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EVALUATION OF ROMANIA'S PROGRESS IN ACHIEVING SDG 11: SUSTAINABLE CITIES AND COMMUNITIES

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Abstract: The article evaluates the progress made by Romania in order to achive the sustainable development goal regarding sustainable cities and communities (SDG 11). The 10 indicators and targets associated with SDG 11 are taken into account from the point of view of the evolution recorded by Romania in the period 2010-2020. This exploratory study aims to analyse secondary data collected from the Eurostat platform dedicated to SDG-related indicators. Thus, we aim to track the extent to which Romania has progressed toward achieving each target associated with SDG 11 and to identify the target(s) for which progress has been most significant.

Keywords: sustainable development goals, sustainable cities and communities, SDG 11, progress evaluation
JEL Classification: Q01, R00, R59
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1. INTRODUCTION

The expansion of cities and of the peri-urban environment, generated by the unprecedented growth of the world's population especially since the second half of the 20th century, indicates, on the one hand, a general socio-economic development and, on the other hand, raises a number of economic, social, and environmental issues. In 2008, the urban population overtook the rural population for the first time in history, and the United Nations (2018) forecasts an increase of up to 70% of the world's total population by 2050.

Cities are recognised as the environment that facilitates technological, economic and socio-cultural development, while being characterised as having the highest values for energy consumption, pollution, and social exclusion (Kourtit and Nijkamp, 2018). The critical role that the urban environment plays in the context of global development goals is clearly recognized by the United Nations 2030 Agenda, which, among the 17 Sustainable Development Goals (SDGs), explicitly advocates for cities and human settlements to be more inclusive, safe, resilient, and sustainable (SDG 11). The latest version of the SDGs, published in 2020 by the Inter-agency and Expert Group on SDG Indicators, consists of 17 goals with 169 targets that can be measured by 231 indicators. Allen, Metternicht and Wiedmann (2018) consider that although the 2020 version improves on the previous version, the same purpose and approach are maintained, outlining at the global level a set of

APPLIED RESEARCH IN ADMINISTRATIVE SCIENCES
Volume 3, Issue 2 / August 2022

guidelines to encourage local-level sustainable policies and decision-making in line with the pillars, goals, and targets of sustainable development.

The adoption of the SDGs marks a transition in global sustainability policies towards an increasing focus on equity, with the role of urban areas in achieving sustainable and inclusive growth more explicitly detailed in SDG 11. Under this goal, urban sustainability indicators are used to monitor environmental quality and equity in urban environments, allowing the development of a new perspective on how urban areas contribute to global environmental sustainability (Thomas, Hsu and Weinfurter, 2021).

2. LITERATURE REVIEW

In the context of increasing global urbanisation, the concept of urban sustainability is an increasingly important element of sustainable development, which has already become a ubiquitous paradigm for economic growth, environmental protection, and social equity (Niemets, Kravchenko and Kandyba, 2021). It is becoming important that cities and communities are effectively evaluated in terms of the progress made towards achieving the SDGs (Wątróbski et al., 2022; European Commission, 2022). There is also a need for quantifiable information on the relevant costs of achieving the goals, with Prakash et al. (2020) finding that it will be difficult for policy makers and stakeholders to efficiently allocate the necessary resources or identify the resource gap that should be filled by exploring and implementing feasible alternative financing mechanisms. For residents, the satisfaction they feel in relation to the cities they live in is based on material well-being, public services, facilities, environmental quality, and more (Macke, Rubim Sarate and Moschen, 2019).

Accelerating urbanisation trends require the integration of sustainability principles into local-scale urban planning to boost the prosperity of cities. D'Adamo et al. (2022) assess that the struggle to achieve the SDGs is about achieving sustainable, safe, resilient, and inclusive societies. Although the urban environment generates output that accounts for 80% of global GDP, it consumes 70% of the world's energy and produces 70% of the world's carbon dioxide emissions. In addition, it is specified that moving towards achieving SGDs will improve the quality of life in urban environments, provide equal opportunities for people - active participants in sustainable development challenges (United Nations, 2015).

Sustainable development is a necessity for future economic growth, social equity, and environmental protection. The European Commission (2022) sees sustainable development as a dynamic and complex process, the unfolding of which involves multiple economic, social, political, and environmental transformations. In this context, most cities and urban communities become engaged and committed actors in achieving socio-economic, environmental, and technological balance as part of global sustainable development.

SDG 11, which targets sustainable cities and communities, aims to plan all human settlements so that they provide people with access to basic services, housing, transport, green spaces, energy, considering limited resources and minimal environmental impact (Eurostat, 2022d). The targets for achieving this goal by 2030 are as follows (Eurostat, 2022a):

1. Access to safe housing and adequate basic services at affordable prices for all citizens, and upgrading of poor neighbourhoods;
2. Access to safe transport systems, improved road safety, expansion of public transport networks, affordable and sustainable for all, with particular attention to meeting the needs of the vulnerable, children, women, the elderly, and the disabled;
3. Strengthening urbanisation in all European countries in an inclusive and sustainable way, participation, and integrated and sustainable management of human settlements everywhere;
4. Protection and safeguarding of the world's cultural and natural heritage;

5. Reducing the number of deaths caused by natural disasters by providing special protection to the poor and vulnerable;

6. Reducing negative environmental impacts in urban areas, especially on air quality and all types of waste;

7. Access to public, green spaces for all citizens, especially children, women, the elderly, and the disabled.

We note that the particularities of sustainable cities and their communities reflected in SDG 11 of the 2030 Agenda illustrate the heterogeneity of the problems facing the urban environment and can be measured. Overall, rankings based on progress towards the SDGs are a spur for all states to focus their efforts towards making their future as sustainable as possible, both individually by each state and at regional and global levels (United Nations, 2015). Estimating the level of achievement of the goals, as well as the progress made by each Member State, makes it possible to develop public policies dedicated to the problems and gaps identified, or to issue recommendations for the most effective articulation of these goals with strategies and public policies developed at national, European and global level (Eurostat, 2022f).

The determination of the status of each SDG is based on the aggregation of all the indicators specific to that goal, expressed in relation to the EU average, expressing a relative measure. Therefore, a high value recorded by a country for a given indicator should be interpreted more as a good position of the country in relation to the European average and less as a trend towards achieving the SDG. (Eurostat, 2022e). The progress score for each country-specific SDG considers the average annual growth rates over the last 5 years of all indicators under that specific goal and is an absolute measure. The higher the progress rate, the more progress the country has made in the last 5 years in the indicator concerned.

3. METHODOLOGY AND RESULTS

This paper is an exploratory study that aims to analyse secondary data collected from the Eurostat platform dedicated to SDG-related indicators, recorded for the period 2010-2022. Thus, we aim to track the extent to which Romania has progressed toward achieving each target associated with SDG 11 and to identify the target(s) for which progress has been most significant.

In Romania, SGD 11 "Sustainable Cities and Communities" aims to renew and plan cities and other human settlements in a way that provides opportunities for all, with access to basic services, energy, housing, transport, green public spaces, while improving resource use and reducing environmental impacts. Monitoring of this target is based on progress in improving the quality of life in the urban environment while reducing negative environmental impacts and promoting sustainable transport (Romanian Government, 2022).

The specific SDG 11 indicators and their evolution are presented below.

I1. **Rate of severe housing deprivation by poverty status**. The indicator refers to overcrowded housing, very dark, with a leaking roof, housing without toilet, bath, shower or indoor toilet, etc.

Table 1. I11.1 indicator dynamics compared to EU27 average (percent)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EU	6,1	5,8	5,5	5,5	5,4	5,3	5,1	4,5	4,3	4	4,3
Romania	25,3	24	22,8	22,8	20,6	19,8	19,8	17,2	16,1	14,2	14,3

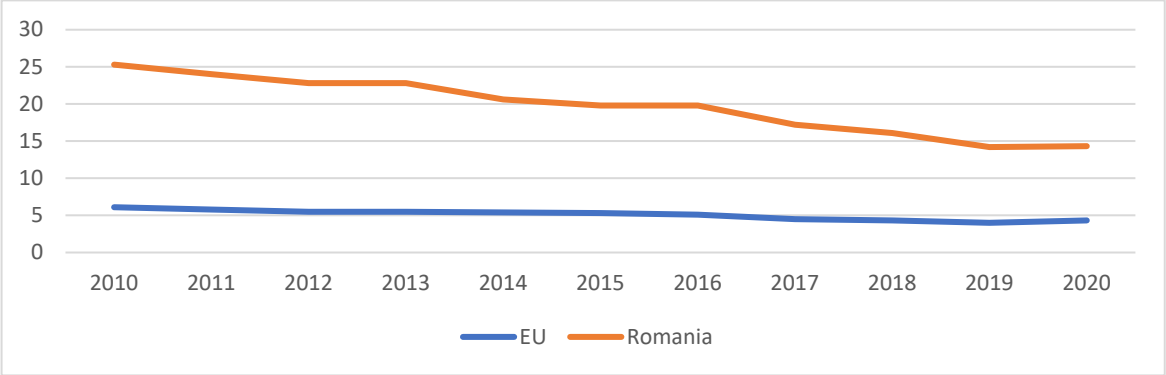

Figure 1. The evolution in dynamics of the indicator I11.1 in relation to the EU27 average (%)
Source: Eurostat, 2022a

It can be seen that Romania has made progress in the evolution of this indicator from 2010 to 2020. Although there has been a decrease in the value of the percentage of the population experiencing severe housing deprivation in relation to the total population, from 25.3% to 14.3%, this value continues to be well above the EU average in Romania.

Quality of life is determined, among other things, by the number of people living in a house, but also by the quality of the dwelling (leaking roof, no toilet, shower or bathroom inside the house, etc.). Regarding overcrowding, in the EU in 2020 around 18% of the total population lived in an overcrowded house, which is lower than in 2010, when the share was 19.1%. The highest rates of overcrowding were recorded in 2020 in Romania (45.1%), Latvia (42.5%), and Bulgaria (39.5%).

The size of the dwellings is also an indicator that complements the above information. The size of a dwelling is expressed as the average number of rooms per person, which in the EU in 2020 is 1.6. However, depending on the country, the average value may be higher or lower. Among EU countries, the highest average value was reported by Malta (2.3 rooms per person), followed by Belgium and Ireland (2.1 rooms/person). The lowest average values were reported in Romania (1.1 rooms), Croatia, Latvia, Poland, and Slovakia (all with an average value of 1.2 rooms/person).

Another indicator of housing quality is the percentage of the population living in dwellings with no toilet, shower, or bathroom. In 2020, compared to the EU average of 1.5%, Romania had a value of 21.2%, the highest of all EU countries, followed by countries such as Bulgaria and Latvia (7%) and Lithuania (6.4%).

I2. **Population living in households considered to be affected by noise, by poverty status,** as a proportion of the total population, is an indicator measuring the proportion of the population reporting to be affected by noise from either neighbours or traffic. Given the subjective nature of this indicator, it is considered that an increase in its value does not always reflect a similar increase in the level of noise pollution, but rather a change in the noise level limit that European citizens are willing to accept.

Table 2. I11.2 indicator dynamics compared to EU27 average (percent)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EU	20,6	19,7	18,9	19,1	18,5	18,3	18,1	17,5	18,21	17,3	17,6
Romania	31,6	28,3	26,4	26,4	23,6	22,2	20,3	19,3	20,1	18,2	16,1

APPLIED RESEARCH IN ADMINISTRATIVE SCIENCES
Volume 3, Issue 2 / August 2022

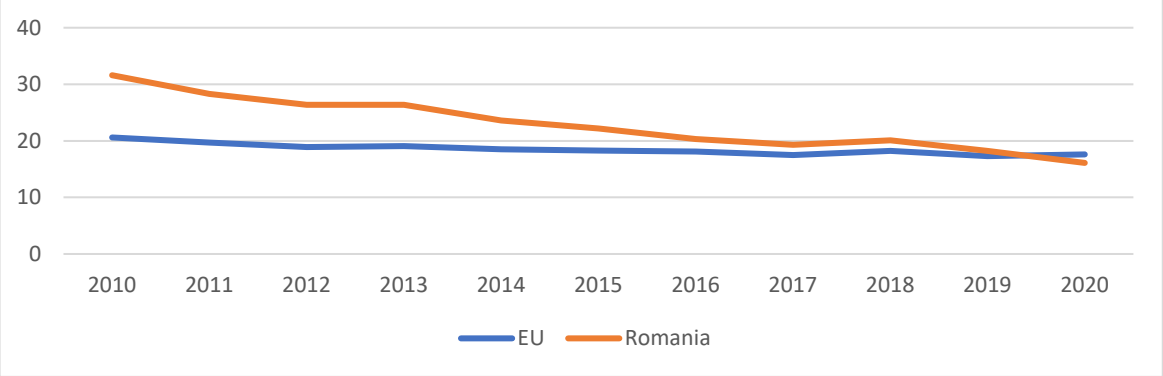

Figure 2. The evolution in dynamics of the indicator I11.2 in relation to the EU27 average (%)
Source: Eurostat, 2022a

As can be seen in the previous figure, the noise level affecting Romanian households was higher than the average values of EU countries until 2019, when the ratio reversed, so that in 2020 the noise level affecting Romanian households fell below the EU average value.

I3 - **Occupied area per capita**, is an indicator that expresses the area in square metres occupied by buildings, industrial, commercial areas, infrastructure and sports grounds, in relation to the total number of inhabitants.

Table 3. I11.3 indicator dynamics compared to EU27 average (percent)

	2012	2015	2018
EU	-	680,6	703,4
Romania	355,2	364,8	528,4

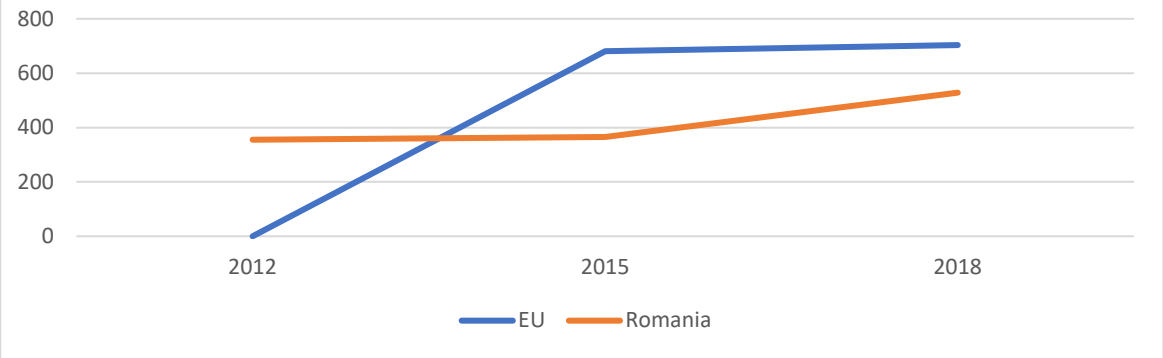

Figure 3. The evolution in dynamics of the indicator I11.3 in relation to the EU27 average (%)
Source: Eurostat, 2022a

In terms of this indicator, as can be seen from the graph above, the occupied area per capita is well below the EU average, even though from 2015 to date there has been an increase in this indicator for our country.

I4 - **Fatalities in road accidents**, an indicator showing the number of people killed within 30 days of an accident involving means of transport, including drivers and passengers of motor vehicles and bicycles, as well as pedestrians.

Table 4. I11.4 indicator dynamics compared to EU27 average (percent)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EU	6,7	6,5	6,0	5,5	5,4	5,5	5,3	5,2	5,2	5,1	4,2
Romania	11,7	10,0	10,2	9,3	9,1	9,6	9,7	10,0	9,6	9,6	8,5

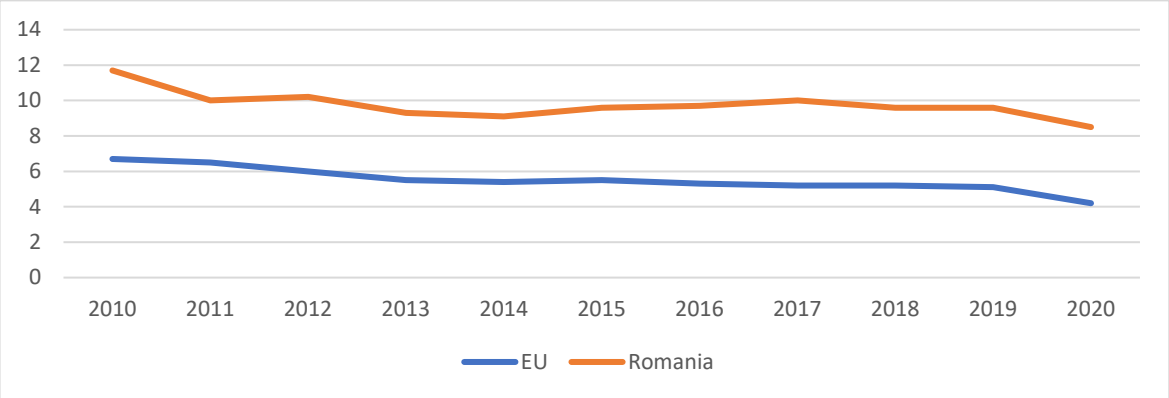

Figure 4. The evolution in dynamics of the indicator I11.4 in relation to the EU27 average (%)
Source: Eurostat, 2022a

The figure above shows that the number of road fatalities in Romania is significantly higher than the average for the EU Member States, and in 2020 the figure even doubled.

I5 - **Years of life lost due to exposure to PM2.5**. The indicator expresses the number of years a person would have lived if he/she had not died prematurely due to exposure to PM2.5 particles. This pollutant contributes to the deterioration of health of people suffering from heart or lung disease.

Table 5. I11.5 indicator dynamics compared to EU27 average (percent)

	2014	2015	2016	2017	2018	2019
EU	3993842	4059813	3835943	3948552	3871377	3370051
Romania	273556	282931	268050	285305	284791	244818

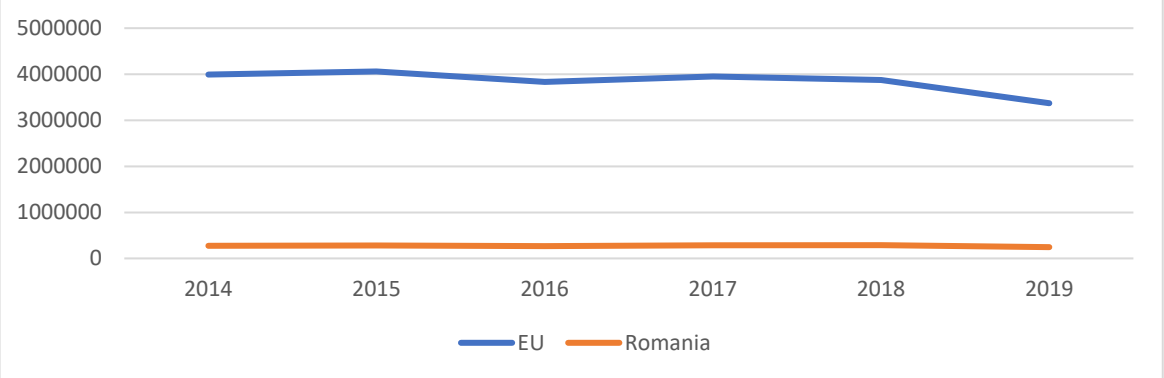

Figure 5. The evolution in dynamics of the indicator I11.5 in relation to the EU27 average (%)
Source: Eurostat, 2022a

This indicator has been roughly constant in our country since 2014, well below the EU average.

I6 - **Municipal waste recycling rate** is a percentage indicator expressing the amount (in tonnes) of municipal waste recycled in relation to the total municipal waste generated. This indicator integrates waste generated at the household level, as well as waste from economic agents and public institutions collected by the municipality.

Table 6. The evolution in dynamics of the indicator I11.6 in relation to the EU27 average (%)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EU	38,0	38,9	40,9	41,5	43,4	44,9	46,5	46,9	47,2	48,1	47,8
Romania	12,8	11,7	14,8	13,2	13,1	13,2	13,4	14,0	11,1	11,5	13,7

APPLIED RESEARCH IN ADMINISTRATIVE SCIENCES
Volume 3, Issue 2 / August 2022

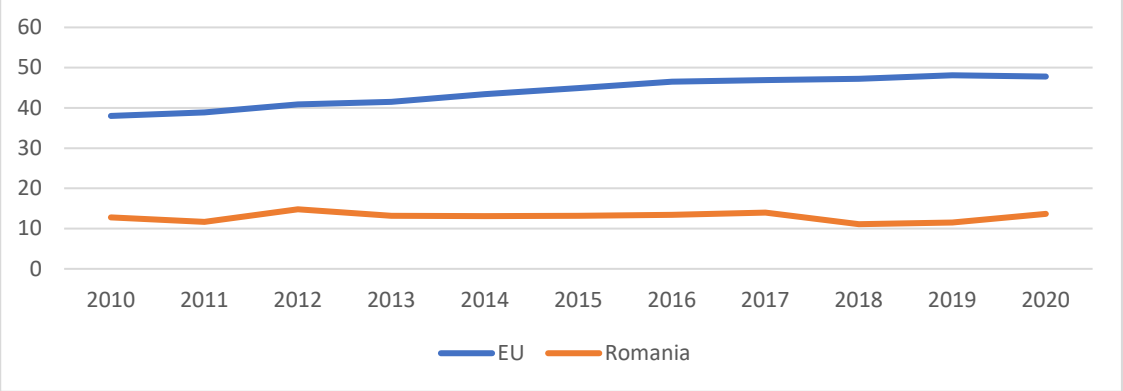

Figure 6. The evolution in dynamics of the indicator I11.6 in relation to the EU27 average (%)
Source: Eurostat, 2022a

The evolution shown in Figure 6 indicates that the recycling rate of municipal waste in Romania is much higher than the EU average over the last 10 years and continues to remain low, so that the gap with the EU average is gradually increasing.

I7 - **Population living in dwellings with damaged roofs with leaks, wet walls, floors or foundations, floors or windows with damp**. The indicator expresses the share of the population experiencing such problems in their dwelling in relation to the total population.

Table 7. I11.7 indicator dynamics compared to EU27 average (percent)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EU	16,3	15,5	14,8	15,6	15,6	15,3	15,2	13,1	13,6	12,7	14,8
Romania	18,7	18,1	15,5	16,2	13,6	12,8	13,3	11,1	10,1	9,4	10,0

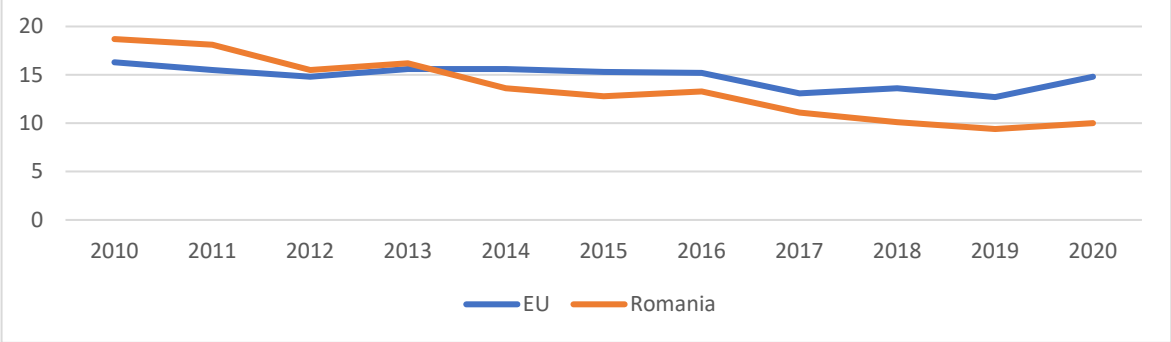

Figure 7. The evolution in dynamics of the indicator I11.7 in relation to the EU27 average (%)
Source: Eurostat, 2022a

The figure above shows that housing conditions in Romania have gradually improved since 2013. The percentage of the population living in dwellings with inadequate living conditions has decreased compared to the average values of the EU countries. In 2020, about 14% of the EU population lived in a house with a leaking roof (the highest values were recorded in Cyprus with 39.1%, Portugal with 25.2% and Slovenia with 20.8%), and 8.2% of the EU population was unable to maintain a comfortable temperature in their home. The highest percentages for this indicator were found in Bulgaria (27.5%), Lithuania (23.1%), Cyprus (20.9%), and Portugal (17.5%), with countries such as Austria (1.5%), Finland (1.8%), and the Czech Republic (2.2%) at the other end of the scale.

APPLIED RESEARCH IN ADMINISTRATIVE SCIENCES
Volume 3, Issue 2 / August 2022

I8 - **Percentage of population connected to waste water treatment system.** The indicator refers to treatment systems that involve biological treatment of wastewater, which removes organic material from the water.

Table 8. I11.8 indicator dynamics compared to EU27 average (percent)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
EU	75,74	76,77	77,29	77,69	77,79	78,83	79,66	80,15	80,47	80,90
Romania	22,70	31,70	35,30	36,10	38,20	39,70	43,80	46,50	48,10	49,40

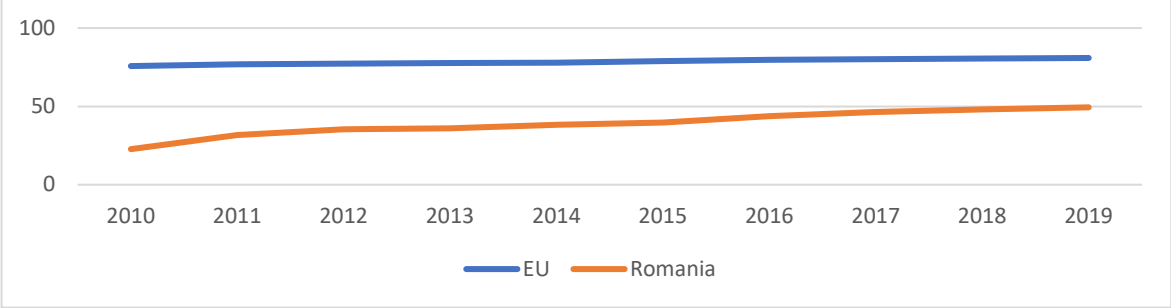

Figure 8. The evolution in dynamics of the indicator I11.8 in relation to the EU27 average (%)
Source: Eurostat, 2022a

The evolution of this indicator shows that there is still a high percentage of households in Romania that are not connected to the wastewater treatment system. Although this percentage has continued to increase slightly in recent years, narrowing the gap with the EU average, it is still well below the EU average.

I9 - **Share of public passenger transport use in total domestic transport**, indicator expressed in passenger-kilometres.

Table 9. I11.9 indicator dynamics compared to EU27 average (percent)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
EU	17	17,2	17,6	18,1	17,8	17,6	17,4	17,1	17,2	17,2
Romania	22	21,5	21,8	21,1	21,5	22,1	21,7	22,2	21,2	21,1

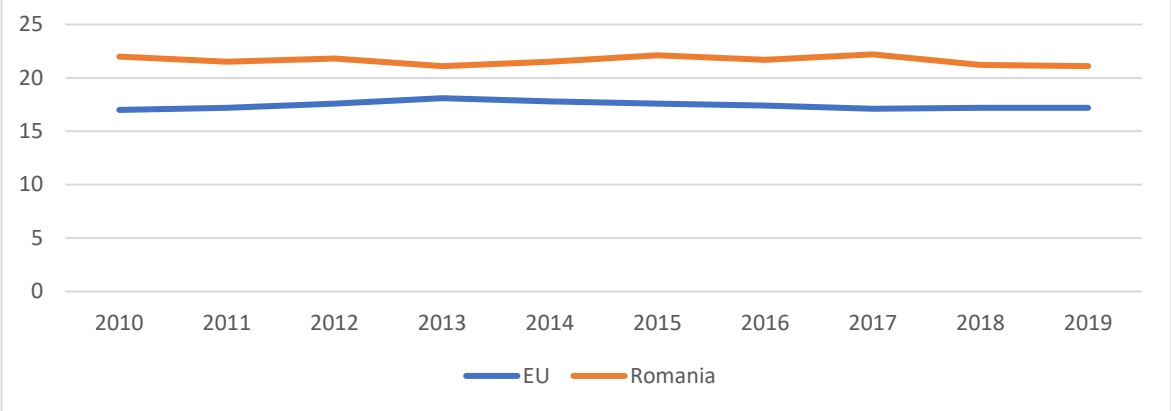

Figure 9. The evolution in dynamics of the indicator I11.9 in relation to the EU27 average (%)
Source: Eurostat, 2022a

The figure above suggests a relative stagnation in the share of the population using public transport. The percentage of the Romanian population using public transport is higher than the EU average.

I10 - Population reporting crime, violence, or vandalism in their area of residence by poverty status. The indicator expresses the share of the population experiencing crime, violence, or vandalism in their area of residence in relation to the total population.

Table 10. I11.10 indicator dynamics compared to EU27 average (percent)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
EU	13,1	13,2	12,8	14,1	13,6	13,2	12,5	11,5	11,5	11,0
Romania	15,4	16,3	13,7	15,7	14,5	13,1	14,1	11,3	11,5	9,6

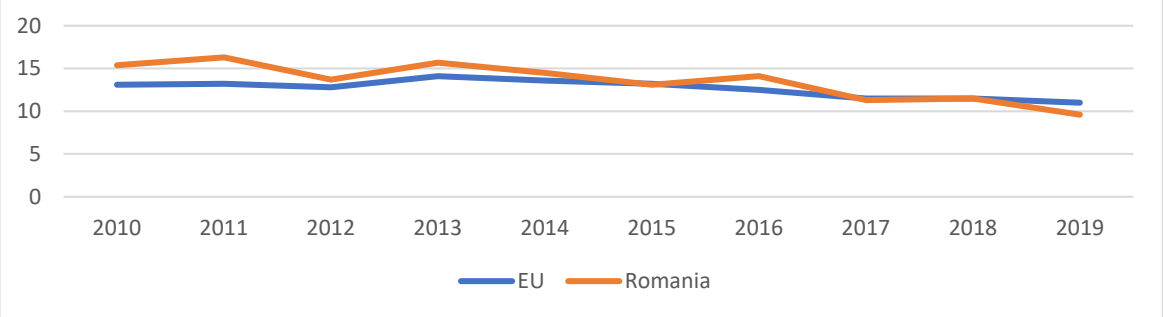

Figure 10. The evolution in dynamics of the indicator I11.10 in relation to the EU27 average (%)
Source: Eurostat, 2022a

The evolution of the above indicator reveals that until 2017, more crime, acts of violence, and vandalism were reported in Romania than the EU average, but after this year the percentage became lower than the European average.

Table 11. Values recorded in the period 2010-2020 for the 10 related indicators of SGD 11

Ind.	Objective	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
I1	Min	25,3	24	22,8	22,8	20,6	19,8	19,8	17,2	16,1	14,2	14,3
I2	Min	31,6	28,3	26,4	26,4	26,3	22,2	20,3	19,3	20,1	18,2	16,1
I3	Max	-	-	335,2	-	-	364,8	-	-	528,4	-	-
I4	Min	11,7	10,0	10,2	9,3	9,1	9,6	9,7	10,0	9,6	9,6	8,5
I5	Min	-	-	-	-	272556	282931	268056	285305	284791	244818	-
I6	Max	12,8	11,7	14,8	13,2	13,1	13,2	13,4	14,0	11,1	11,5	13,7
I7	Min	18,7	18,1	15,5	16,2	13,6	12,8	13,3	11,1	10,1	9,4	10,0
I8	Max	22,7	31,7	35,3	36,1	38,2	39,7	43,8	46,5	48,1	49,4	-
I9	Max	22	21,5	21,8	21,1	21,5	22,1	21,7	22,2	21,2	21,1	-
I10	Min	15,4	16,3	13,7	15,7	14,5	13,1	14,1	11,3	11,5	9,6	-

Source: data from SDI database, Eurostat (2022a)

Given the heterogeneity of the criteria, i.e., of the 10 indicators expressed in Table 11, their values will be normalized using the minimum-maximum normalization method, the results being expressed in Table 12. Using the minimum-maximum formula (1), given below, the values in Table 11 are normalised and expressed as subunit values in Table 12 so that they can be compared.

$$(1)\quad V_{ij} = \frac{vij - vj0}{vj1 - vj0},$$

- vij - the value of indicator (i) in year j to be normalised;

- vj0 - worst case value (lowest if maximum criterion, highest if minimum criterion);

- vj1 - most favourable value (highest if maximum criterion, lowest if maximum criterion).

Extreme values are not calculated, but are scored with 1 (for the highest value in the case of a maximum criterion, or the lowest value for a minimum criterion) and 0 (for the highest value in the case of a minimum criterion, or the lowest value for a maximum criterion). Missing values of indicators corresponding to certain years have been approximated by the values expressed in the closest years.

Table 12. The normalized values of the indicators

Indicatori	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
I1	0	0,11	0,22	0,22	0,43	0,49	0,49	0,72	0,82	1	0,99
I2	0	0,21	0,33	0,33	0,51	0,60	0,72	0,79	0,74	0,86	1
I3	0	0	0	0,05	0,05	0,05	1	1	1	1	1
I4	0	0,53	0,46	0,75	0,81	0,65	0,62	0,53	0,65	0,65	1
I5	0,29	0,29	0,29	0,29	0,29	0,05	0,42	0	0,01	1	1
I6	0,45	0,16	1	0,56	0,54	0,56	0,62	0,78	0	0,10	0,70
I7	0	0,06	0,34	0,26	0,54	0,63	0,58	0,81	0,92	1	0,93
I8	0	0,33	0,47	0,50	0,58	0,63	0,79	0,89	0,95	1	1
I9	0,81	0,36	0,63	0	0,36	0,90	0,54	1	0,09	0	0
I10	0,13	0	0,38	0,08	0,26	0,47	0,32	0,74	0,71	1	1

Source: authors processing of data available at Eurostat (2022a)

By the graphic representation of the 10 indicators over the period of analysis, Figure 11 below results.

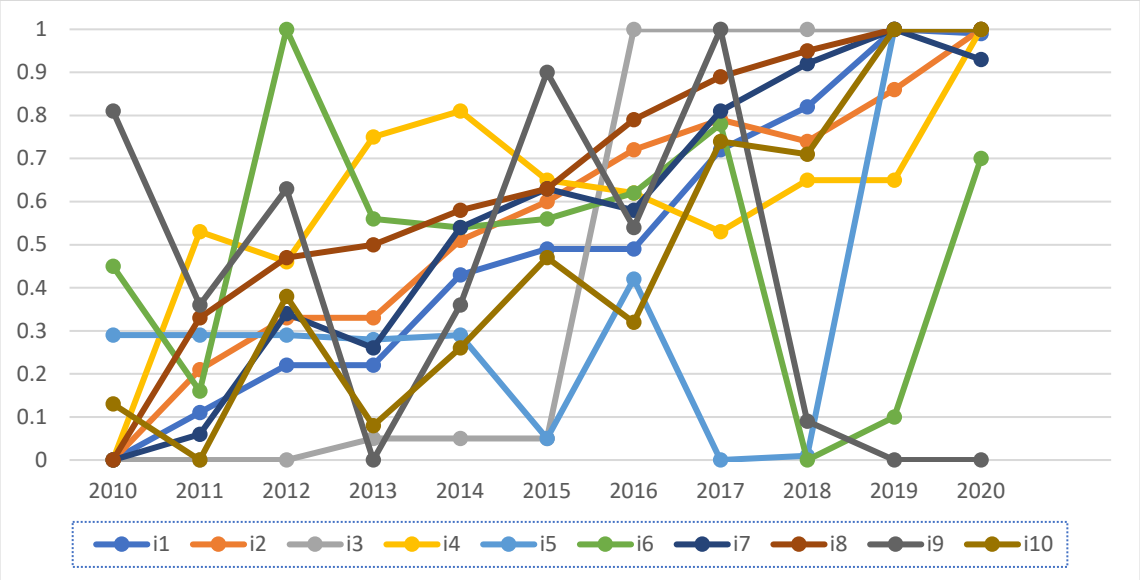

Figure 11. The evolution of 10 SGD 11 indicators

Source: authors processing of data available at Eurostat (2022a)

The results centralised in Figure 11 capture the evolution of the 10 indicators over a period of 10 years. Their values have been standardised using the minimum-maximum normalisation approach. The average annual growth rates of all SDG 11 indicators are an absolute measure of the progress score of Romania's specific SDG. A varied dynamic of the indicators associated with SDG 11 for Romania is observed, with a positive result of the developments recorded over the period 2010-2020.

4. CONCLUSIONS

The extraordinary growth of the world's population in the last 10 years has led to the spread of cities, which induces serious economic, social, and environmental problems. The concept of urban sustainability is thus becoming a ubiquitous paradigm for economic growth, environmental protection, and social equality as global urbanisation increases. Cities and the communities around them will need to be measured against their progress toward the Sustainable Development Goals for sustainable development as material well-being, public services, amenities, environment, and other factors affect the satisfaction and happiness of city dwellers.

Accelerating urbanisation trends require local sustainability planning to promote the city economy. In the struggle for sustainable development, it will be necessary to seek safe, resilient, and inclusive societies. Future economic growth, social equity, and environmental conservation require sustainable development. It is a dynamic and complicated process encompassing many economic, social, political and environmental changes. Most cities and urban communities struggle for socio-economic, environmental, and technical balance. We note that SDG 11 of the 2030 Agenda reflects reality and can be measured.

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