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ENVIRONMENTAL, SOCIAL AND ECONOMIC DETERMINANTS OF SUSTAINABLE DEVELOPMENT IN THE PROCESS OF MANAGING MUNICIPALITIES ILLUSTRATED USING THE EXAMPLE OF THE LESSER POLAND VOIVODESHIP

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ABSTRACT: In an age of climate change and increasing negative environmental effects of the development of urban agglomeration, it is becoming more and more important to implement sustainable development principles in governing urban municipalities (Polish: gminy). The three areas of sustainable development: social, economic and environmental, have been extensively explored in scientific research over recent years. These studies have mostly covered international or regional areas and, to a lesser extent, local ones. Six environmental, economic and social indicators of sustainable development were examined for 14 urban municipalities located in Lesser Poland Voivodeship. Only a selected group of indicators from these areas was assessed due to limited data availability. Social and economic measures showed a strong Spearman's rank correlation. Based on the collected research material, benchmarking was developed for the units under evaluation, indicating that over the period between the year 2014 and 2019, the city of Krakow occupied the highest position, on average, among urban municipalities of Lesser Poland Voivodeship, considering the measures analysed.

KEYWORDS: environment, sustainable development factors, management, municipalities

Introduction

Natural environment degradation has led to severe climate change worldwide, bringing natural disasters (droughts, floods, hurricanes, tornadoes) that have had far-reaching consequences for humans. More and more countries realise that economic expansion has harmed the environment, leading to depletion of natural resources, problems with smog, access to clean water, etc. Many years of discussions, climate summits and scientific research have made it clear that this is a complex problem that affects many aspects of life. This has led to the search for ways to stop the adverse effects of human activity on the natural environment and to create the concept of sustainable development. This concept is treated as one of the ways to solve contemporary social and environmental problems. Implementation of sustainable development strategies reduces social disparities, reduces environmental pollution, and facilitates rational development of economic, ecological and environmental goals (Bocian, 2007, p. 143–160). It is essential to move towards an increased environmental awareness through an appropriate action strategy by the local authorities. A task of municipalities as territorial government units operating at a local level is to promote and encourage the building of community in line with the concept of sustainable development (Giordano, 2005, p. 34). Municipal authorities are perceived as a body with a significant potential to contribute to the creation of a sustainable economy; they can employ coercive measures to reduce activities that are not in line with the idea of sustainable development (Rosa et al., 2005, p. 112; Matysiak, 2010, p. 12). Looking at the literature on the subject, one can notice that sustainable development is mainly referred to in the context of three dimensions: economy, society and the environment (Keiner, 2004, p. 381). Both residents of a municipality and municipal authorities actively participate in the propagation and creation of sustainable development. Engaging economic entities operating in a given area and other local government units or central and EU authorities is also necessary.

To achieve appropriate results in sustainable development, actions need to be planned in the long run (Krupa, 2013, p. 50). Moreover, implementing sustainable development principles in municipalities depends on how a given unit is governed. Changes taking place in organisations and their environment brings about new problems. New challenges and dilemmas emerge with organised activities and initiatives. However, what has changed over the years is mainly the conditions under which leaders operate, as well as their fundamental principles and character of governance (Anderson et al., 2014, p. 18; Waśniewska, 2015, p. 86).

This paper aims to identify determinants of sustainable development in the process of governing urban municipalities, particularly in the aspect of environmental factors and their quantification. In order to accomplish the above-stated aims, the environmental dimensions of sustainable development indicators were analysed in urban municipalities located in Lesser Poland Voivodeship from 2014 to 2019.

An overview of the literature

The sustainable development paradigm occupies a prominent position in global, regional and local strategies. This concept is fundamental at a local level in dynamically developing cities (Guo et al., 2020, p. 6571; Gunzenova, 2019, p. 217-224; Sciarelli et al., 2021, p. 39-56). Factors stimulating and reducing sustainable development have a significant impact on the development of the concept in the urban municipalities' sustainable development paradigm. At the same time, the local urban development system is complex (although it covers the smallest area) and requires effective coordination across many different types of organisations or groups of stakeholders that significantly impact the concept's development. Often, the task of municipal authorities is to create a system that combines all components (public and private sector organisations, citizens and enterprises, institutions and development agencies) and maximises all available resources, knowledge and experience. The essential idea of sustainable development is based on the premise of ensuring a sustainable increase in the quality of life of the present and future generations by developing reasonable proportions between the economy, society and ecology (Piontek, 2011, p. 19; Makhosheva et al., 2018, p. 28; Klarin, 2018, p. 67-94). Concerning the elements of the natural environment, the necessity of taking care of its resources, i.e. soil, minerals, water, plants and animals, is highlighted. Also, such values as landscape or ecosystems are recognised. The environmental dimension of sustainable development is oriented towards preserving biological diversity and ecosystem balance. Attention is focused not on single elements of the environment but on the relationships between the components of individual ecosystems (Preisner, 2002, p. 440-447; Holden et al., 2018). Environmental elements are directly linked to the capability of using the natural environment and ecosystem utility. Their availability translates into satisfying human needs, which is necessary to improve the quality of life. Ensuring that the environment is as intact as possible requires, in the first place, identifying its potential (Preisner, 2008, p. 484-487; Lenox & Chatterji, 2018, p. 4; Carboet al. 2018, p. 9, 68, 138, 155-158). Gotowska (2013, p. 28), among others, notes a strong correlation between the quality of life of people living in municipalities and sus-

tainable development. Linking the quality of citizens' life with the concept of sustainable development is also crucial because of the environmental aspect. The environmental quality of the area where people live impacts the satisfaction of human needs such as health and safety. By appropriately managing a social life, social contact and support can be provided, thus preventing social helplessness, social exclusion and marginalisation (Preisner & Pindór, 1999, p. 13-23; Bhandari 2019, p. 97-128). Moreover, apart from individual satisfaction (personal preferences concerning quality), it also ensures collective satisfaction of residents, leading to the quality of life being rated higher at the local level (Woźniak, 2015, p. 79-99). At the same time, the way a municipality is governed determines to what extent a high quality of life and sustainable development are achieved. Thus municipal authorities should concentrate on issues related to improving quality of life through governance (Michalska-Żyła, 2016, p. 57).

Research on the social determinants of sustainable development was carried out, among others, by Basar & Eren (2021). They assessed the relationship between the regional human development index and public investment expenditure, terrorist attacks and population density in 12 regions of Turkey. Their findings and recommendations are also considered beneficial to countries with a similar social and economic situation to Turkey. Research on the determinants of the human development index was also conducted by Khan et al. (2019). The study's authors modelled the relationship between ICT, economic growth, and the Human Development Index (HDI), considering urbanisation, foreign direct investment (FDI), and trade in Pakistan. The study of the economic and social determinants of sustainable development of small and medium-sized enterprises (SMEs) was carried out by Cicea et al. (2019). The novelty and originality of their research were defined in terms of addressing the performance of SMEs from a new perspective, using an econometric basis in a macroeconomic view. In turn, the assessment of the financial and economic determinants of sustainable development using the functional coefficient model was carried out by Herwartz & Walle (2014). The presented research directions concerned various areas of sustainable development but focused primarily on the regional approach.

Sustainable development indicators are assessed regionally and internationally, as summarised in annual reports (Sustainable Development Report, 2022). Indicators of sustainable development for all member states of the UN were presented in multiple reports, such as the one by Sachs et al. (2021). As prepared by teams of independent experts at the Sustainable Development Solutions Network (SDSN) and the Bertelsmann Stiftung. The interactive SDR 2021 studied counties were assessed regarding the impact of the COVID-19 pandemic on sustainable development goals. Action priorities were identified based on the visual representation of countries' performance by SDG.

On the other hand, a team of independent researchers at the Sustainable Development Solutions Network (SDSN), together with SDSN Europe and the Institute for a European Environmental Policy (IEEP), created the Europe Sustainable Development Report (2021). This report was prepared based on evidence-based methods introduced in the annual Sustainable Development Report, as well as the SDG Index and Dashboards provided by the SDSN and Bertelsmann Stiftung since 2016. However, studies addressing the assessment of sustainable development indicators for municipalities are scarce.

The governance of a municipality in the context of sustainable development should be defined as a set of interrelated tasks executed by a municipality's governing bodies and subordinate institutions to achieve cohesion as well as territorial, economic and environmental sustainability. This process enables the local authorities and population to identify and prioritise needs and, simultaneously, ensure the necessary means to satisfy them (Brandenburg, 2003, p. 202). These are activities integrated with the general system of local government administration that involves strategic planning, and considering rational use of local resources. To achieve cohesion in different areas of development, efficient instruments and methods must be used (Paluch, 2013, p. 526-527). The issues of local-level governance are closely connected with the local authorities establishing the direction of sustainable development actions, which is expressed through adopted policies and specifies types of tasks to be executed and means used for that purpose (Pietrzyk, 2000, p. 32). Local authorities play an important role in managing and stimulating sustainable development, but in order to ensure progress, the existing ways of governing public entities need to be constantly improved. Being responsible for the municipality's level of development, local authorities have to develop techniques that support transformations contributing to sustainability-based development correlated with the natural environment. Such techniques make it possible to fulfil different expectations and social aspirations through which the municipalities' living environment is created (Nonaka & Toyama, 2005).

Research methods

The paper represents an attempt to analyse sustainable development indicators in the following 14 urban municipalities (Polish: *gminy*) of Lesser Poland Voivodeship: Bochnia, Gorlice, Limanowa, Mszana Dolna, Grybów, Nowy Targ, Bukowno, Oświęcim, Jordanów, Sucha Beskidzka, Zakopane, Krakow, Nowy Sącz, and Tarnów. The municipalities vary in terms of sustainable development conditions. The analysed municipalities include both large, urban areas (e.g. the city of Krakow) and smaller, typically tourist towns (e.g.

Zakopane, Sucha Beskidzka). The economic, social and environmental variation in the studied municipalities makes it possible to show the conditions of sustainable development specific to each city. The municipalities are located in the southern part of Poland, covering around 15 thousand square km. (one of the smallest voivodeships in Poland, bounded on the west by Silesian Voivodeship, on the north by Świętokrzyskie Voivodeship, on the east by Subcarpathian Voivodeship, and on the south by Slovakia). Lesser Poland Voivodeship comprises 22 powiats (counties) and 182 municipalities (3 cities with powiat rights: Tarnów, Nowy Sącz and Krakow). The Voivodeship is located within the following physical and geographical units: Oświęcim Basin, Sandomierz Basin, the Western Carpathians, Krakovian Gate, Nida Basin, the Krakow-Czestochowa Upland, which makes its environment relatively varied. The research was conducted at the turn of 2020-2021. The study period covered the years 2014-2019 to ensure comparability of data in all municipalities. The indicators were developed based on the Local Data Bank, where the information is made available with a two-year delay.

The assessment of the level of sustainable development of municipalities consists of monitoring a set of constructed individual and group indicators describing the economic, environmental and social aspects. In the literature on the subject, one can find various proposals for measuring sustainable development at individual levels of territorial division (local, regional, sub-regional, national, and international) (Poskrobko, 2011). Nourry (2008) compared the results of eight methods of assessing sustainable development. The overall findings were that every method had limitations. Therefore, the methods for sustainable development assessment require critical analysis as the final conclusions are method-specific. Paris and Kates (2003) noted that despite the persistent definitional ambiguities associated with sustainable development, much work (over 500 research efforts) has been devoted to developing quantitative indicators of sustainable development. They have concluded that no indicator sets are universally accepted, backed by compelling theory, rigorous data collection and analysis, and influential in the policy. Also, Evans et al. (2015) concluded that there is still no single method of assessing the sustainability of development that is widely accepted as suitable. All methods developed have inadequacies that prevent an accurate measure of sustainable development from being determined. Alfsen and Greker (2007) state that most indicators fail due to a large number of indicators, often representing measurements that are not backed up by theoretical rationale and only focus, to a limited extent, on crucial sustainable development parameters. The development of a set of indicators that enable measurement of the effects of implementing the principles of sustainable development results from the operationalization of the concept, supervision of the implementation of goals indicated in planning, as well as strategic or

political documents prepared at individual territorial levels (Lawn, 2003; Poskrobko, 2011). Korol (2008) points out that at the regional level, there are three dimensions of indicators: economic (GDP, sustainable energy development, entrepreneurship and professional activity, sustainable transport, sustainable tourism development, sustainable rural development, infrastructure availability); environmental (water quality – water and sewage management, protection of natural resources, air protection, radiation protection, landscape and nature protection, climate protection, access to environmental information) and social (poverty level, health protection, demography, public safety, education, culture, housing, equality, partnership).

Creating a database of sustainable development indicators should become the overriding research goal and, at the same time, a joint action of local governments, involving the contribution of local government units to the spread of the idea of sustainable development (Dahl, 2012). In practice, only some of the indicators are often analysed. Correct assessment is also undermined by low availability or lack of statistical data comprising an appropriate time and spatial perspective that can form the basis for comparisons. This contributes to difficulties in creating a comprehensive assessment and the emergence of information gaps. Numerous attempts to quantify the idea of sustainable development do not solve the problem of the lack of availability of material for comparisons.

Table 1. Environmental, economic, and social indicators of sustainable development

Symbol	Environmental indicators	Economic indicators	Social indicators
W1	Expenditure on municipal economy and environmental protection per capita [PLN]	Own revenue of gmina budgets per capita [PLN]	Total net migration per 1000 population
W2	Expenditure on climate and air protection per capita [PLN]	Budget expenditure per capita [PLN]	Expenditure on culture and art per capita [PLN]
W3	Population connected to wastewater treatment plants in % of total population	The share of investment expenditure of gminas in total expenditure [%]	Expenditure on physical education and sport per capita [PLN]
W4	Consumption of water per capita in [m ³]	Dwellings completed per 1000 population	The share of registered unemployed persons in population in the working age [%]
W5	Mixed waste collected during the year in total per capita in [kg]	Entities by size classes per 1000 population total	Expenditure on social welfare per capita [PLN]
W6	The share of parks, lawns and green areas of the housing estate areas in the total area [%]	Entities newly registered by ownership sectors per 1000 population	Expenditure on education and upbringing per capita [PLN]

Source: authors' work.

Table 1 provides the symbols and names of the sustainable development indicators. Six indicators related to the environmental, economic and social aspects of the areas of sustainable development were selected. Such a selection of indicators was influenced by the availability of data from the analysed municipalities.

The indicators were developed based on quantitative data obtained from Statistics Poland (BDL). Descriptive statistics and correlational analyses were used to gain insight into trends, differences and relationships between variables in obtained quantitative data. The environmental governance indicators covered the aspects of climate change, air protection, waste management and the size of urban green areas. A significant indicator was the municipal budget expenditure for environmental protection and municipal services management. The way the indicators of implementation of sustainable development concept are selected is a subject of continuous discussion. However, it should be emphasised that the main aim of the presented indicators is to show how this idea was developed for the selected municipalities in Lesser Poland Voivodeship.

Results of the research

The indicators of sustainable development in urban municipalities were quantified considering environmental, social and economic dimensions. Due to a large number of indicators in each dimension, selected six measures were examined. Table 2 presents the measurement of environmental factors for urban municipalities of Lesser Poland Voivodeship. Analysis of the expenditure for environmental protection and municipal services management shows a positive trend – an increase in the indicator relative to the base year – in 11 examined municipalities. In contrast, a decrease was recorded in the following municipalities: Bochnia, Limanowa, and Nowy Targ. The high average expenditure for environmental protection and municipal services management can be observed in Zakopane ($X = 711.93$) and Krakow ($X = 663.53$), both of which are tourist destinations. These municipalities, due to their proximity to many areas of protected wildlife (Zakopane) and the problem of pollution of the environment (Krakow), emphasise raising ecological awareness. As a result, the expenditure for environmental protection is recorded at higher rates in these areas. It should be stressed that in the municipality of Limanowa, the average value of the indicator is also at a high level ($X = 621.91$). This results from the actions undertaken by the municipality to increase the quality of the environmental infrastructure and improve urban public infrastructure. In addition, the municipality emphasises the development of active tourism, recreational and cultural infrastructure, and

Table 2. Sustainable development indicators in the environmental area of urban communes of the Lesser Poland Voivodeship in 2014-2019

Specification	Krakow	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
W1 – Expenditure on municipal economy and environmental protection per capita [PLN]														
2014	446.59	253.07	268.19	849.04	254.79	1068.59	414.15	241.94	651.2	421.9	303.82	249.86	582.08	500.66
2015	558.44	278	272.09	366.78	228.47	1004.33	386.23	248.16	463.56	386.56	322.14	346.97	572.8	599.78
2016	674.78	357.8	346.86	332.16	189.31	301.54	298.94	268.24	288.08	371.56	312.27	273.42	526.26	617.76
2017	707.7	370.7	360.36	443.4	222.55	434.06	239.45	262.66	353.74	406.64	351.4	359.53	413.27	874.44
2018	748.72	423.16	377.13	415.26	240.66	673.6	571.99	356.48	477.18	510.83	418.92	462.54	521.77	1024.01
2019	844.91	487.18	457.97	844.91	1005.57	249.35	507.91	396.41	599.61	517.39	882.53	456.73	919.16	654.91
2014-2019	663.52	361.65	347.10	541.92	190.48	621.91	403.11	295.65	472.23	435.81	431.85	358.17	589.22	711.93
W2 – Expenditure on climate and air protection per capita [PLN]														
2014	47.11	11.09	1.57	0	41.42	0.65	178.56	0	0.51	2.61	4.21	0.56	219.71	no data
2015	46.4	25.69	7.78	0.76	1.96	0.05	182.58	0	1.73	7.06	3.35	94.07	218.49	no data
2016	89.97	30.97	43.02	0.59	1.85	3.25	90.77	0	11.71	7.38	2.78	0	173.42	no data
2017	115.69	4.31	41.86	2.71	15.96	6.74	2.23	8.13	51.26	43.79	5.03	52.27	46.34	no data
2018	71.42	25.15	21.08	56.31	5.24	70.02	152.77	75.58	36.85	100.74	10.5	102.01	126.51	no data
2019	58.65	5.05	27.02	34.79	4.06	28.32	18.18	4.2	41.76	41.89	26.08	17.67	92.04	no data
2014-2019	71.54	17.04	23.72	15.86	11.74	18.17	104.18	14.65	23.97	33.91	8.66	44.43	146.08	no data
W3 – Population connected to wastewater treatment plants in % of total population [%]														
2014	97.56	86.31	99.59	97.32	99.23	81.57	53.84	64.32	94.59	67.07	98.43	37.7	88.54	97.98
2015	98.64	93.35	99.61	94.66	99.5	81.3	54.87	64.44	95.59	67.03	98.1	37.7	90.03	97.98
2016	98.33	95.25	99.98	95.29	99.76	83.23	55.45	6.19	96.01	67.17	98.31	37.7	91.36	97.97
2017	97.72	92.87	96.47	95.59	99.72	84.75	56.88	62.4	96.21	77.38	97.09	37.7	92.38	97.96

Specification	Krakow	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
2018	97.26	94.12	97.62	95.91	99.86	86.41	59.58	62.93	96.24	80.73	96.55	37.7	94.77	97.45
2019	96.25	94.71	99.97	96.67	99.97	86.4	60.03	63.23	92.21	78.84	96.16	37.27	95.91	98.11
2014-2019	97.63	92.77	98.87	95.89	99.67	83.94	56.77	53.92	95.14	73.03	97.44	37.62	92.16	97.63
W4 – Consumption of water per capita in [m3]														
2014	70.8	40.2	155	63.9	40.3	41.9	17.3	11.2	31.2	865.5	229.7	25.5	38.5	82.4
2015	69.3	40.3	147.3	65	37.3	44.5	17.2	11.8	29.6	924.9	232.8	26.1	38.3	87.2
2016	69.2	40	139.1	64.1	37.9	44.1	16.8	11.7	29.9	801.5	231.1	24.8	40.1	92
2017	70.3	40.7	149.1	65.8	38.5	45.4	17.5	14.7	31.1	908.5	261.5	23.8	41.2	95
2018	73.9	41	151.1	68.6	38.6	45.1	17.5	12.5	32.8	1175.4	266.4	23.8	44	97.2
2019	71.4	42.9	146.4	70.6	38.6	46.5	17.7	12.8	34	1053.7	285.2	23.6	44.8	99.3
2014-2019	70.82	40.85	148.00	66.33	38.53	44.48	17.33	12.45	31.43	792.44	251.12	24.60	41.15	70.82
W5 – Mixed waste collected during the year in total per capita in [kg]														
2014	253.5	231.2	244.2	227.8	244.4	231.6	192	191.3	215.1	269.1	319	147.7	161.9	433.9
201	248.8	235.4	195.4	234.6	235.2	249.5	202.7	209.9	225	271.8	321	172.3	37.4	455.6
2016	326.1	244.8	267.6	233.9	258.3	275.8	188	220.4	238.2	282.1	325.9	98.3	186	539.3
2017	283.3	261.2	262.3	236.6	273.7	297.4	209.4	218.7	223.5	298.1	333	162.7	208.2	571.6
2018	291.2	242.3	287	259.5	278.1	314.3	196.1	222.5	251	290.9	343.2	191.9	236.9	587.1
2019	284.3	245	290.9	225.9	281.3	317.3	192.5	209.5	245	285.5	347.1	198	365.2	606.4
2014-2019	281.20	243.32	257.90	236.38	261.83	280.98	196.78	212.05	232.97	282.92	331.53	161.82	199.27	532.32
W6 – The share of parks, lawns and green areas of the housing estate areas in the total area [%]														
2014	4.8	1.6	1.9	1.7	1.9	0.6	0.2	0.6	0.8	0.4	3.8	0.2	0.4	0.6
2015	4.9	1.9	1.8	1.7	1.9	0.6	0.2	0.5	0.6	0.4	3.8	0.2	0.5	0.6

Specification	2016	5.1	1.9	1.9	1.9	1.7	2	0.7	0.2	0.5	0.7	0.2	3.8	0.2	0.5	0.9
	2017	5.3	1.9	1.9	1.7	2	2	0.7	0.2	0.5	0.6	0.2	3.8	0.2	0.5	0.9
	2018	5.5	1.7	1.8	1.7	2.1	2.1	0.7	0.2	0.6	0.6	0.2	3.7	0.2	0.5	0.6
	2019	5.8	1.7	1.8	1.7	2.1	2.1	0.7	0.2	0.6	0.6	0.3	3.7	0.2	0.5	0.6
	2014-2019	5.23	1.78	1.85	1.70	2.00	2.00	0.67	0.20	0.55	0.65	0.28	3.77	0.20	0.48	0.70

Source: authors' work based on BDL.

leisure spaces. Analysis of the indicator of the expenditure for air and climate protection shows a decrease in its value in three municipalities. This refers to the following cities: Nowy Sącz, Gorlice, Sucha Beskidzka and Mszana Dolna. In other municipalities, the value of this indicator increased. The highest increase was recorded in the municipality Nowy Targ (in 2014, the value of the indicator was PLN 0.51, while in 2019 – PLN 41.76) and in the municipality Bochnia, where in 2014, the expenditure for that purpose amounted to PLN 0 and increased to PLN 34.79 in 2019. The highest average amount of expenditure in the analysed period was recorded in Sucha Beskidzka ($X = 146.08$). The municipality is implementing the „Low Emission Reduction Programme for the municipality Sucha Beskidzka”, which involves the fulfilment of residents’ needs and expectations about heat management. Information about air and climate protection expenditure was not made available by the municipality Zakopane.

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2018	748.72	423.16	377.13	415.26	240.66	673.6	571.99	356.48	477.18	510.83	418.92	462.54	521.77	1024.01
2019	844.91	487.18	457.97	844.91	1005.57	249.35	507.91	396.41	599.61	517.39	882.53	456.73	919.16	654.91
2014-2019	663.52	361.65	347.10	541.92	190.48	621.91	403.11	295.65	472.23	455.81	431.85	358.17	589.22	711.93
W2 – Expenditure on climate and air protection per capita [PLN]														
2014	47.11	11.09	1.57	0	41.42	0.65	178.56	0	0.51	2.61	4.21	0.56	219.71	no data
2015	46.4	25.69	7.78	0.76	1.96	0.05	182.58	0	1.73	7.06	3.35	94.07	218.49	no data
2016	89.97	30.97	43.02	0.59	1.85	3.25	90.77	0	11.71	7.38	2.78	0	173.42	no data
2017	115.69	4.31	41.86	2.71	15.96	6.74	2.23	8.13	51.26	43.79	5.03	52.27	46.34	no data
2018	71.42	25.15	21.08	56.31	5.24	70.02	152.77	75.58	36.85	100.74	10.5	102.01	126.51	no data
2019	58.65	5.05	27.02	34.79	4.06	28.32	18.18	4.2	41.76	41.89	26.08	17.67	92.04	no data
2014-2019	71.54	17.04	23.72	15.86	11.74	18.17	104.18	14.65	23.97	33.91	8.66	44.43	146.08	no data
W3 – Population connected to wastewater treatment plants in % of total population [%]														
2014	97.56	86.31	99.59	97.32	99.23	81.57	53.84	64.32	94.59	67.07	98.43	37.7	88.54	97.98
2015	98.64	93.35	99.61	94.66	99.5	81.3	54.87	64.44	95.59	67.03	98.1	37.7	90.03	97.98
2016	98.33	95.25	99.98	95.29	99.76	83.23	55.45	6.19	96.01	67.17	98.31	37.7	91.36	97.97
2017	97.72	92.87	96.47	95.59	99.72	84.75	56.88	62.4	96.21	77.38	97.09	37.7	92.38	97.96

Specification	Krakow	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
2018	97.26	94.12	97.62	95.91	99.86	86.41	59.58	62.93	96.24	80.73	96.55	37.7	94.77	97.45
2019	96.25	94.71	99.97	96.57	99.97	86.4	60.03	63.23	92.21	78.84	96.16	37.27	95.91	98.11
2014-2019	97.63	92.77	98.87	95.89	99.67	83.94	56.77	53.92	95.14	73.03	97.44	37.62	92.16	97.63
W4 – Consumption of water per capita in [m ³]														
2014	70.8	40.2	155	63.9	40.3	41.9	17.3	11.2	31.2	865.5	229.7	25.5	38.5	82.4
2015	69.3	40.3	147.3	65	37.3	44.5	17.2	11.8	29.6	924.9	232.8	26.1	38.3	87.2
2016	69.2	40	139.1	64.1	37.9	44.1	16.8	11.7	29.9	801.5	231.1	24.8	40.1	92
2017	70.3	40.7	149.1	65.8	38.5	45.4	17.5	14.7	31.1	908.5	261.5	23.8	41.2	95
2018	73.9	41	151.1	68.6	38.6	45.1	17.5	12.5	32.8	1175.4	266.4	23.8	44	97.2
2019	71.4	42.9	146.4	70.6	38.6	46.5	17.7	12.8	34	1053.7	285.2	23.6	44.8	99.3
2014-2019	70.82	40.85	148.00	66.33	38.53	44.48	17.33	12.45	31.43	792.44	251.12	24.60	41.15	70.82
W5 – Mixed waste collected during the year in total per capita in [kg]														
2014	253.5	231.2	244.2	227.8	244.4	231.6	192	191.3	215.1	269.1	319	147.7	161.9	433.9
201	248.8	235.4	195.4	234.6	235.2	249.5	202.7	209.9	225	271.8	321	172.3	37.4	455.6
2016	326.1	244.8	267.6	233.9	258.3	275.8	188	220.4	238.2	282.1	325.9	98.3	186	539.3
2017	283.3	261.2	262.3	236.6	273.7	297.4	209.4	218.7	223.5	298.1	333	162.7	208.2	571.6
2018	291.2	242.3	287	259.5	278.1	314.3	196.1	222.5	251	290.9	343.2	191.9	236.9	587.1
2019	284.3	245	290.9	225.9	281.3	317.3	192.5	209.5	245	285.5	347.1	198	365.2	606.4
2014-2019	281.20	243.32	257.90	236.38	261.83	280.98	196.78	212.05	232.97	282.92	331.53	161.82	199.27	532.32
W6 – The share of parks, lawns and green areas of the housing estate areas in the total area [%]														
2014	4.8	1.6	1.9	1.7	1.9	0.6	0.2	0.6	0.8	0.4	3.8	0.2	0.4	0.6
2015	4.9	1.9	1.8	1.7	1.9	0.6	0.2	0.5	0.6	0.4	3.8	0.2	0.5	0.6

Specification	2016	5.1	1.9	1.9	1.7	1.7	2	0.7	0.2	0.5	0.7	0.2	3.8	0.2	0.5	0.9
	2017	5.3	1.9	1.9	1.7	1.7	2	0.7	0.2	0.5	0.6	0.2	3.8	0.2	0.5	0.9
	2018	5.5	1.7	1.8	1.7	1.7	2.1	0.7	0.2	0.6	0.6	0.2	3.7	0.2	0.5	0.6
	2019	5.8	1.7	1.8	1.7	1.7	2.1	0.7	0.2	0.6	0.6	0.3	3.7	0.2	0.5	0.6
	2014-2019	5.23	1.78	1.85	1.70	2.00	0.67	0.28	0.65	0.28	0.65	0.28	3.77	0.20	0.48	0.70

Source: authors' work based on BDL.

In the case of the large and medium-sized cities included in the analysis (cities with more than 20 thousand residents), almost the entire population is connected to wastewater treatment plants (over 90% of the population). On the contrary, in smaller towns, a lower percentage of residents is connected to wastewater treatment plants, with the exception of municipalities Sucha Beskidzka and Limanowa (where 90% and 80% of residents are connected to treatment plants, respectively). It is also noticed that in many smaller municipalities, this percentage is increasing, while regress is observed in some larger cities. This can be primarily attributed to the development of single-family households not connected to the urban sewage system. The highest average value of this indicator ($X = 99.67$) is in Gorlice. Since this value is nearly 100%, most residential properties in this municipality must have a sewage system connection. In almost all of the analysed municipalities, water usage was significantly increased. This is a negative trend in the study area, leading to faster use of one of the most essential natural resources. The highest average value of the indicator, markedly higher than other analysed units, is observed in the municipality Bukowno ($X = 792.44$), the municipality Oświęcim ($X = 251.11$) and the municipality Tarnów (148). It should be highlighted, however, that higher water usage in these municipalities relates to the development of manufacturing and industry.

In the municipality of Bukowno, industrial production accounts for over 90% of the total water usage, in the municipality Oświęcim – over 80%, whereas in the city Tarnów – over 60%.

Meanwhile, the high value of this indicator in the municipality of Zakopane is linked with the development of tourism. In most of the analysed urban municipalities, the amount of waste collected in the analysed years increased. This relates to an increase in consumption in Poland. Particularly noteworthy is the large amount of waste relative to the number of residents within the municipality Zakopane. The average value of this indicator in this city is the highest and equals ($X = 532.32$). This is because Zakopane is a tourist destination, meaning visitors leave a significant proportion of the waste. It is also worth mentioning the average value of the indicator in the municipality Jordanów ($X = 161.82$), which is lower than other analysed units. Moving on to the indicator of the share of urban green areas in the city's total area, the highest average value was recorded in the municipality of Krakow ($X = 5.23$).

Moreover, it showed an increase throughout the years. This may relate to the fact that the residents and authorities of the city are more aware of the benefits of having green areas, especially in areas affected by smog. Zakopane, in turn, recorded a slight increase over the entire study period (in 2016 and 2017, the indicator's value was 0.9). Still, in the following years, the indicator's value was at the same level as in the base year. This may result from the constant development of tourist infrastructure in this city, which limits the creation of green areas. In the case of other municipalities, the share of green areas changed slightly. Table 3 presents the calculated indicators of sustainable development for the economic and social areas. As the main topic of the study are environmental determinants of sustainable development, especially economic and social indicators, it was decided to present the values for the initial period (2014), the end period (2019), and the average values for 2014-2019 period in Table 3. The purpose of presenting the data in this way was to improve clarity. The presentation of data for individual years for 12 indicators would have been very extensive.

In the analysed years, almost all municipalities in the Lesser Poland Voivodeship recorded a negative migration balance, apart from the largest agglomeration – Krakow ($X = 4.28$; $SD = 2.96$), which seems obvious due to the city's position and progress in the Lesser Poland Voivodeship. The majority of the communes showed an increase in expenditure per capita in relation to the base year for physical education and sport. The exceptions include the municipalities of Limanowa, Nowy Targ and Zakopane, which were characterised by a downward trend. In the case of Nowy Sącz, the Spearman's correlation coefficient showed that with the increase in spending

Table 3. Sustainable development indicators in the economic and social area of urban communes of the Lesser Poland Voivodeship in 2014-2019

Years	Krcow	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
Economic area														
W1 – Own revenue of gmina budgets per capita [PLN]														
2014	3653.1	2222.7	2407.9	2174.3	1690.1	2454.9	1234.2	1130.7	1881.2	2475.4	2431.3	1669.5	1898.5	2928.8
2019	4947.3	3251.5	3263.7	2709.3	2414.4	2525.6	1756.5	1425.3	2831.6	3679.7	3430.1	2293.5	2415.4	4303.5
2014-2019	4231.81	2685.53	2776.58	2463.83	1915.89	2513.54	1561.35	1254.16	2184.04	2938.16	2954.08	1970.40	2153.69	3595.23
W2 – Budget expenditure per capita [PLN]														
2014	5362.6	5048.3	4838.8	3460.7	2673.3	4853.5	2938.6	2865.1	3760.4	3638.9	3766.7	2599.5	3125.6	4062.6
2019	8017.0	7581.0	7858.9	5338.6	4738.8	6351.8	4712.4	5581.7	5039.8	5751.1	5854.9	5253.6	5544.5	6057.7
2014-2019	6468.58	6179.51	6180.90	4141.42	3578.29	5236.07	3962.30	4028.44	3926.47	4092.66	4915.09	3758.53	4264.59	5315.75
W3 – The share of investment expenditure of gminas in total expenditure [%]														
2014	16.4	10.5	9.3	17.3	15.2	32.7	19.4	3.4	33.2	25.6	11.7	2.4	23.9	14.6
2019	13.6	8.8	18.1	17.3	19.2	24.6	12.7	17.2	17.6	27.7	13.9	22.9	24.1	16.8
2014-2019	13.32	9.82	13.12	13.35	16.17	23.68	19.67	8.40	17.35	17.03	17.13	9.87	22.73	20.25
W4 – Dwellings completed per 1000 population														
2014	9.6	3	1.8	6.5	2.7	2.9	1.5	1	2.3	1.5	1.7	1.5	1.3	4.3
2019	16.8	2.1	2.2	4.1	2.6	3.2	1.6	1.3	5.5	1.2	2.1	1.7	1.9	4.5
2014-2019	12.33	2.70	2.15	3.52	1.77	2.75	2.32	0.88	3.27	1.22	1.70	2.40	1.88	5.23
W5 – Entities by size classes per 1000 population total														
2014	161.6	114	100	115.2	92.8	115.8	103	74.7	141.3	103.8	109.3	113.1	138.1	208.7
2019	188.6	121	110.7	121.2	96.4	123.3	115.5	82	150.5	103.8	114.4	128.4	147.4	228
2014-2019	176.92	117.05	103.72	117.08	91.88	119.55	108.05	76.88	144.35	101.12	110.67	120.28	142.0	216.17

Years	Krcow	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
W6 – Entities newly registered by ownership sectors per 1000 population														
2014	13.5	11	8.3	8.9	8	11.4	11.4	10.7	11.2	7.3	7.5	9.6	9	13.8
2019	15.8	10.5	8.8	8.3	7.1	9.1	10.6	7.5	10.7	7	7.8	7.3	9.2	14.6
2014-2019	15.23	10.33	8.68	11.32	7.25	10.67	11.10	9.23	10.93	6.41	7.45	10.82	9.23	14.97
Social area														
W1 – Total net migration per 1000 population														
2014	2	-2.3	-5.3	-2.5	-6.1	-5.4	-0.6	-4.1	-2.2	-4.1	-2.6	2.8	-3.7	-2.2
2019	9	-2.9	-5.95	-7.45	-5.14	-6.33	-4.15	-3.98	-2.25	-1.77	-4.38	-6.73	-5.92	-3.69
2014-2019	4.28	-3.06	-4.23	-3.95	-5.41	-4.47	-1.39	-4.28	-2.13	-1.79	-4.14	-1.27	-5.00	-1.60
W2 – Expenditure on culture and art per capita [PLN]														
2014	415	61	90	129	89	168	74	32	72	122	231	77	139	188
2019	385	77	249	161	118	886	255	294	148	168	284	212	1105	224
2014-2019	331.50	71.00	151.00	146.00	129.83	354.00	165.83	94.67	90.00	142.33	268.50	109.33	599.00	286.17
W3 – Expenditure on physical education and sport per capita [PLN]														
2014	159	120	128	159	130	132	19	16	587	364	180	14	78	152
2019	217	233	397	185	242	39	257	307	325	770	307	10	81	122
2014-2019	191.0	201.0	269.33	183.17	139.67	81.83	67.83	74.17	297.00	449.67	517.17	15.00	114.83	165.83
W4 – The share of registered unemployed persons in population in the working age [%]														
2014	4.6	7.6	7.7	6	8.8	10.5	11	7.9	8.8	7.8	7.2	5.6	6.3	9.9
2019	2.1	2.5	3.7	2.1	3.7	4.7	6.4	4.7	3.5	4.4	3.5	2.6	4.3	6.5
2014-2019	3.28	4.87	5.62	3.98	6.17	7.40	7.72	5.85	5.73	5.78	4.92	3.57	4.68	8.53

Years	Zakopane	Sucha Beskidzka	Jordanów	Oświęcim	Bukowno	Nowy Targ	Grybów	Mszana Dolna	Limanowa	Gorlice	Bochnia	Tarnów	Nowy Sącz	Krcow	
W5 – Expenditure on social welfare per capita [PLN]															
2014	490	462	553.17	773.83	591.00	393.17	403.17	434	414	348	542	399	423	415	
2019	462	525	773.83	591.00	428	228	170	434	414	348	542	399	423	415	
2014-2019	553.17	462	773.83	591.00	428	228	170	434	414	348	542	399	423	415	
W6 – Expenditure on education and upbringing per capita [PLN]															
2014	1396.0	1912.2	1619.96	2184.18	2327.26	1250.02	937.67	1591.91	1297.76	1422.83	1012.67	1157.50	1216.07	1088.59	
2019	1396.0	1912.2	1619.96	2184.18	2327.26	1250.02	937.67	1591.91	1297.76	1422.83	1012.67	1157.50	1216.07	1088.59	
2014-2019	1396.0	1912.2	1619.96	2184.18	2327.26	1250.02	937.67	1591.91	1297.76	1422.83	1012.67	1157.50	1216.07	1088.59	

Source: authors' work based on BDL.

on culture and art per capita, the expenditure on physical education and sport also increased per capita ($Rho = 0.9$; $p < 0.05$). The same is true for Tarnów and Limanowa ($Rho = 0.9$; $p < 0.05$). The value of the Rho coefficient was not statistically significant for the remaining communes. The highest average expenditure on education and upbringing per capita was recorded in the Commune of Tarnów ($X = 2327.26$; $SD = 275.45$), for which the values of the Spearman correlation coefficient showed that with the increase in expenditure on culture and art per capita, expenditure on education and upbringing also increased per capita ($Rho = 0.93$; $p < 0.05$), similarly in the commune of Limanowa ($Rho = 0.98$; $p < 0.05$), Gorlice ($Rho = 0.97$; $p < 0.05$), Bukowno, Jordanów and Oświęcim ($Rho = 0.92$; $p < 0.05$).

Within the period 2014-2019, a relatively low unemployment rate was recorded in Poland, as well as in municipalities (in 2014, it was 12.3% and decreased to 5.4% in 2019). Analysis of the proportion of registered unemployed individuals in the working age population revealed that all analysed communes faced a visible regression. The lowest average level of unemployment is in Krakow ($X = 3.29$, $SD = 0.98$). It is a positive social phenomenon, reducing poverty and increasing the activity of the population. Moreover, the area is characterised by a high degree of urbanisation, and therefore many jobs are available. In the case of Krakow, the values of Spearman's correlation coefficient showed that with the increase in the employed in the working-age population, the proportion of registered unemployed individuals in the working-age population decreased ($Rho = -0.98$; $p < 0.05$). A similar correlation was found in Nowy Sącz ($Rho = -0.98$; $p < 0.05$), Oświęcim ($Rho = -0.94$; $p < 0.05$), Limanowa and Nowy Targ ($Rho = -0.92$; $p < 0.05$), and Jordan ($Rho = -0.88$; $p < 0.05$). In the case of the remaining localities, the value of the Rho coefficient was not statistically significant. In the analysed period, a decrease in the expenditure of municipalities allocated to social welfare was observed (except for 2016, in which this category included funds from the „Family 500 plus” program, and in 2017, expenditures allocated to family assistance were assigned to a separate budget classification category). Average spending on social welfare were higher in cities such as Nowy Sącz, Tarnów, and Oświęcim.

Focusing on the assessment of economic indicators, the first two, the incomes and expenditures of the surveyed municipalities per capita, showed progress in the analysed period. The highest average ratio of own revenue per capita was recorded in Krakow ($X = 4231.81$; $SD = 511.28$). The municipalities' revenue is mainly influenced by taxes and local fees, as well as revenues from PIT and CIT. The lowest average own revenue of the commune per capita in the analysed years can be observed in Grybów ($X = 1254.16$, $SD = 148.7$), which suggests the commune's low-income independence. In 2014, the share of municipalities' own revenue was 49.3%, and between 2018 and 2019 – 43.3%, suggesting a decrease in the income independence of these entities. A high increase in expenditure per capita was recorded in Krakow ($X = 6468.58$; $SD = 1022.94$), Tarnów ($X = 6180.90$; $SD = 1148.82$) and Nowy Sącz ($X = 6179.51$, $SD = 1023.74$). It also results from the increased demand for expenses due to municipalities' greater number of tasks. The values of the Spearman correlation coefficient for the city of Krakow showed that with the increase in the commune's revenue per capita, the commune's expenses per capita increased ($Rho = 0.99$; $p < 0.05$), similarly in the case of Sucha Beskidzka ($Rho = 0.97$; $p < 0.05$), Bochnia ($Rho = 0.96$; $p < 0.05$), Nowy Sącz ($Rho = 0.94$; $p < 0.05$), Nowy Targ and Oświęcim ($Rho = 0.90$; $p < 0.05$). In the case of the remaining localities, the value of the Rho coefficient was not statistically significant. In the years 2014-2019, the highest average share of

investments in expenditure can be observed in the Limanowa commune ($X = 23.68$; $SD = 7.84$) and the lowest in the Grybów commune ($X = 8.6$; $SD = 5.62$). Municipalities showed a slowdown in investment activity in the period 2014-2016 (from 18.2-11.2%) and 2019 (16.9%). The period 2017-2018 was characterised by a substantial improvement in investment activity (from 14.6 to 20.6%). The investment regression in 2019 resulted from the COVID-19 pandemic and the introduction of a new debt ratio, limiting the possibility of obtaining debt capital by municipalities.

Considering the index of dwellings completed per 1000 individuals, only in some of the analysed communes there is an upward trend, positively influencing the construction industry. The average value in the analysed period is highest in the city of Krakow (it should be emphasised that this value is significantly higher than the average in other analysed communes). This shows a significant development of the real estate market, which is related to the phenomenon of economic migration. In smaller cities of the region, the real estate market is changing less dynamically, with the commune of Zakopane having a high average level of newly built apartments, which can be rented for tourism purposes. A positive upward trend is observed when analyzing the entities by size classes per 1000 individuals. The highest average values were noted for the city of Zakopane ($X = 216.17$, $SD = 7.21$) and Krakow ($X = 176.92$; $SD = 9.70$). This is because Zakopane is one of the most prominent tourist centers in Poland. In turn, Krakow is focused both on tourism and city development. The above trend concerns the entities newly registered by ownership sectors per 1000 individuals in the commune of Krakow ($X = 15.23$; $SD = 0.87$) and Zakopane ($X = 14.97$; $SD = 0.84$). A slight decrease in the value of the indicator was noted in the municipalities of Gorlice, Limanowa, Mszana Dolna, Grybów, Nowy Targ, Bukowno, Oświęcim and Jordan.

Based on the sustainable development indicators in the area of environmental determinants calculated for urban municipalities in Lesser Poland Voivodeship, an attempt was made to carry out a benchmarking evaluation (Table 4).

Table 5 presents the ranking of sustainable development indicators in the economic, social and environmental areas in the first – 2014 and the last year of the analysis – 2019.

Table 4. Ranking position of sustainable development indicators in the environmental area of urban communes in 2014-2019 – benchmarking evaluation

Specification	Kraków	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
Ranking position W1 – Expenditures on environmental protection and municipal management per capita [PLN]														
2014	6	11	10	2	14	1	8	13	3	7	9	12	4	5
2015	4	11	12	8	14	1	7	13	5	6	10	9	3	2
2016	1	5	6	7	14	9	10	13	11	4	8	12	3	2
2017	2	7	8	3	14	4	13	12	10	6	11	9	5	1
2018	2	9	12	11	14	3	4	13	7	6	10	8	5	1
2019	4	10	11	5	1	14	9	13	7	8	3	12	2	6
Ranking position W2 – Expenditure on climate and air protection per capita [PLN]														
2014	3	5	8	12	4	9	2	13	11	7	6	10	1	-
2015	4	5	6	11	9	12	2	13	10	7	8	3	1	-
2016	3	5	4	11	9	10	2	13	6	7	8	12	1	-
2017	1	11	6	12	7	9	13	8	3	5	10	2	4	-
2018	6	10	11	8	13	7	1	5	9	4	12	3	2	-
2019	2	11	7	5	13	6	9	12	4	3	8	10	1	-
Ranking position W3 – Population connected to wastewater treatment plants in % of total population [%]														
2014	6	9	1	5	2	10	13	12	7	11	3	14	8	4
2015	3	8	1	7	2	10	13	12	6	11	4	14	9	5
2016	3	8	1	7	2	10	12	14	6	11	4	13	9	5
2017	3	8	5	7	1	10	12	13	6	11	4	14	9	2
2018	4	9	2	7	1	10	13	12	6	11	5	14	8	3
2019	5	8	2	4	1	10	13	12	9	11	6	14	7	3
Ranking position W4 – Consumption of water per capita in [m3]														
2014	10	6	12	9	7	8	2	1	4	14	13	3	5	11
2015	10	7	12	9	5	8	2	1	4	14	13	3	6	11
2016	10	6	12	9	5	8	2	1	4	14	13	3	7	11
2017	10	6	12	9	5	8	2	1	4	14	13	3	7	11
2018	10	6	12	9	5	8	2	1	4	14	13	3	7	11
2019	10	6	12	9	5	8	2	1	4	14	13	3	7	11
Ranking position W5 – Mixed waste collected during the year in total per capita in [kg]														
2014	11	7	9	6	10	8	4	3	5	12	13	1	2	14

Specification	Krakow	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
2015	11	10	3	8	9	12	4	5	6	13	7	2	1	14
2016	13	7	9	5	8	10	3	4	6	11	12	1	2	14
2017	10	7	8	6	9	11	3	4	5	12	13	1	2	14
2018	11	5	9	7	8	12	3	2	6	10	13	1	4	14
2019	8	6	10	4	7	11	1	3	5	9	12	2	13	14
Ranking position W6 – The share of parks, lawns and green areas of the housing estate areas in the total area [%]														
2014	1	6	4	5	3	8	13	10	9	12	2	14	11	7
2015	1	4	5	6	3	8	13	10	9	12	2	14	11	7
2016	1	5	4	6	3	8	13	10	9	12	2	14	11	7
2017	1	5	4	6	3	8	13	10	9	12	2	14	11	7
2018	1	5	4	6	3	8	13	10	9	12	2	14	11	7
2019	1	5	4	6	3	8	13	10	9	12	2	14	11	7

Source: authors' work based on Table 2.

Table 5. Ranking position of sustainable development indicators in the economic, social and environmental area of urban communes of the Lesser Poland Voivodeship in 2014 and 2019

Years	Krakow	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
Economic area														
W1 – Own revenue of gmina budgets per capita [PLN]														
2014	1	7	6	8	11	4	13	14	10	3	5	12	9	2
2019	1	5	6	8	11	9	13	14	7	3	4	12	10	2
W2 – Budget expenditure per capita [PLN]														
2014	1	2	4	9	13	3	11	12	7	8	6	14	10	5
2019	1	3	2	10	13	4	14	8	12	7	6	11	9	5
W3 – The share of investment expenditure of gminas in total expenditure [%]														
2014	7	11	12	6	8	2	5	13	1	3	10	14	4	9
2019	12	14	6	8	5	2	13	9	7	1	11	4	3	10

Years	Kraków	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
W4 – Dwellings completed per 1000 population														
2014	1	4	8	2	6	5	10	12	7	10	9	10	11	3
2019	1	8	7	4	6	5	12	13	2	14	8	11	10	3
W5 – Entities by size classes per 1000 population total														
2014	2	7	12	6	13	5	11	14	3	10	9	8	4	1
2019	2	8	11	7	13	6	9	14	3	12	10	5	4	1
W6 – Entities newly registered by ownership sectors per 1000 population														
2014	2	5	10	9	11	3	3	6	4	13	12	7	8	1
2019	1	5	8	9	13	7	4	11	3	14	10	12	6	2
Social area														
W1 – Total net migration per 1000 population														
2014	2	5	10	6	12	11	3	9	4	9	7	1	8	4
2019	1	4	11	14	9	12	7	6	3	2	8	13	10	5
W2 – Expenditure on culture and art per capita [PLN]														
2014	1	13	8	6	9	4	11	14	12	7	2	10	5	3
2019	3	14	7	11	13	2	6	4	12	10	5	9	1	8
W3 – Expenditure on physical education and sport per capita [PLN]														
2014	4	9	8	4	7	6	11	12	1	2	3	13	10	5
2019	8	7	2	9	6	12	5	4	3	1	4	13	11	10
W4 – The share of registered unemployed persons in population in the working age [%]														
2014	13	8	7	11	4	2	1	5	4	6	9	12	10	3
2019	10	9	6	10	6	3	2	3	7	4	7	8	5	1
W5 – Expenditure on social welfare per capita [PLN]														
2014	7	1	3	13	4	5	8	2	11	14	6	12	9	10
2019	3	1	4	8	7	5	12	6	11	10	2	9	12	5
W6 – Expenditure on education and upbringing per capita [PLN]														
2014	4	2	1	8	14	3	6	5	13	11	7	12	10	9
2019	3	1	2	8	14	4	6	5	13	11	9	12	7	10
Environmental area														
W1 – Expenditure on municipal economy and environmental protection per capita [PLN]														
2014	6	11	10	2	14	1	8	13	3	7	9	12	4	5

Years	Krakow	Nowy Sącz	Tarnów	Bochnia	Gorlice	Limanowa	Mszana Dolna	Grybów	Nowy Targ	Bukowno	Oświęcim	Jordanów	Sucha Beskidzka	Zakopane
2019	4	10	11	5	1	14	9	13	7	8	3	12	2	6
W2 – Expenditure on climate and air protection per capita [PLN]														
2014	3	5	8	12	4	9	2	13	11	7	6	10	1	-
2019	2	11	7	5	13	6	9	12	4	3	8	10	1	-
W3 – Population connected to wastewater treatment plants in % of total population [%]														
2014	6	9	1	5	2	10	13	12	7	11	3	14	8	4
2019	5	8	2	4	1	10	13	12	9	11	6	14	7	3
W4 – Consumption of water per capita in [m3]														
2014	10	6	12	9	7	8	2	1	4	14	13	3	5	11
2019	10	6	12	9	5	8	2	1	4	14	13	3	7	11
W5 – Mixed waste collected during the year in total per capita in [kg]														
2014	11	7	9	6	10	8	4	3	5	12	13	1	2	14
2019	8	6	10	4	7	11	1	3	5	9	12	2	13	14
W6 – The share of parks, lawns and green areas of the housing estate areas in the total area [%]														
2014	1	6	4	5	3	8	13	10	9	12	2	14	11	7
2019	1	5	4	6	3	8	13	10	9	12	2	14	11	7

Source: authors' work based on Table 2 and 3.

To ensure clarity of the presented data, it was decided to present the indicators for the years 2014 and 2019, on the basis of which the benchmarking of three areas of sustainable development of urban communes was prepared. The benchmarking evaluation was extended to include indicators of sustainable development in the economic, social and environmental area. The test results are presented in Table 5.

When assessing the economic area, it can be noticed that the smallest changes in the ranking positions in 2014 and 2019 were recorded by the W1 (Own revenue of gmina budgets per capita) and W5 (Entities by size classes per 1000 population total) indicators. The city of Krakow (1st place) and Zakopane (2nd place) are the leaders in this aspect, while Grybów occupied the 14th place. In the years 2014-2019, the municipalities were characterised by a progression of their own revenues, Nowy Sącz recorded a change in the ranking from 7th to 5th and Nowy Targ from 10th to 7th. The majority of the companies surveyed maintained their position in the ranking. Own income is an essential source of financing for municipal activities, which can

thus finance their activities, including sustainable development. The deficits in self-financing illustrate the application for funding under EU programmes, which are crucial for the development of municipalities. The leader in the ranking for the W2 (Budget expenditure per capita) indicator is Krakow (1st place), and Zakopane came on the 5th position. The financial capacity of the municipalities has determined the steady increase in budgetary expenditure. Compared to 2014 in 2019, two cities showed a significant change in the ranking of the W2 indicator, with Grybow moving from 12th to 8th place and Jordans from 14th to 11th. Only two cities recorded a slower increase in per capita spending: Mszana Dolna (from 11th to 14th place) and Nowy Targ (from 7th to 12th place). Compared to 2014, there was a rapid increase in capital expenditure, particularly in the period 2017-2018. Unfortunately, the year 2019 was characterised by a slowdown in investment activity in Polish municipalities, as compared to the previous year, there was a negative dynamic (decrease of more than 13%) in terms of capital expenditure as a proportion of total expenditure. This has also been reflected in the ranking of municipalities in the Lesser Poland Voivodeship. The leaders in the W3 index (The share of investment expenditure of communal in total expenditure) were Bukowno (change from 3rd to 1st) and Limanowa (2nd place). The municipalities that rose in the ranking are Jordanów (from 14th to 4th place), Tarnów (from 12th to 6th place) and Grybów (from 13th to 9th place). Significant decreases in the ranking were recorded by Mszana Dolna (from 5th to 13th place), Kraków (from 7th to 12th place) and Nowy Sącz (from 11th to 14th place). Minor changes can also be noticed in the case of the W4 indicator (Dwellings completed per 1000 population), where the city of Krakow is also the leader (1st place). Zakopane ranked third, while a significant change can be noticed in the case of Bochnia, which dropped from rank 2nd to 4th, while Nowy Targ from rank 7th in 2014 to 2nd recorded in 2019. In the case of the W6 (Entities newly registered by ownership sectors per 1000 population) indicator, the best note in 2014 was recorded by the city of Zakopane (1st place) and Krakow (2nd). In 2019, the notes of these cities switched around, the leader was the city of Krakow, instead of Zakopane. Similar scores in the ranking were registered for the W5 indicator (W5 – Entities by size classes per 1000 population total) – Zakopane with the leading position (1st), followed by Krakow (2nd). Nowy Targ (3rd), Sucha Beskidzka (4th), Gorlice (13th) and Grybów (14th) retained stable positions.

Indicators in the social area are characterised by the diversity of ranking positions. Only for the W5 (Expenditure on social welfare per capita) indicator in the first and last year of the analysis did Nowy Sącz (1st place) emerge as the leader, Krakow was promoted from (7th) to (3rd), and Zakopane from (10th) to (5th). Changes in the ranking were not shown by Nowy Sacz (1st), Limanowa (5th) and Nowy Targ (11th). The increase in social assistance

spending was mainly driven by the introduction of the Family 500+, 300+ social programme package from 1 April 2016. Since 1 July 2019, the programme has been fundamentally modified by including every child in the family regardless of the income threshold. The programme has contributed to a significant improvement in families' financial situation, but also an increase in municipalities' income and social expenditure. With the launch of this programme, the share of expenditure on family policy increased significantly from 1.78% of PKB in 2015 to 4% of PKB in 2021. Since 1 February 2022, ZUS has started receiving applications for entitlement to benefits, so municipalities do not represent funds for income and expenditure from this area, which will lead to a decrease in municipal expenditure on social assistance and consequently to a change in the ranking of municipalities. In the case of the W1 indicator (Total net migration per 1000 population), Krakow was promoted from note (2nd) to (1st), while the W2 indicator (Expenditure on culture and art per capita) from (1st) to (3rd). Expenditure on culture and art per capita (W2) was characterised by progression during the analysed period. There are significant changes in the 2019 ranking compared to 2014. Sucha Beskidzka from the 5th place ended up in 1st place and Limanowa from 4th place in 2nd place. Krakow recorded a decline from the leading position to 3rd place in the ranking. Oswiecim took 5th place and Zakopane 3rd. This shows an increase in cultural and art spending in smaller towns in the Lesser Poland Voivodeship compared to larger ones like Krakow, Zakopane or Oświęcim, which are most popular among tourists. The percentage of expenditure on culture and the arts is relatively low compared to the total expenditure of Polish municipalities. It was around 3.5% in 2014 and 3.3% in 2019. Unfortunately, the Covid 19 pandemic has not had a positive impact on the community's activities in these areas and has not favoured the intensification and caused the temporary closure of art and cultural sites, which could significantly impact the ranking after 2019. The share of municipal expenditure on physical fitness and sport also decreased: in 2014, it accounted for 2.7% of the total budget expenditure of Polish municipalities, and in 2019 it was 2.4%. The index W3 (Expenditure on physical education and sport per capita) also shows major changes in the ranking of urban municipalities in the Lesser Poland Voivodeship. Bukovno recorded a decline from (2nd) to (1st), while Nowy Targ recorded a decline from (1st) to (3rd place). Significant changes in benchmarking can be seen in cities such as Krakow (from 4th to 8th place). Zakopane (from 5th to 10th), Limanowa (from 6th to 12th), and also Tarnów (up from 8th to 2nd) and Mszana Dolna (up from 11th to 5th). The change in the ranking of the leaders in the W4 indicator (The share of registered unemployed persons in the population in the working age) affected Zakopane (from 3rd to 1st) and Mszana Dolna (from 1st to 2nd). They are struggling with the highest unemployment rates. The significant increase in

unemployment also affected municipalities such as Sucha Beskidzka (from 10th to 5th) and Jordanów (from 12th to 8th). These are tourist destinations where seasonal affiliation determines unemployment during the year. In 2019, cities such as Limanowa and Grybów were ranked 3rd, Tarnów and Gorlice 6th and Nowy Targ and Oswiecim 7th. The lowest unemployment rates were recorded in Krakow, ranked last in the ranking of the years studied. It is the largest city in the region, which is attractive for professionally active people. Expenditure on education represents a significant proportion of the total budget expenditure of Polish municipalities, amounting to 35.8% in 2014 and falling to 29.3% in 2019. Nowy Sącz and Tarnów were the leaders in the W6 (Expenditure on education and upbringing per capita) index, noting the first and second places, respectively. In other cities, changes were slight, and a constant score was recorded by Grybów (5th), Mszana Dolna (6th), Bochnia (8th), Bukowno (11th), Nowy Targ (13th) and Gorlice (14th position).

In the environmental area, the W6 (The share of parks, lawns and green areas of the housing estate areas in the total area) and W4 (Consumption of water per capita) indicators showed the lowest changes in the benchmarking compared to 2014 and 2019. For the W6 indicator, the city of Krakow maintained its leading position (1st), and the last place was occupied by Jordanów (14th). In turn, the leader for the W4 indicator was Grybów (1st), and the last position was recorded by Bukowno (14th). Water consumption in the face of climate change and drought in many areas, including the cities of the Lesser Poland Voivodeship, is a challenge for JST in Poland. In 2019, except for Krakow, Tarnow and Jordanow, all other municipalities surveyed recorded increased water consumption per capita. In the case of the W5 (Mixed waste collected during the year in total per capita) indicator, both in 2014 and 2019, the last place in the ranking was taken by the city of Zakopane (14th), while Jordanów dropped to (2nd) from the (1st place). The problem of sewage treatment is very complex, and the construction of sewage treatment plants requires time and money. In view of the drought and scarcity of water resources, municipalities should step up their efforts in this regard. Proper management of water resources by cities and investments to restore polluted waters are crucial in the face of fast-paced climate change. The share of expenditure on the municipal economy and environmental protection amounted to 9.4% of the total expenditure of Polish municipalities in 2014 and 9.3% in 2019. When analysing the share of capital expenditure on the municipal economy and environmental protection in the total budget of Polish municipalities, major changes can be observed: in 2014, the ratio was 18.7%, and in 2019, it was 9.4%. The already mentioned slowdown in investment activity has also been reflected in the Expenditure on the municipal economy and environmental protection. The municipalities of the Lesser

Poland Voivodeship have also noted significant changes in the measure studied. The best results for the W3 indicator (Population connected to wastewater treatment plants in % of the total population) were recorded in Tarnów – 1st position in 2014 and 2nd in 2019; as well as Gorlice – 2nd position in 2014 and 1st in 2019. The other cities did not show any significant changes in the ranking.

On the other hand, an exciting change in the ranking in the analysed period can be noticed for the W1 indicator (Expenditure on the municipal economy and environmental protection per capita), as Gorlice and Limanowa reversed their positions from (1st) to (14th). Only Jordanów (12th) and Grybów (13th) did not change their ranking positions. Oświęcim has moved from 9th to 3rd place in the ranking, while Kraków has moved from 6th to 4th and Zakopane from 5th to 6th. The leader in the ranking for the W2 indicator (Expenditure on climate and air protection per capita) turned out to be Zakopane (1st), and the city of Krakow strengthened its position from (3rd) to (2nd place). Spending on climate and air protection is essential to sustainable development, especially in the fight against smog. Smog in Poland is a very problematic phenomenon, as the data shows. The Supreme Audit Office informed us in its report in 2015 that Poland ranks second among the EU countries with the most polluted air. The IQAir (2022) ranking from April 2022 indicates that among the most polluted cities in the world, Warsaw ranks 41st, Krakow 58th, Wroclaw 59th, and Poznan 85th. In the Małopolska province, the clear leader in this respect for many years has been the city of Krakow, due to its old buildings and unfortunate geographical location (the city lies in a valley), but also Nowy Targ, Nowy Sącz and Zakopane. The city authorities of Kraków have been taking appropriate measures to fight smog for many years, which is also confirmed by the increase in spending in this regard (2nd place in the ranking for W2 in 2019). In the ranking assessment, Nowy Targ was ranked 4th in 2019 from 11th place, and Nowy Sącz was ranked 11th from 5th place.

In conclusion, the comparative monitoring and evaluation of sustainable development indicators should constitute an essential element of the management process of municipalities (Figure 1). Determinants in the three areas of sustainable development can be stimulated or destimulated. In the case of environmental determinants, two destimulatns are visible – per capita water usage, as well as waste collected annually per capita. In the case of these two indicators, municipalities with a lower indicator value recorded the highest position in the ranking. Unfortunately, over the analysed period, the values of the indicated measures showed an upward trend. The surveyed communes received high scores in the ranking in various areas. However, the communes of Zakopane and Krakow are leaders.

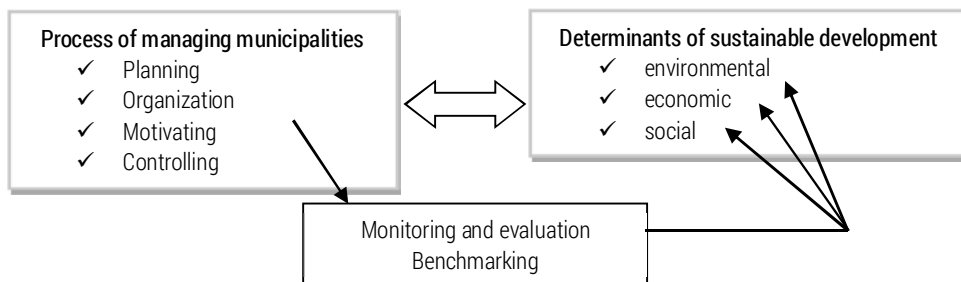


Figure 1. Sustainable development determinants in the process of managing municipalities

Source: author's work.

Benchmarking of sustainable development indicators is an essential instrument in the process of municipal management. The position of a particular determinant in the ranking in the benchmarking assessment allows for diagnosing its strengths and weaknesses. A comparison over a more extended period also indicates whether a commune has taken appropriate measures to limit its liabilities and strengthen its strengths over the years. Municipalities should strive for the best possible position in the ranking. Benchmarking helps to identify good practices, and cities should benefit from the experience of successful local government units. As the awareness of the inhabitants of communes in the field of sustainable development increases, they follow various rankings, they want to participate in the process of communal management by submitting their projects – monitoring of sustainable development indicators becomes more and more critical.

In 2021, at the turn of March and May, a questionnaire interview was conducted in the surveyed municipalities (the results will be presented in more detail in the following study). The research results in this field indicate that 100% of respondents stated monitoring sustainable development indicators as crucial in managing municipalities. All municipalities confirmed that they regularly monitor sustainable development indicators once a year.

Conclusion

Regarding the generalisation of results, three areas of sustainable development were assessed: environmental, economic and social. Six indicators from each site were selected to enable comparability of results. In a review of the literature, many authors pointed toward the limitations in the indicator assessment of sustainable development. The research limitations concern, first and foremost, the two-year delay in the publication of data in the Local Data Bank in Poland, and second, the lack of comparability of findings in var-

ious municipalities. Therefore, only indicators that could be meaningfully compared were selected.

The indicators showing performance improvement over the study period for the 14 evaluated urban municipalities in Lesser Poland Voivodeship included: expenditure for environmental protection and municipal services management, expenditure for air and climate protection, the proportion of the population connected to a wastewater treatment plant, and the share of green areas in the total size of a city. This indicates increasing awareness of sustainable development principles among governments at a municipal level. However, analysis of the environmental indicators also revealed those showing a negative trend. These are mainly indicators of water usage and the amount of waste generated per year. No significant progress was also observed in the case of the indicator reflecting the share of urban green areas in the total size of a city. These are crucial issues concerning which urban municipalities in Lesser Poland Voivodeship should intensify their activity and adjust the management process towards a more dynamic implementation of sustainable development principles, especially in the area of environmental determinants.

In summary, along with an increase in sustainable development indicators such as expenditure on culture and art per capita, the share of the employed in the working-age population and the own revenue of municipal budgets per capita, the values of the indicators related to other aspects of sustainable development remained stable. Thus the activities of municipalities are aimed at improving these areas and increasing the level of sustainable development. All surveyed communes are identified as key in monitoring sustainable development indicators. This is because they all confirmed that they regularly assess and monitor sustainable development indicators once a year.

Benchmarking sustainability indicators is an important instrument in the municipal management process. This practice used in management consists of comparing processes and practices used by municipalities with the best ones in the analysed field. The need for a more precise analysis of municipalities' functioning results from the constantly changing environment and implementation of sustainable development principles. Therefore, benchmarking has become one of the most popular methods for improving organisations and the efficiency of their operations. Based on the results of the benchmarking assessment, strategic goals can be set, and areas for development of the municipality can be sought. Managing municipalities in terms of sustainable development should consider environmental, economic and social determinants. Tracking municipalities' ranking position for indicators in these areas should guide them in their strengths and weaknesses. Cities

should strive for the best possible position in the ranking and benefit from the experience of the most successful local government units.

The presented research concerned the assessment of three groups of sustainable development indicators but focused primarily on benchmarking. Future research should aim towards an in-depth statistical and econometric evaluation and exploring correlations between the indicated measures.

The contribution of the authors

Conception and literature review: A. Brzozowska – 35%, J. Łukomska-Szarek – 45%, J. Imiołczyk-Sepczuk – 20%.

Acquisition of data, analysis and interpretation of data: A. Brzozowska – 35%, J. Łukomska-Szarek – 45%, J. Imiołczyk-Sepczuk – 20%.

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