventions from EU resources contributed to the development of the area, the population retention capacity of the settlements, the transition to a low-carbon economy, the improvement of the local community services and the development of human resources. This study examines the impacts of these issues in detail: characteristics of the given area; settlement development goals, activities, and resources; development outputs and development impacts.

3.1 Administrative situation, location and characteristics of the area

As of 1 January 2013 new districts were re-established in Hungary, forming units that make up the administrative level of the state administration, located between the settlement and country levels (Act XCIII of 2012). Thus, the Mezőkövesd District was formed, which is one of the 16 districts of Borsod-Abaúj-Zemplén County.

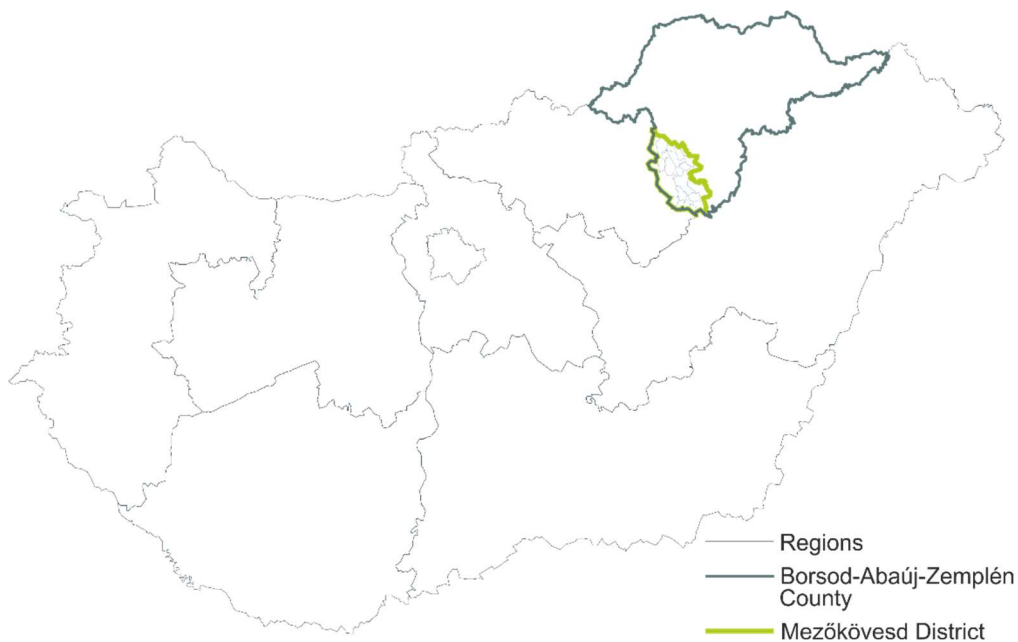


Figure 2: Geographical position of Mezőkövesd District

Source: authors' own elaboration

After 1989, the economic, social and environmental conditions of the territory underwent unfavourable transformations. Large-scale agriculture disappeared. Some of the medium-sized companies that were displaced from the capital went bankrupt. As a result, Mezőkövesd District

ranked only 93 (out of 175) in the national competitiveness ranking, ending up in the upper middle position and scoring below the national average (Lengyel et al., 2015).

Before the programme period 2014-2020, the social situation of majority settlements in the area had stagnated after the political reform. Both the economy and the economic infrastructure were underdeveloped and the regional potential was not utilised (such as the advantages arising from the proximity of the motorway). Consequently, Government Decree 209/2014 (XI.26) qualified this district as a beneficiary. (Since its calculated complex indicator was 41.32, it was ranked 86 out of 197 districts) (Government Decree 209/2014 (XI.26) on the classification of beneficiary districts).

Although the competitiveness of the district is below the average, it can be easily accessed. The electrified main railway line passes through Mezőkövesd. The 2×2-lane motorway M3 is only 1.5 km away from the town. Mezőkövesd is located only 45 km away from Miskolc, the seat of Borsod-Abaúj-Zemplén County, 132 km from Budapest, the capital of the country, 24 km from Eger, the seat of Heves County, 107 km away from Debrecen, the seat of Hajdú-Bihar County, and 101 km away from Szolnok, the seat of Jász-Nagykun-Szolnok County. Since the M3 and M30 motorways were built, the accessibility of the central regions of the country has significantly improved, which has positively affected the district as a whole. The nearest airports with international traffic serving flights are Budapest Ferenc Liszt International Airport (150 km), Debrecen Airport (110 km) and Košice (135 km).

Mezőkövesd is a suburb of Borsod-Abaúj-Zemplén County. This is the town where foreign capital reaches the country while moving eastward.

The economy in Mezőkövesd was dominated by machine manufacturing and metal processing industries from 1970. After the privatisation period, a number of Hungarian-owned enterprises were formed and Mezőkövesd also attracted foreign investors.

Even in 2010s arable farming was a dominant activity in the Mezőkövesd District. The production of field crops like winter wheat and sunflower prevails. In addition, viticulture and winemaking also play a significant role. Agricultural production areas are mostly dedicated to monoculture and intensive farming, the ecological consequences of which can be detrimental in a number of ways. Intensive cultivation practices involving the application of excessive amounts of fertilisers and pesticides, deep ploughing and over-irrigation used in monoculture production leads to an imbalanced diversity of the soil and increases its CO₂ emissions. The application of a combination of crop rotation and land fallowing techniques ensures biodiversity, maintains soil fertility and promotes the CO₂ storage capacity of the soil. As for the livestock sector, poultry farming (production of broiler chickens, hatching eggs and eggs for consumption) dominates, while the role of both beef cattle and hog farming is decreasing.

The tourism industry is a flagship sector in the Mezőkövesd District and due to its inter-sectoral nature, its development is a significant source of revenue. Among the most popular tourist attractions in the district are the spas: Zsóry Thermal Bath and Spa in Mezőkövesd and the Thermal Bath and Spa in Bogács. Matyó folk traditions and embroidery also play a prominent role.

The opportunities to break out of the development trap are very complex and affect both demand and supply (Table 3).

Table 3: SWOT analysis of Mezőkövesd District
Source: authors' own elaboration

<p style="text-align: center;">STRENGTHS</p> <ul style="list-style-type: none"> - Mezőkövesd District is on a growth path, boasts active development and the adoption of solutions offered by future technology during infrastructural investments. - Mezőkövesd is the centre of human-education, health, cultural and social infrastructure of the area. - It is connected to the M3 motorway. - The settlement centres and community spaces have been upgraded. 	<p style="text-align: center;">WEAKNESSES</p> <ul style="list-style-type: none"> - Available capital is limited. - The proportion of unskilled and underskilled labour force is high. - Demand is low. - Entrepreneurial activity is low.
<p style="text-align: center;">OPPORTUNITIES</p> <ul style="list-style-type: none"> - Making the product supply of the district more diverse by designing new products specific to the district and offering already available ones; - Enhancing sustainable tourism development; - Encouraging the start-up of goods-producing/service micro-enterprises; - Improving the standard of services based on the market needs; - Building energy-efficient systems in order to reduce overhead costs; - Applying incentive tools to encourage investment; - Connecting the district to the trans-European network since it is located along the M3 motorway; - Making the district suitable for attracting and maintaining industries that generate significant added value; - Developing service packages tailored to individual needs. 	<p style="text-align: center;">THREATS</p> <ul style="list-style-type: none"> - Decreasing and aging population (negative natural reproduction and migration balance); - Emigration of young people and qualified work force and increasing proportion of dependents; - Lack of joint actions; - Low willingness to establish regional partnerships for cooperation at inter-professional and public levels.

3.2. Settlement development objectives, tendering activities and sources

As for the territorial development objectives for the 2014-2020 programme period, the main objectives were as follows: to improve the quality of life, stop population aging, create a liveable environment, decrease social tensions, improve the economic potential and performance of the area and create a competitive economy.

In the investigated period, the intensity of support of the European Union programs varied. In the Territorial and Settlement Development Operative Programs, the support amounted to 100%. The beneficiaries could be primarily municipalities (in some cases civil organisations) and the advance payments amounted to 100%. The beneficiaries of the Economic Development and Innovation Operational Programs (EDIOP) were small and medium-sized enterprises SMEs, and support was in the range of 50-70%.

Regional plans and programs, as well as output indicators, were assigned to each goal (Figure 3).

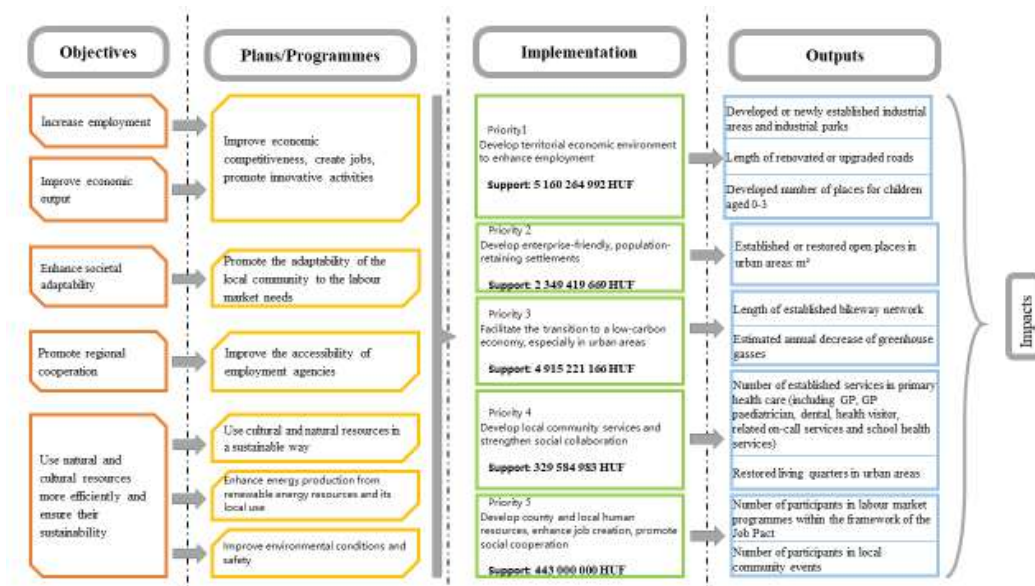


Figure 3. Impact chain of implemented developments from EU sources
Source: authors' own elaboration

Calls for proposal, project generation and data collection processes are complex and time consuming. The steps are shown in Table 4.

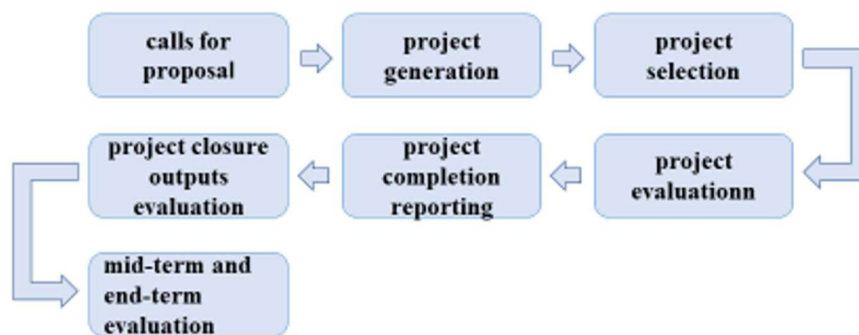


Figure 4: The process from the call for tenders to the closing of program
Source: authors' own elaboration

Project selection experiences

When the grant applications were submitted, the majority of the beneficiaries had minimal project content both from a technical and budgetary points of view. It was not unusual that only the grant agreements were signed, following which the actual technical and professional contents as well as the budget were elaborated and the supporting documents were prepared. Upon the approval of the project, beneficiaries faced difficulties and challenges in the implementation process (including unsettled ownership rights, inaccurate technical content, feasibility risks of the planned technical content, cost redesign, modifications of project elements due to incomplete preparation). Any amendment requests had to be approved by the participating organisations, which made further amendments necessary (major milestones in the progress report, transfers between budget lines, etc.). These were the reasons for discrepancies

between the number of project ideas outlined in the identification and submitting stages (Table 5).

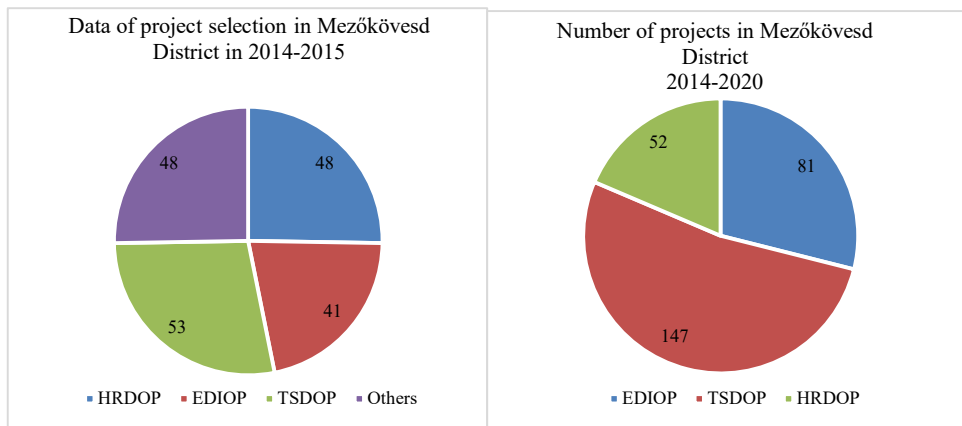


Figure 5: Distribution of project ideas (left) and submitted projects (right).
Source: authors' own elaboration

The amendments made the preparation stage longer and the project implementation period shorter. (The calls for proposal maximised the project preparation period to 18 months and the duration of the project implementation to 18 months.)

The preparation time of 18 months was quite long for beneficiaries. However, small-scale projects could have been implemented during this period.

The participating organisations and beneficiaries focused on closing the 2014-2020 HRDOP projects in the second half of 2023, as they had to be completed by the end of December 2023.

Public procurement processes were longer comparable to the previous period, thus several issues had to be clarified, which led to delays in project closure beyond the set deadline. Involving planning councils and competent authorities in permitting procedures also prolonged the preparation cycle.

The current regulatory environment does not impose strict reporting obligations. Beneficiaries are expected to report only on whether the project remains fully consistent with the set key milestones. However, both the county municipality and the state treasury would greatly benefit from additional information if mandatory information on the progress of a specific project had to be provided every quarter. This would be important because in the preparation phase of some projects, beneficiaries and stakeholders could be informed in time either about the public procurement that has been announced several times, or about the increased need for funds for the investment. Thus, a territorial actor would have more possibilities for efficient intervention in time and the project could start the implementation phase sooner. Territorial actors can intervene only if they possess information supported by accurate data and can get access to this information in time.

Grants awarded

Figure 6 illustrates the number of initiated, approved and implemented projects within the Territorial and Settlement Development Operational Programme (TSDOP), Economic Development and Innovation Operational Programme (EDIOP), and Human Resource Development Operational Programme (HRDOP), as well as the allocated resources. In the case of EDIOP applications, the amount of support in the implementation period. increased in parallel

with the number of applications, while in the TSDOP and HRDOP cases, resources were scarce in the implementation phase.

In the 2014-2020 programme period, the beneficiaries waited to initiate projects while the calls for applications were open. Thus, they elaborated and submitted their development requests under known conditions. In the case of EDIOP, there is a two-fold difference between the planning and implementation phases, while in the case of TSDOP, there is almost a three-fold difference. On the basis of the experience gained, it can be claimed that the main reason for waiting lies in the unwillingness of companies to share their development ideas with other actors in the economy, primarily in order to protect their market position. The reason why municipality projects were prepared so slowly was a shortage of human resources.

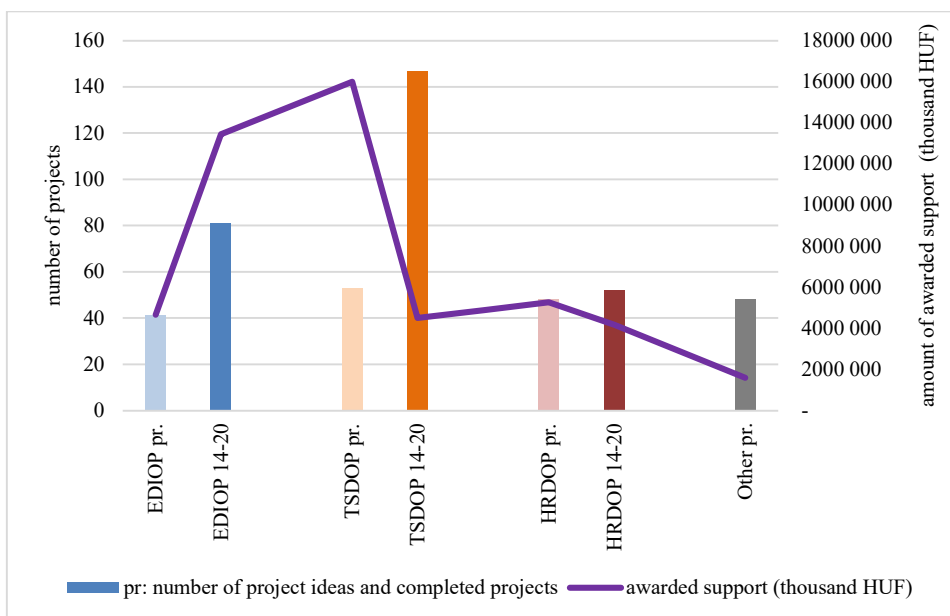


Figure 6: Number of identified and implemented projects and the amount of awarded support (thousand HUF)

Source: authors' own elaboration

Installation of solar energy systems was given high priority and projects with 50-79% intensity received financial support. Lower aid intensity was granted to projects involved in complex information development, production capacity expansion or credit-product related projects.

3.3. Development outputs

The financial resources used by Borsod-Abaúj-Zemplén County in the programme period 2014-2020 amounted to HUF 133 billion. The funds allocated to the Mezőkövesd District was proportionate to the population and accounted to HUF 1.55 billion/year. During seven years, this amount was as high as HUF 10.88339 billion, which was supplemented by the cost increases necessary to complete certain developments. This is summarised in Figure 7.

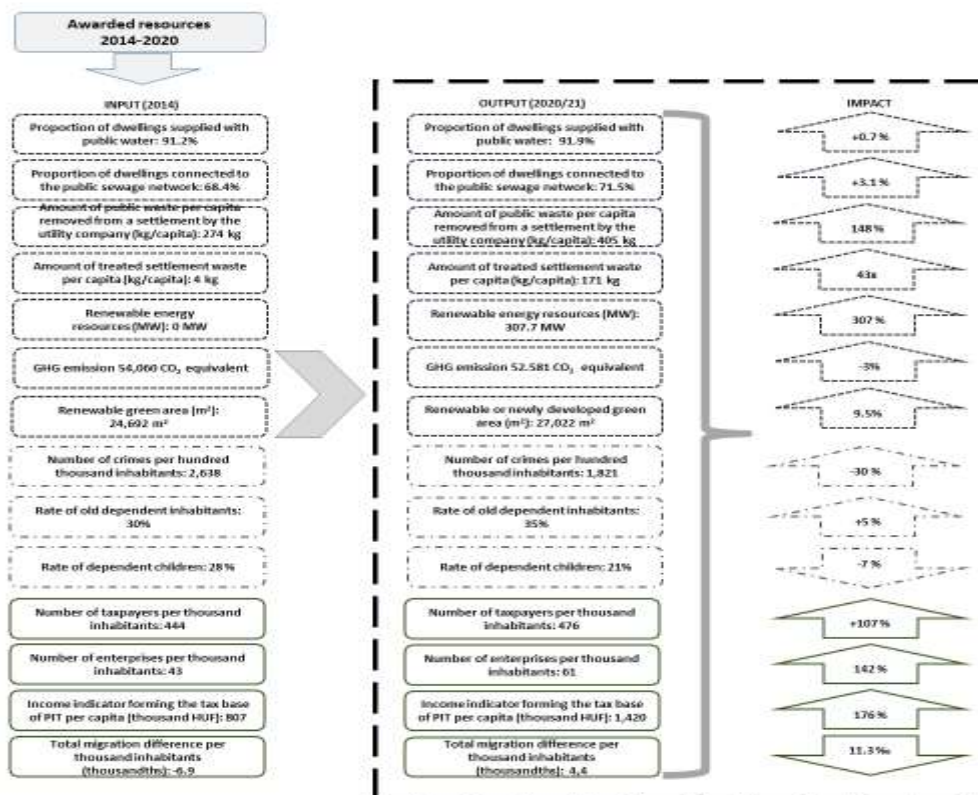


Figure 7: Changes in economic, environmental and societal outputs in the Mezökövesd District in the EDIOP programme period 2014-2020

Source: authors' own elaboration

Environmental outputs of developments

The proportion of dwellings supplied with public water at the beginning of the programme period (2014) was already relatively high, 91.2%, which increased to 91.9% in 2020. A higher increase (from 68.4% to 71.5%) was observed in the proportion of dwellings connected to the public sewage water network (HCSO). The amount of public waste removed per capita from a specified settlement also increased (it amounted to 274 kg in 2014 and to 405 kg in 2020) (HCSO). One of the causes of this may be due to the increased demand for packaging materials of products during the investigated period. Also, customers' purchasing behaviour changed and there was a greater demand for pre-packed products. In addition, the number of dwellings using municipal waste collection services significantly increased.

The amount of treated waste recovered per capita increased from 4 kg to 171 kg over the seven years (HCSO) due to a more eco-conscious consumer attitude towards selective waste collection.

Societal outputs of developments

The number of crimes per hundred thousand inhabitants decreased in the district by one third, from 2638 to 1821 cases (30% decrease) (HCSO). This is presumably due to the higher employment rate, increased public security and decreased unemployment rate (Figure 8). This also significantly contributes to the shift in the total migration difference in a positive direction.

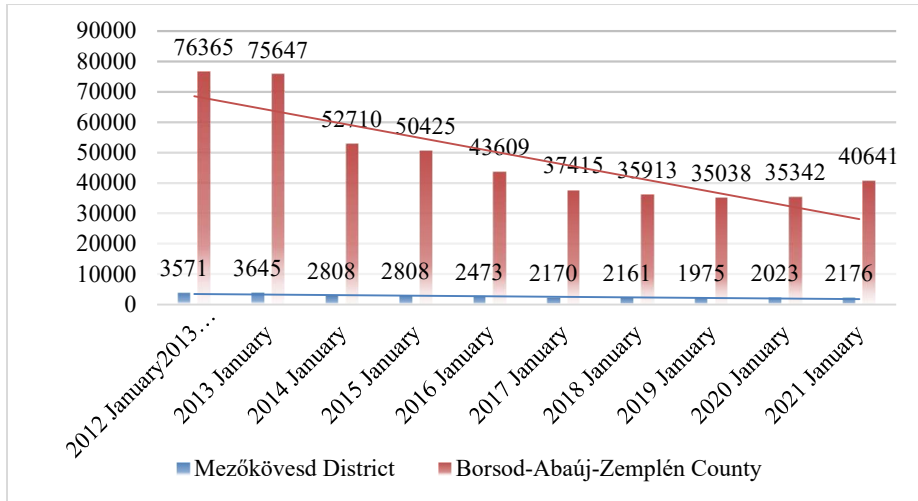


Figure 9: Number of registered job seekers on the closing date

Source: authors’ own elaboration based on the data of National Employment Service

The number of civil organisations operating in the area remained almost unchanged (Figure 9).

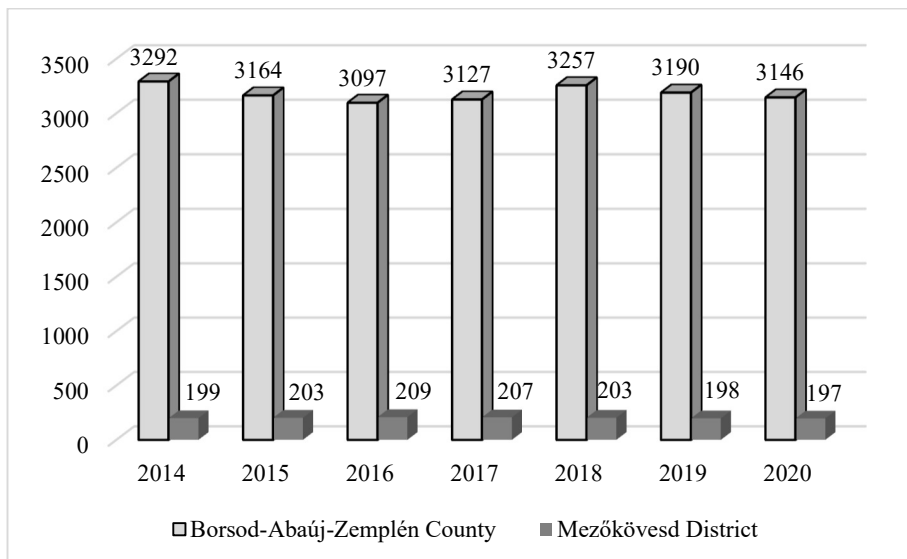


Figure 9: Change in the number of civil organisations (2014-2020)

Source: General Assembly of B.-A.-Z. County (2023)

Economic outputs of developments

The primary objective of EU project applications was to foster economic development. Local governments would have been unable to make investments without EU financial resources because they had only limited possibilities for savings.

When the use of resources was investigated, special attention was paid to technological development and the purchase of equipment. In the 2014-2020 programme period the completed projects had a favourable impact on entrepreneurial activities in the district.

The development of the district is ahead of the county data in terms of several indicators. EU funds boosted economic recovery and resulted in increased entrepreneurial spirit, a higher number of tax payers and a 75% increase in income forming the tax base of PIT per capita (Table 4).

Table 4: Changes in some indicators of Borsod-Abaúj-Zemplén County and the Mezőkövesd District (2014-2020)

Source: authors' own elaboration

	Density of public road network (km)		Number of taxpayers per thousand inhabitants		Income indicator forming the tax base of PIT per inhabitant (thousand HUF)		Number of enterprises per thousand inhabitants		Total migration difference per thousand inhabitants (thousandths)	
	Mezőkövesd District	Borsod-Abaúj-Zemplén Country	Mezőkövesd District	Borsod-Abaúj-Zemplén Country	Mezőkövesd District	Borsod-Abaúj-Zemplén Country	Mezőkövesd District	Borsod-Abaúj-Zemplén Country	Mezőkövesd District	Borsod-Abaúj-Zemplén Country
2014	55.1	59.5	444	434	807	768	43	43	-6.9	-5.7
2015	55.1	59.4	449	442	862	827	44	44	-1.7	-5.7
2016	55.1	59.8	503	492	945	909	45	44	-2.9	-5
2017	55.2	59.7	499	488	1077	1031	48	47	0.1	-6.3
2018	58.8	60.6	494	488	1215	1162	52	51	1.2	-7.1
2019	62.2	61.5	488	484	1376	1307	58	56	2.1	-7.1
2020	58.9	61.3	476	476	1420	1374	61	59	4.4	-5.8

The gross migration difference of Borsod-Abaúj-Zemplén County fluctuated between -5.0 and -7.1, whereas in the Mezőkövesd District it amounted to -6.9 in 2014. However, this difference turns into a positive figure in 2017, and grows further (HCSO). The ability of the district to retain its population and attract more people to the area was due to predictable developments, favourable transport conditions, new investments and jobs creation (Figure 10).

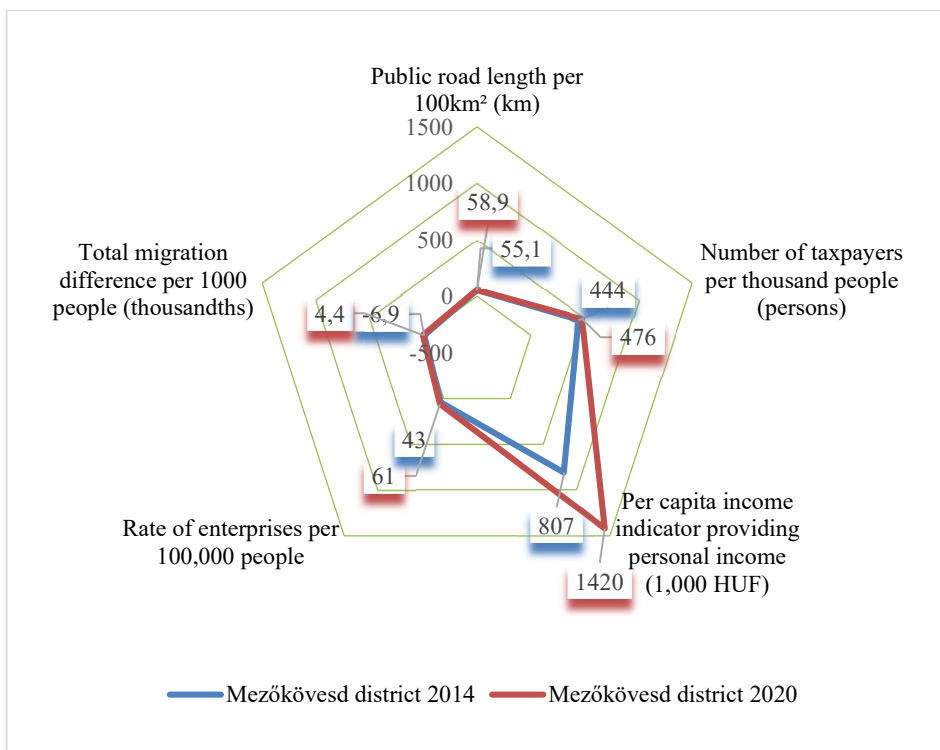


Figure 10: Evolution of development indicators in the Mezőkövesd District in the period 2014-2020

Source: authors' own elaboration based on <https://map.ksh.hu/timea>

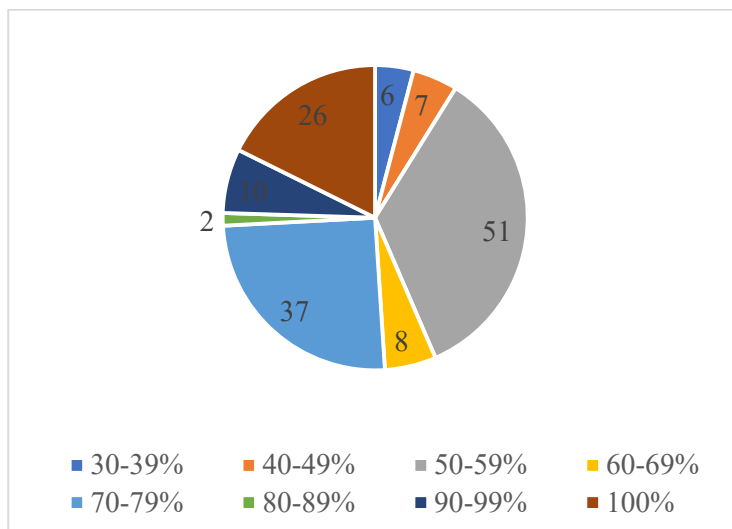


Figure 11: Distribution of support intensity of TSDOP applications in Mezőkövesd District in the 2014-2020 programme period

Project beneficiaries invested 56% of the granted EU resources in qualitative site development.

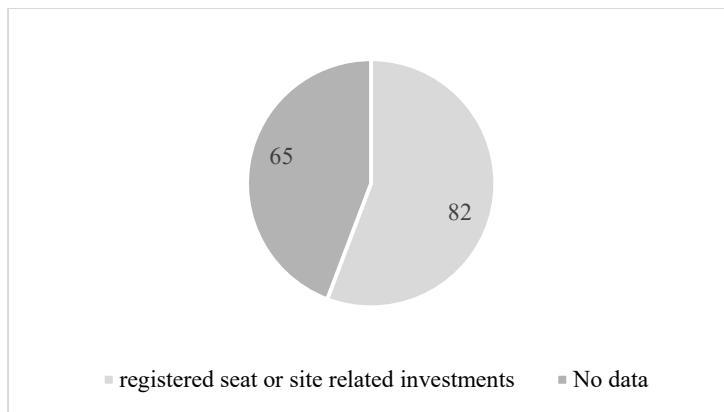


Figure 12: Number of investments within EDIOP in Mezőkövesd District (2014-2020)
 Source: authors' own elaboration based on <https://www.palyazat.gov.hu/eredmenyek>

About one fourth of EU funds were aimed at job creation and retention.

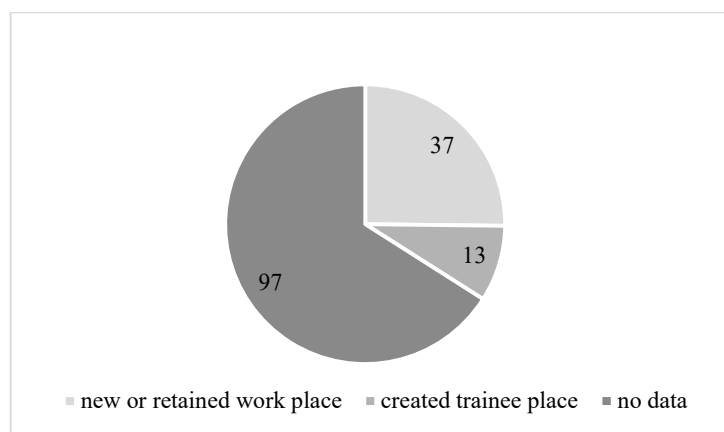


Figure 13: Number of jobs created in the Mezőkövesd District within EDIOP (2014-2020)
 Source: authors' own elaboration based on <https://www.palyazat.gov.hu/eredmenyek>

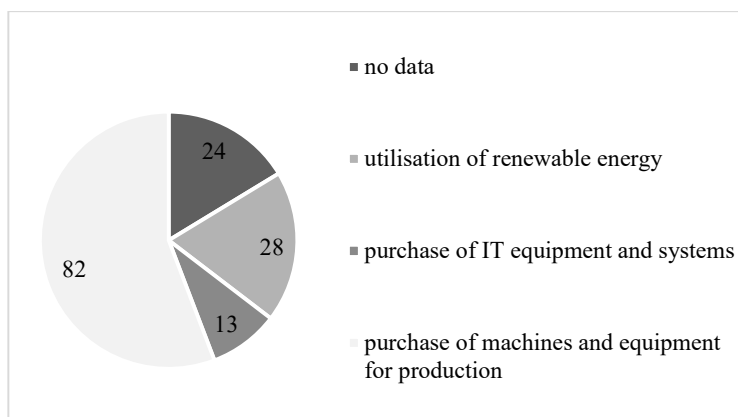


Figure 14. Number of purchased items of equipment within EDIOP (2014-2020)
 Source: authors' own elaboration based on <https://www.palyazat.gov.hu/eredmenyek>

Entrepreneurial activities are reflected in the fact that there were 43 enterprises/thousand in the district in the 2014 figures, which is the same as the county average. As for the number of enterprises in the Mezőkövesd District, the settlements of Mezőkövesd (58), Bogács (52), Cserépfalu (48) and Bükkábrány (45) stand out, whereas in Négyes (17) and Csincse (11) the number of enterprises was considerably lower.

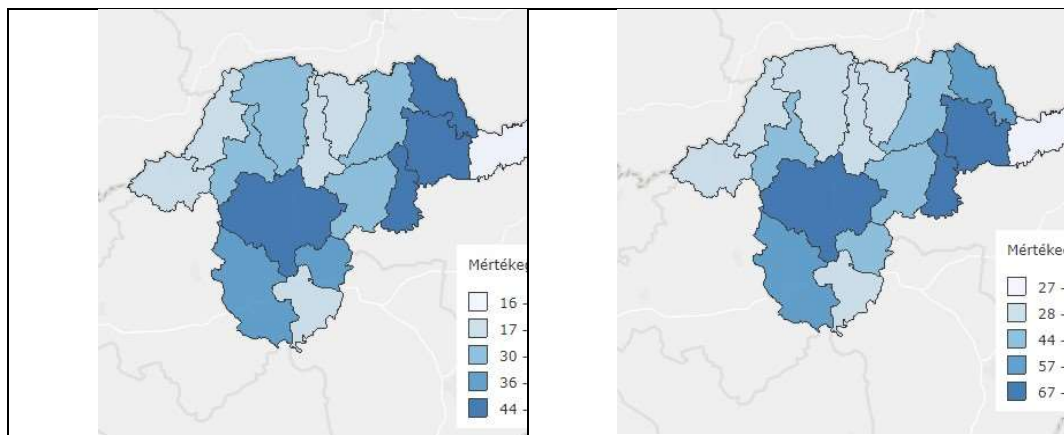


Figure 15: Number of enterprises per thousand inhabitants in districts of Borsod-Abaúj-Zemplén County in 2014 (left) and 2020 (right)

Source: <https://map.ksh.hu/timea>

The projects completed in the 2014-2020 period had a favourable impact on entrepreneurial activities in the Mezőkövesd District, since there were 61 enterprises per thousand inhabitants in 2020, which was higher than both the county average (59) and the regional average (62).

As for the number of taxpayers per thousand inhabitants, Borsod-Abaúj-Zemplén County (with 443 in 2014 and 485 in 2020) was below the regional average both in 2014 (434) and in 2021 (476). In terms of the number of taxpayers per thousand inhabitants in 2014, the Mezőkövesd District (444 people) surpassed the regional indicator. However, differences within the district can also be observed. The indicator is the highest in Cserépváralja (580 people) and the lowest in Sály (275 people). Data for 2021 shows that the number of taxpayers per thousand inhabitants in the Mezőkövesd District (485 people) grew in parallel with the regional average (483 people) and surpassed the Borsod-Abaúj-Zemplén County average (476 people). The differences between the settlements within the district also changed in the investigated period, since the number of taxpayers was the highest in Bükkábrány (538 people).

Since entrepreneurial activities grew in the Mezőkövesd District, the number of taxpayers also increased (Figure 16), and so did the indicator of income forming the tax base of PIT per thousand inhabitants (Figure 17).

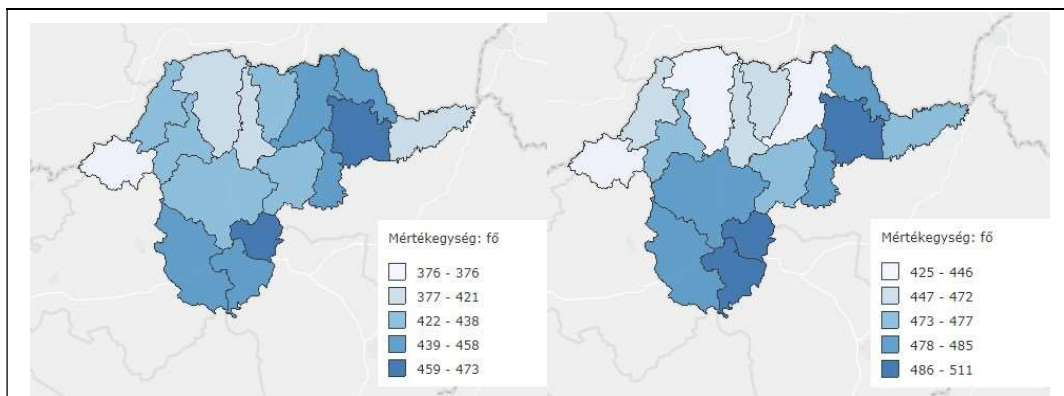


Figure 16: Number of taxpayers per thousand inhabitants in the districts of Borsod-Abaúj-Zemplén County in 2014 (left) and 2021 (right)

Source: <https://map.ksh.hu/timea>

The indicator of the income forming the tax base of PIT per thousand inhabitants also shows a positive trend. In 2014 the district indicator (HUF 807,000) was higher than that of the country (HUF 768,000). In 2021 the district indicator was HUF 1,591,000, while the county indicator was only HUF 1,532,000 (Figure 17).

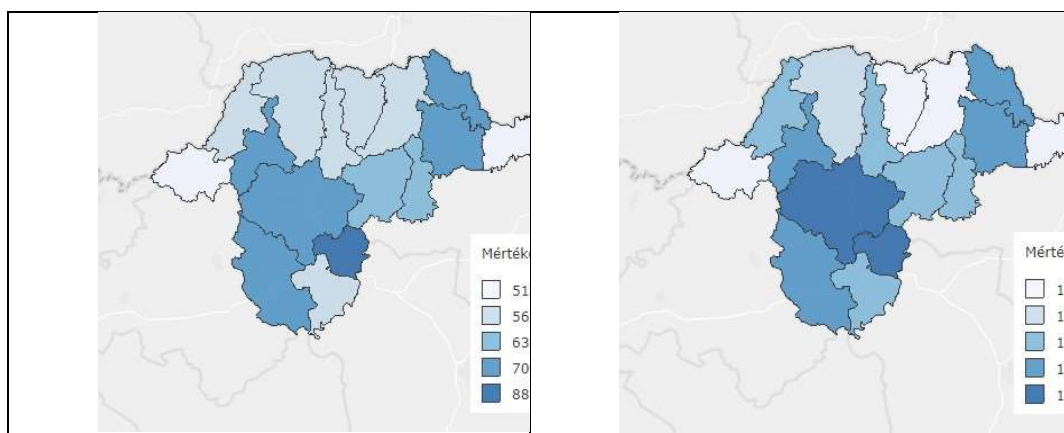


Figure 17: Income forming the tax base of PIT per permanent resident in the districts of Borsod-Abaúj-Zemplén County in 2014 (left) and 2021 (right)

Source: <https://map.ksh.hu/timea>

4. Results of the impact assessment

The outputs were used to investigate three impacts in the examined area. The weighed data of the added values of employment and sectors were used to measure the economic structural impact. The obtained results clearly show that the weight of the tertiary sector increases compared to primary and secondary sectors. The human development index value increases because years of schooling increase, the rate of early school leavers decrease, and gross incomes grow. The developments resulted in a decreased environmental load due to the changes in the conditions of infrastructure, waste collection and treatment (Table 5).

Table 5: Evolution of impact sub-indices and aggregated indices of the developments in the Mezőkövesd District in the period 2014-2020

Source: authors' own elaboration

Impact index	Year	
	2014	2020
Economic impact sub-index	0.42	0.54
Human development impact sub-index	0.871	0.882
Environmental impact sub-index	0.231	0.349
Aggregated impact index	43.8	54.9

5. Conclusions

The current target system and the allocation mechanism of territorial development is basically value-oriented, which may change in time and space. It makes a difference, however, whether the assessment is limited to the results or the fund provider also wants to examine the complex social, economic and environmental effects of the intervention.

This study uses an intermediate solution to deal with the challenges arising from the latter. Based on the social, economic and environmental results of the territorial developments (14 indicators), three impact sub-indicators (expressing the evolution of changes in economic structure, human development and environmental load) were elaborated. The aggregate index created from three sub-indices allows not only temporal but also spatial comparison. The spatial and aggregated indices take into account direct impacts resulting from funding, but neglect indirect and spillover impacts.

The validity of the model was tested by analysing the impacts of the developments in the Mezőkövesd District, Borsod-Abaúj-Zemplén County, Hungary, in the EU funding programme period 2014-2020.

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