

Romania's Path to Sustainable Development: Achieving a Sustainable Development Target

Marian-George PIERȘINARU

*National University of Science and Technology Politehnica Bucharest, Bucharest, Romania
marian.piersinaru@stud.faima.upb.ro*

Dana-Corina DESELCU*

*National University of Science and Technology Politehnica Bucharest, Bucharest, Romania
Academy of Romanian Scientist, Bucharest, Romania
Corresponding author, d_deselnicu@yahoo.com*

Beatrice-Alexandra LUPU

*National University of Science and Technology Politehnica Bucharest, Bucharest, Romania
balexandrescu@upb.ro*

Abstract. *This article reviews Romania's commitment to the achievement of the Sustainable Development Goals (SDGs) as a member of the United Nations and of the European Union, with a particular attention on the SDG no. 1 "No Poverty" through Target no. 3 which aims to strengthen the national emergency situation system, rehabilitation and compensation mechanisms in order to respond to natural disasters, industrial accidents and extreme weather events. The existing literature explores various aspects of the sustainable development goals, little research has been conducted on how individual countries, including Romania, are implementing measures in order to achieve their national targets. For Romania, there are three indicators that assess target no. 3. The results suggest that one of the indicators (TAN0131), related to the number of emergency situations intervention, does not require an extensive examination as it is unlikely that the target will not be reached. However, the achievement of no. 3 target depends on one main indicator and one additional indicator. The research assesses Romania's progress towards Sustainable Development Target no. 3, focusing on the need for strengthening the emergency situation intervention services and communities' resilience to disasters. While TAN0131 indicator is on track, achievement of the TAP0133 and TAO0132 requires increasing the number of employees as well as the budget allocated for the institution. Effective management and investments are essential to enhancing Romania's disaster resilience and supporting Sustainable Development Goal No. 1. By highlighting the challenges and opportunities that Romania faces during the process, the paper offers policymakers with useful recommendations.*

Keywords: Sustainable Development, Sustainable Development Goals, Sustainable development targets.

Introduction

As a member state of the European Union (EU) as well as the United Nations (UN), Romania has the obligation and has committed to implementing the Sustainable Development Goals (SDGs) at national level, aiming to achieve the SDGs by 2030. In the ranking of European countries regarding the achievement of the SDGs, Romania ranks at the bottom, according to the 2023 Eurostat Report

on Monitoring Progress towards the SDGs, a report which analyzes and evaluates the performance of all European Union member states in relation to all 17 sustainable development goals. For the Sustainable Development Goal No. 1 "No poverty", Romania has made progress, but is still below the EU average, as presented in Figure no. 1:

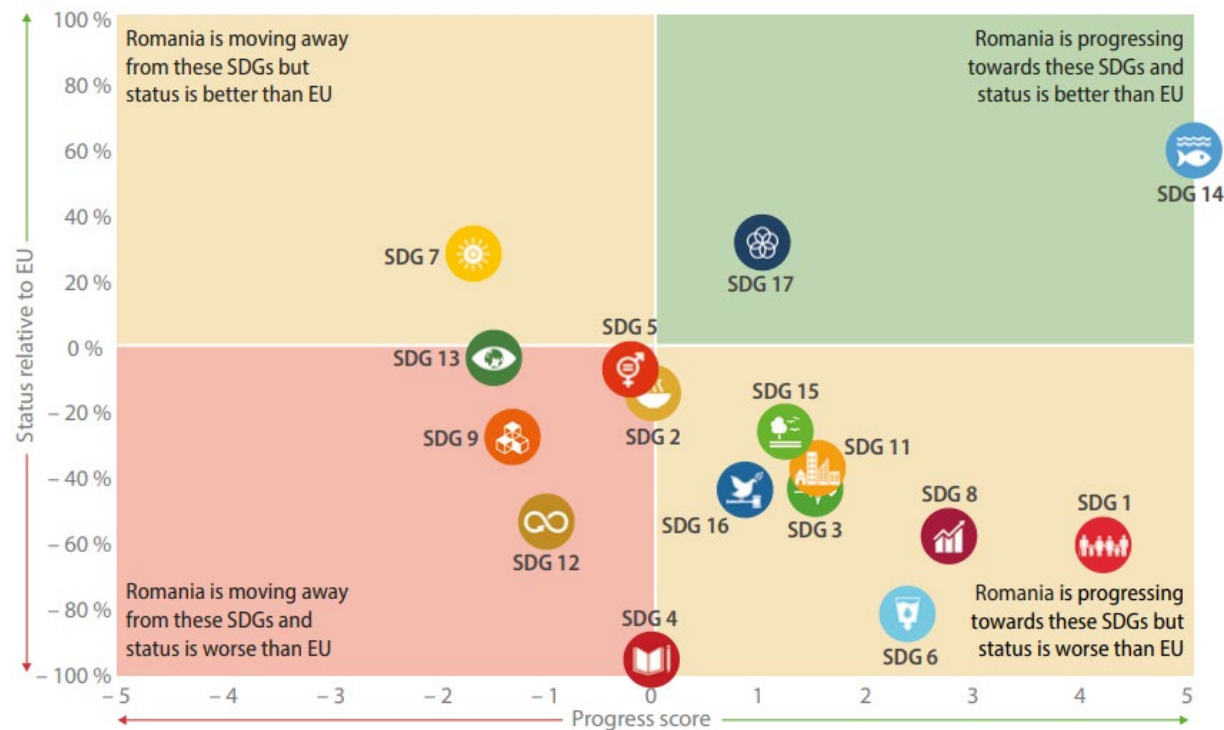


Figure 1. Romania's status in terms of achieving sustainable development goals

Source: Eurostat.

In order to ensure a proper implementation of the 2030 Agenda, the Romanian Government adopted the National Strategy for Romania's Sustainable Development 2030 (SNDDR) through no. 877/2018 Government Decision. The Strategy is structured on the fundamental pillars of sustainability – economic, social and environmental, and has its main scope to facilitate the implementation of the 17 Sustainable Development Goals, displayed in Figure no. 2:

SUSTAINABLE DEVELOPMENT GOALS



PICBE |
5202

Figure 2. Sustainable development Goals

Source: <https://www.un.org/sustainabledevelopment/news/communications-material/>

Literature review

Chronologically, as mentioned by Marco Keiner (2005), the concept of sustainable development goes over 3 centuries, to the introduction of the principle of "sustainable forest use" by Hans Carl von Carlowitz, encouraging the fair use of forests to satisfy current needs without harm to future regeneration, defining the essential function of wood as "as necessary as our daily bread", emphasizing the need to utilize it in a thrifty way to provide equilibrium between exploitation and renewal.

The year 1972 was the pivotal year for the protection of the environment and concepts related to it, when the first major international conference devoted entirely to environmental considerations, ending in the adoption of the Stockholm Declaration which set forth 26 principles and 109 recommendations, and the publication of "The Limits of Growth" report which underscored the unsustainable consequences of the exponential populational growth, industrialization, pollution and resources consumption within a finite system.

Based on the significant results since 1972, environmental protection aspects began to be taken into consideration internationally. One of the key moments at that time was made by the United Nations General Assembly in 1974 through the Charter of Economic Rights and Duties of States where it was noted that "*it is the responsibility of all States to protect, preserve, and enhance the environment, including for future generations*".

The first formal definition of sustainable development emerged in 1987 with the Brundtland Report, *Our Common Future*, published by the World Commission on Environment and Development. It defined sustainable development as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (WCED, 1987). The report also introduced the structure of sustainable development, structured on three key pillars: economic, social, and environmental, as illustrated in Figure no. 3. In later years,

researchers such as Astara (2014) advocated for the inclusion of a fourth pillar—culture—further expanding the framework of sustainable development.

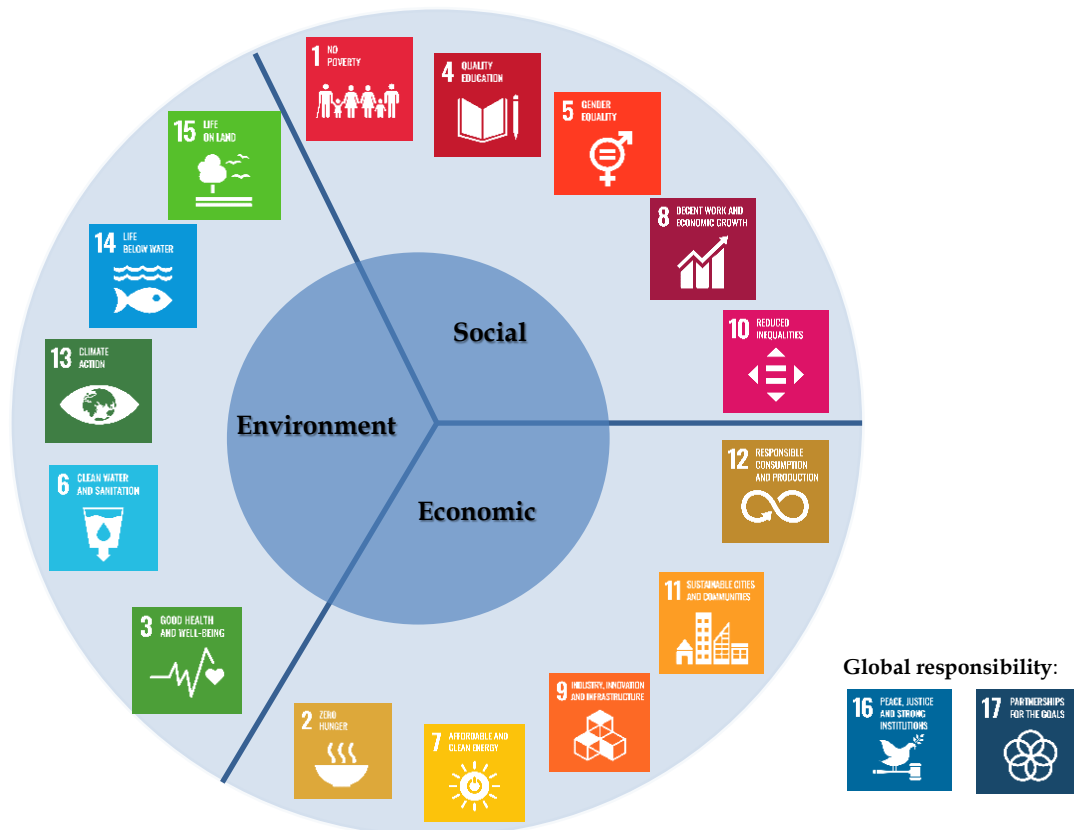


Figure 3. Pillars and Goals of Sustainable Development

Source: Author's contribution.

The importance given to the 3 pillars has changed over time, the importance given to the economic and social pillars gradually increasing, reaching the current level of importance given to them as equal to the 3 pillars.

The social pillar, assigned to human capital, has been defined as *"the development (and/or growth) that is compatible with the harmonious evolution of civil society, fostering an environment in which culturally and socially diverse groups can live together, while encouraging social integration and improving the quality of life for all segments of the population"*. (Polense, 2001)

The economic pillar of sustainable development reflects the need to strike a balance between the costs and benefits of economic activity, within the limits of the regenerative capacity of the environment, while environmental pillar is based on the protection and conservation of natural resources and, implicitly, on ensuring a balance between human activities and the regenerative capacity of ecosystems.

Adopted at the United Nations General Assembly in New York in 2015, the 17 Sustainable Development Goals (SDGs) have replaced the 8 Millennium Development Goals adopted in the Millennium Declaration of 2000, and aim to eradicate extreme poverty, combat inequality and injustice, and protect the planet, with a target date of 2030.

The Millennium Development Goals were intended for developing countries and included issues focused on poverty, hunger and health, while the Sustainable Development Goals are addressed to all countries, including promoting equal opportunities, gender equality, climate change, etc.

The United Nations describe the Sustainable Development Goals (SDG), as follows:

- ✓ SDG no. 1 "No poverty": End poverty in all its forms everywhere;
- ✓ SDG no. 2 "Zero hunger": End hunger, achieve food security and improved nutrition and promote sustainable agriculture;
- ✓ SDG no. 3 "Good health and well-being": Ensure healthy lives and promote well-being for all at all ages;
- ✓ SDG no. 4 "Quality education": Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
- ✓ SDG no. 5 "Gender equality": Achieve gender equality and empower all woman and girls;
- ✓ SDG no. 6 "Clean water and sanitation": Ensure availability and sustainable management of water and sanitation for all;
- ✓ SDG no. 7 "Affordable and clean energy": Ensure access to affordable, reliable, sustainable and modern energy for all;
- ✓ SDG no. 8 "Decent work and economic growth": Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
- ✓ SDG no. 9 "Industry, innovation and infrastructure": Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;
- ✓ SDG no. 10 "Reduced inequalities": Reduce inequality within and among countries;
- ✓ SDG no. 11 "Sustainable cities and communities": Make cities and human settlements inclusive, safe, resilient and sustainable;
- ✓ SDG no. 12 "Responsible consumption and production": Ensure sustainable consumption and production patterns;
- ✓ SDG no. 13 "Climate action": Take urgent action to combat climate change and its impact;
- ✓ SDG no. 14 "Life below water": Conserve and sustainably use the oceans, seas and marine resources for sustainable development;
- ✓ SDG no. 15 "Life on land": Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;
- ✓ SDG no. 16 "Peace, justice and strong institutions": Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and building effective, accountable and inclusive institutions at all levels;
- ✓ SDG no. 17 "Partnership for the goals": Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

A global framework of indicators was created by the Inter-Agency and Expert Group on Sustainable Development Goals Indicators with the objective to monitor the progress of the Sustainable Development Goals at the international level. The above mentioned framework was adopted by the United Nations General Assembly in 2015, as mentioned in the resolution on the work of the Statistical Commission on the 2030 Agenda for Sustainable Development (A/RES/71/313). This resolution emphasizes the importance of continuously improving the global framework for the development of additional indicators by United Nations Member States.

The global framework includes 248 indicators, out of which 231 are unique, the remaining indicators being duplicates that appear for two or three different targets. For Romania, the framework includes 243 unique indicators, comprising 99 main indicators and 192 additional indicators.

At the European level, Sustainable Development Goal no. 1 "No Poverty", comprises seven sustainable development objectives. In Romania, this goal is represented by three specific targets:

- ✓ Eradicate extreme poverty for all citizens.
- ✓ Reduce the number of citizens living in relative poverty by at least half.
- ✓ Strengthen the national system for emergency intervention, rehabilitation, and compensation services in natural disasters, industrial accidents, or extreme weather events.

Since each country has established its own national targets based on the global framework and adapted them to its own specific internal needs, direct comparisons between Target 3 of Romania and corresponding targets in other states or at the European level are not feasible. The methodological differences and country-specific priorities make such comparisons inconsistent, as they would equate fundamentally different approaches and national contexts.

Sustainable Development Goal no. 1 "No Poverty", represent one of the most important goals, since it focuses on individuals who lack access to essential needs from Maslow's Pyramid (water, food and shelter).

Romania ranks last in the European Union in terms of achieving Sustainable Development Goal no. 1 "No Poverty" targets, with a gap of -63.03 points and a progress of only 4.1 points, compared to the EU average. These figures demonstrate the importance that Romania must give to achieving the targets of this sustainable development goal, pointing out the urgent additional measures in order to improve Romania's performance. In this context, this study is particularly relevant, providing a detailed analysis of the progress and the future necessary steps for achieving the established targets.

The paper analyzes how Romania will achieve the third Sustainable Development Target: *"Strengthening the national system of emergency intervention services, as well as subsequent rehabilitation and compensation for losses resulting from natural disasters, industrial accidents, or extreme weather events"*. This target is related to the first Sustainable Development Goal: "No Poverty." It consists of three indicators: one main indicator and two additional indicators.

✓ *Indicator TAO0132*: Share of the budget allocated to the activity of the General Inspectorate for Emergency Situations in the total government expenditure, main indicator;

✓ *Indicator TAN0131*: Number of interventions of professional, voluntary and private emergency services, additional indicator;

✓ *Indicator TAP0133*: Number of employees of the General Inspectorate for Emergency Situations, additional indicator.

Methodology

For this study were utilized historical data from the period 2008-2021, the study being approached through a quantitative research method. The research relies on data collected only from official sources, including the Romanian Sustainable Development Aggregator, the General Inspectorate for Emergency Situations (IGSU) – the national institution targeted for fulfillment of the targets.

The main objective of the study is to analyze the current situation of Romania's progress in achieving no. 3 Sustainable Development Target as well as to identify the future necessary steps for its fulfillment, taking into consideration the national strategies.

The research approach is a systematic analysis of the historical series of data in order to estimate trends, patterns and correlations between the indicators. Specifically, the national indicators established were analyzed, respectively:

- ✓ TAN0131 – Number of interventions by professional, voluntary and private emergency services;
- ✓ TAO0132 – The share of the budget allocated to IGSU within total government expenditure
- ✓ TAP0133 – Number of employees within IGSU.

Each indicator was thoroughly analyzed. For each one, an accurate description was done, including the way in which it was calculated. Subsequently, the current status of implementation was examined, enabling a comprehensive conclusion regarding its progress and effectiveness in Romania.

A comparative analysis was done in order to assess the extent to which these indicators have changed over time and their alignment with Romania's sustainable development commitments. A trend analysis is also included in the study in order to identify potential future trajectories and the possibilities to achieve the target by 2030.

By interpreting historical data and forecasting future developments, this research provides evidence-based data to guide policymakers, enabling informed decision making to enhance Romania's emergency services in the context of sustainable development.

Results and discussions

For a better understanding of the target and its 3 indicators, it is important to highlight that the General Inspectorate for Emergency Situations is a central institution, fully financed from the state budget, having responsibilities in coordination, prevention and management of emergency situations thorough the operational coordination of intervention to 23 risks, ensuring 16 support functions, according to the provisions of no. 557/2016 Government Decision regarding risk type management. IGSU is composed by 44 subordinated units with legal personality, which carry out their activity in an area of competence, usually a national county.

The emergency situation is defined by the relevant legislation as an exceptional event, non-military in nature, which threatens the life or health of a person, the environment, material and cultural values, and in order to restore normality, urgent measures and actions are required, as well as the allocation of specialized resources and the unitary management of the forces and means involved.

Indicator TAO0132: The share of the budget allocated to IGSU within total government expenditure

The main indicator, TAO0132 measures the share of the budget allocated to the Romanian General Inspectorate for Emergency Situations (IGSU) relative to total government expenditure, which reflects progress in strengthening the national system of professional emergency services. This can be calculated by dividing the IGSU expenditure budget by the total government expenditure, then multiplying the result by 100, resulting in the following mathematical formula:

$$X = \frac{\text{Budget allocated to the activity of IGSU}}{\text{Government expenditure}} \times 100$$

The IGSU budget, presented in Figure no. 4, tripled over the analyzed period, while government spending increased by approximately 2.3 times, which led to a maximum increase of

1.82%, for this percentage being taken into account the minimum level recorder in 2010 (0.47%) and the maximum level recorded in 2021 (0.85%)

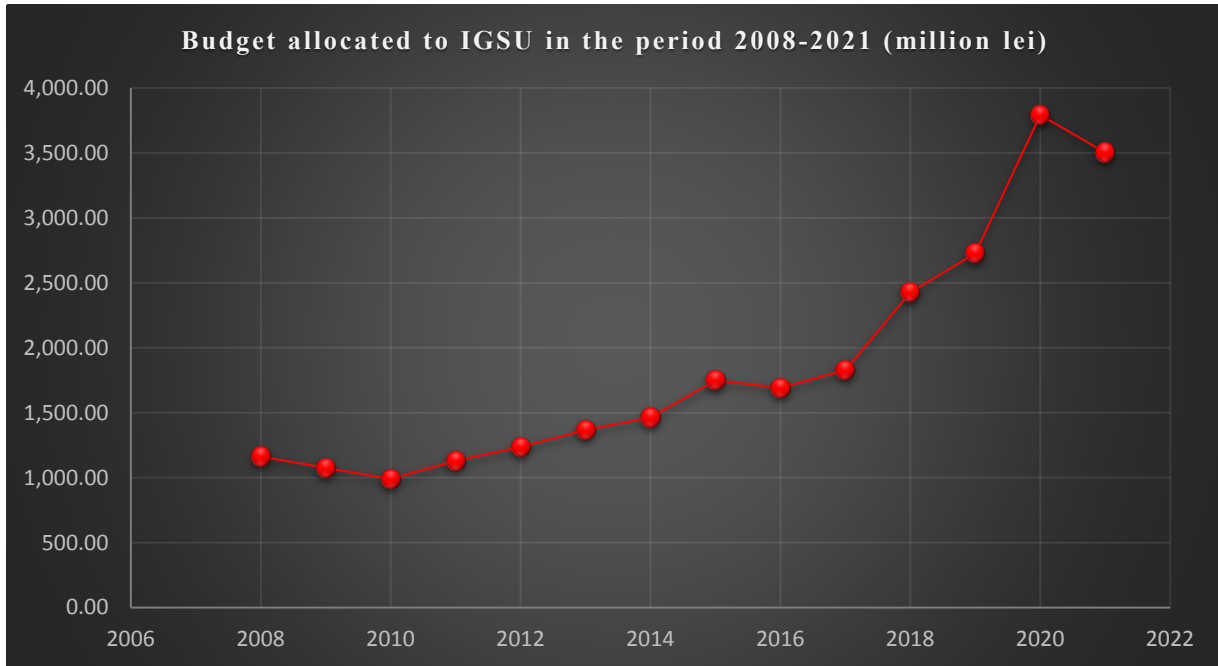


Figure 4. Budget allocated to IGSU in the period 2008-2021

Source: Author's contribution resulting from the processing of historical information.

The proportion of the IGSU budget in total government spending over the period 2008-2021 is illustrated in Figure 5:

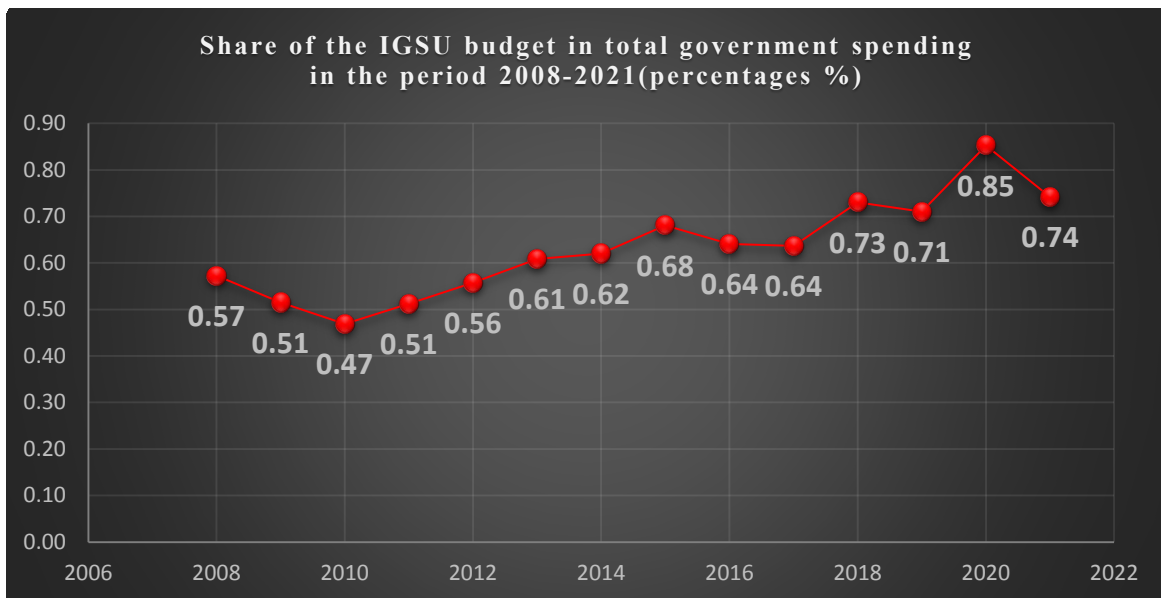


Figure 5. Share of IGSU budget in total government spending in 2008-2021

Source: Author's contribution resulting from the processing of historical information.

For a rigorous analysis of the budget allocated to the IGSU, it is imperative to analyze the budget resulted from the implementation of projects with non-reimbursable European funds, IGSU implemented over 44 projects financed by EU in 2008-2021 time period. One of the most important projects is VISION 2020, financed through the Large Infrastructure Operational Program 2014-2020, which had a budget of over 682 million euro, equivalent of over 3.28 billion lei, which represents the institution's budget for one year for its activity, including salaries, fuel, maintenance, etc. For the aforementioned project, the financing contract was signed in 2020, but it included expenses incurred since 2017, and the project was completed on 31.12.2023, having a multi-annual budget.

From the perspective of the projects implemented in the period 2008-2024 by IGSU and its subordinated structures, in conjunction with the share of the IGSU budget in the total government expenditure, we can conclude that the amounts attracted from external non-reimbursable funds have had a significant contribution to the increase in the percentage shown in Figure no. 4.

In conclusion, in order to achieve the main indicator TAO0132: The share of the budget allocated to the General Inspectorate for Emergency Situations in the total government expenditure, it is necessary to increase the share of the budget of the General Inspectorate for Emergency Situations in the total government expenditure, given that the allocation from European funds in the 2021-2027 framework for promoting climate change adaptation and risk management has decreased, compared to the allocation from the 2014-2020 financial framework, decreased by over 56%.

Indicator TAN0131: Number of interventions by professional, voluntary and private emergency services

The TAN0131 indicator measures the number of emergency interventions carried out by professional, voluntary, and private emergency services. Professional emergency services refer to operational structures within the IGSU. The voluntary and private emergency services consist of specialized units with paid and/or volunteer personnel, operating under the authority of local governments or private companies.

Since the number of emergency situations interventions involving voluntary and private emergency services participated is less than 1.5% per year of the total number of emergency situation interventions, the analysis will take into consideration only the IGSU number of interventions.

The low share of the number of voluntary and private emergency services interventions in the total amount of intervention is related to the fact that approximately 75% of the total number of interventions in emergency situations are those for providing qualified first aid through the Mobile Emergency, Reanimation and Rescue Service (SMURD), and voluntary and private services have no duties in this regard.

The unquestionable upward trend in the number of emergency situation interventions of the IGSU coincides with the fact that at the national level in the period 2008 - 2010, SMURD was established in 24 counties, and now SMURD is going beyond Romania's borders, the service being established in the Republic of Moldova.

As presented in figure no. 6, the trend of emergency situation interventions in which IGSU participated, illustrated by the green line, shows a clear ascending trajectory, the total number of interventions increasing more than sixfold during the analyzed period.

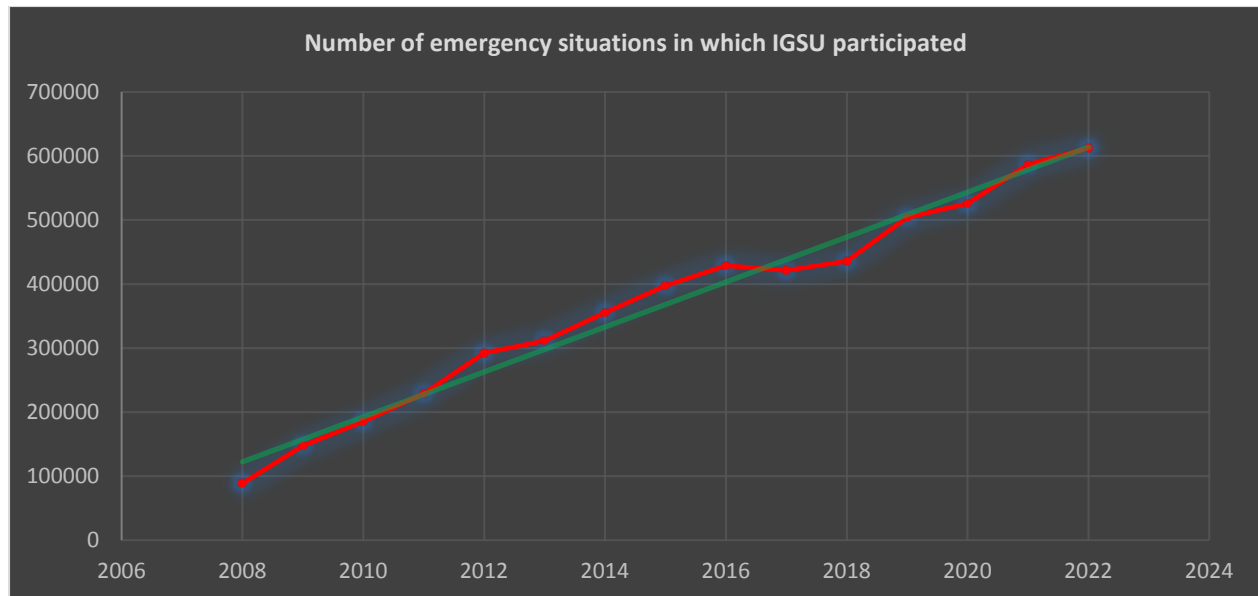


Figure 6. Number of emergency situations in which IGSU participated

Source: Author's contribution resulting from the processing of historical information.

It is important to note that the frequency of emergency situations in a period of time can be influenced by different external factors, such as the incidence of diverse risks as well as fires, accidents or other natural phenomena. Barring these variables and considering that fact that the number of interventions increased more than sixfold from 2008-2022, it is highly unlikely that this indicator will not be reached, and therefore it is not necessary to continue with further analysis.

The indicator TAP0133: The number of employees of the IGSU

The indicator TAP0133 measures the number of IGSU employees. A detailed evaluation of the statistical data presented in figure no. 7 reveals a significant decline over the period from 2008 to 2022 of the number of IGSU employees. Specifically, the number of employees has decreased by 14.65%, a downtrend that may have significant implications for the emergency situation intervention capacity of this institution.

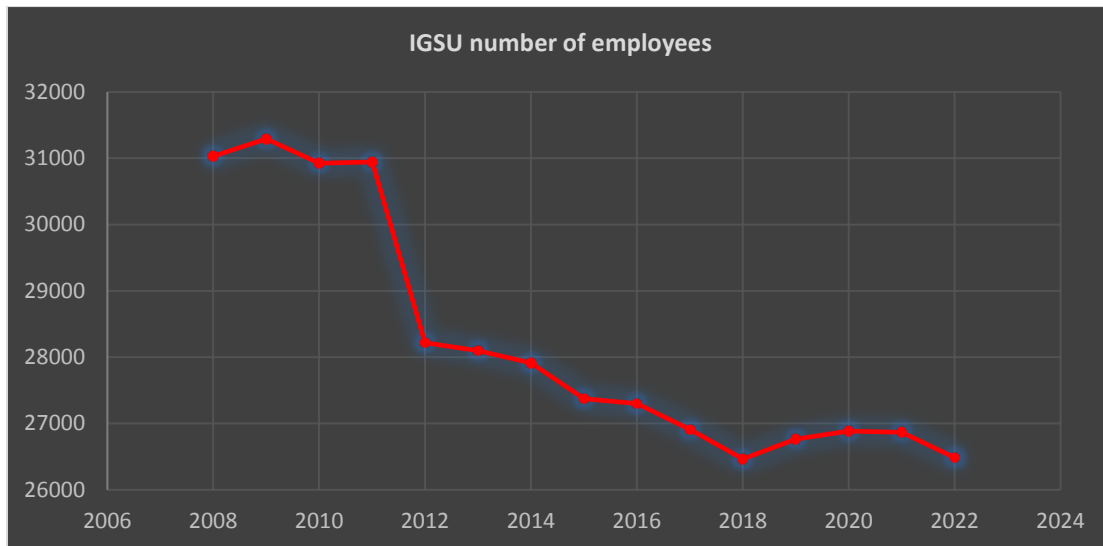


Figure 7. IGSU number of employees

Source: Author's contribution resulting from the processing of historical information.

Both indicators TAP0133 number of IGSU employees and TAN0131 number of interventions by professional emergency services, play a significant role in establishing the institution's budget and overall resources planning. As presented in figure no. 7, while the number of IGSU employees decreased by approximately 15%, the number of emergency interventions increased by more than sixfold in the period under review. In contrast, the total budget allocated for IGSU was increased by only threefold, indicating a potential imbalance between growing operational requirements and the allocated financial resources.

This analysis leads to three key assumptions:

✓ **Cost optimization per intervention:** The cost efficiency per intervention has improved during the analyzed period. This improvement may be the result of the several EU-funded projects implemented by IGSU, whose common objective was to modernize the technical equipment and streamline emergency response through specialized training of operational employees. These projects have contributed to a more effective allocation of resources on each intervention.

✓ **Insufficient budget and employees:** The IGSU budget, and by extension the number of employees, may be inadequate to meet the operational requirements. This assumption is supported by the development of a Memorandum titled "*The Recovery of IGSU and its subordinated units,*" which aims to supplement the number of IGSU employees with 8,546 positions. This legislative proposal highlights a recognized shortage of employees, which impacts the ability to ensure a proper management for the increasing emergency situations demands.

✓ **Continued resource constraints (human and financial) despite increasing efficiency per intervention:** Although the cost per intervention has been optimized, the overall analysis indicates that human and financial resources remain insufficient to respond to the growing number of emergency situations. The significant discrepancy between the exponential growth in the number of interventions and the modest increase in the budget, underlines the need to allocate additional funds.

Based on the notions presented above, the last key assumption is correct, as it synthesizes efficiently elements from the previous two key assumptions. This conclusion is supported by the graphical illustration presented in figure no. 8, which can be explained by a simple mathematical equation set up by two constants and an increasing variable. The equation shows a considerable disparity between the three indicators (the number of emergency situations interventions, the number of employees and the allocated budget).

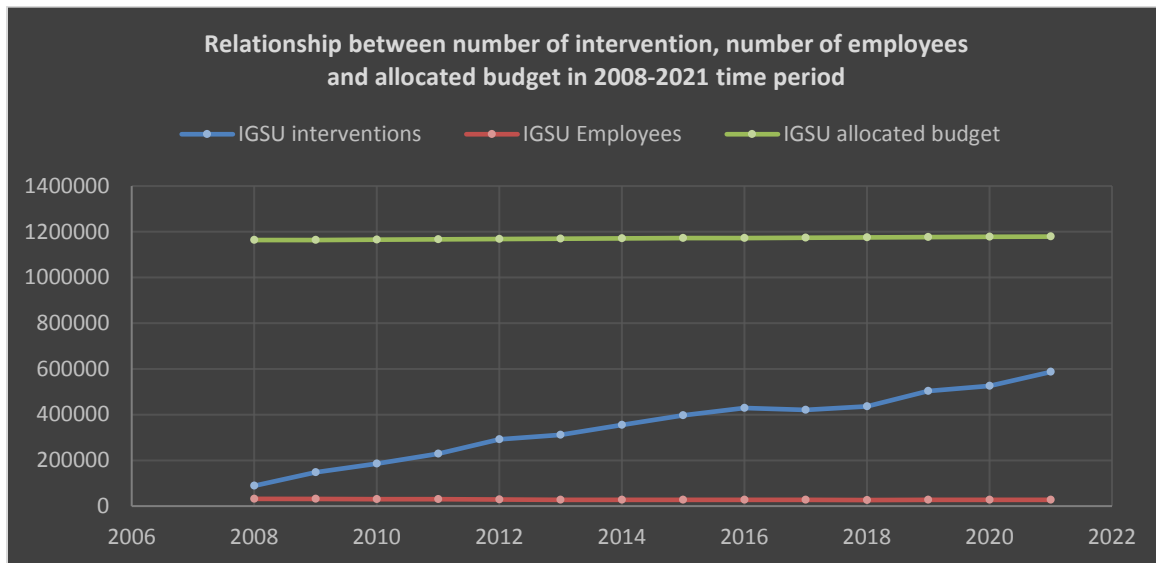


Figure 8. Relation between the number of interventions, number of employees, and allocated budget for IGSU during 2008-2021

Source: Author's contribution resulting from the processing of historical information.

For a comprehensive analysis of how the additional indicator TAP0133 will be achieved, the following key aspects should be taken into account:

- ✓ Implementation of the Memorandum on the Recovery of IGSU and its subordinate units, which aims to supplement the number of employees by adding 8456 positions;
- ✓ The projected aging rate of IGSU employees by the end of 2030 which could impact the organizational capacity.

Considering that in 2021, over 51% of IGSU employees were over 41 years old, it can be expected that in 2030, this category of employees will be at least 50 years old, which leads to the idea that this category of employees will no longer be active.

Thus, supplementing the IGSU personnel with 8546 positions, the existing positions in 2022 (26486) cumulated with 856 positions resulting from the implementation of the Memorandum, will lead to 35302 positions, which will represent the highest value of the number of IGSU employees, as can be seen in Figure no. 9:

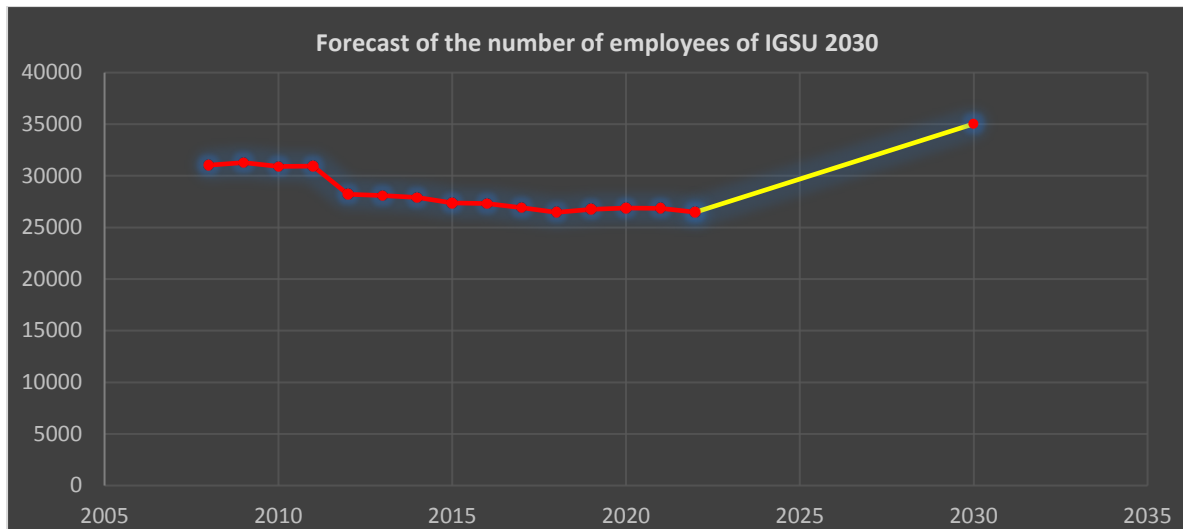


Figure 9. Forecast of the number of employees of IGSU in 2030

Source: Author's contribution resulting from the processing of historical information.

To successfully achieve the TAP0133 indicator, the following conditions must be met simultaneously:

- ✓ The number of employees overall (26,486 in 2022) must be maintained at a steady level so that any loss of employees due to retirements or other reasons is fully replaced by new hiring;
- ✓ At least 3,741 of the 8,546 positions mentioned in the Memorandum must be filled, in order to exceed the number of employees from 2009, which is the highest value recorded up the date.

It must be mentioned that the fulfillment of the 2 above conditions will have a direct financial impact on the share of the budget allocated to IGSU within the total government expenditure, as reflected in the main indicator TAO0132. Considering the gross minimum wage (3700 RON - 1st of July 2024), the estimated minimum financial impact for 1 year is 166.10 million RON. This represents approximately 5% of IGSU's annual total revenue, emphasizing the budgetary consequences of increasing personnel levels.

Conclusion

Achieving sustainable development goals is a fundamental commitment for Romania as a member state of the United Nation as well as of the European Union. This article assesses Romania's progress towards one of the 102 sustainable development targets, namely Target no. 3 "*Strengthening the national unitary system of emergency intervention services, subsequent rehabilitation and compensation for losses in the event of natural disasters, industrial accidents or extreme climatic events*", related to Sustainable Development Goal no. 1 "No Poverty".

Target no. 3 is closely interconnected with Sustainable Development Goal no. 1 "No Poverty," emphasizing its vital role in building resilience and protecting vulnerable communities.

The article analyzed three key indicators associated with Target no. 3:

- ✓ TAN0131 – Number of interventions by professional, voluntary, and private emergency services;
- ✓ TAO0132 – The share of the budget allocated to IGSU within total government expenditure;
- ✓ TAP0133 – Number of IGSU employees.

The analysis determined that the indicator TAN0131 will be achieved, since the number of emergency situation intervention increased more than sixfold in the period of 2008 to 2022, leaving no doubt about its fulfillment.

Regarding the indicator TAO0132, increasing the share of the national budget allocated for IGSU activities is crucial, since the European funding for climate change adaptation and risk management for the 2021-2027 funding period has decreased by over 56%, compared to the previous funding period 2012-2020.

The TAP0133 indicator, the number of IGSU employees, requires special attention. For its achievement, the following two conditions must be met simultaneously:

- ✓ Maintaining the ascending trend of the IGSU budget share, given the reduction of the European funding for the actual funding framework;
- ✓ Maintaining the current number of employees and recruiting at least 3,741 additional employees in order to exceed the 2009 employee levels, the highest recorded to date.

In conclusion, in order to achieve the third sustainable development target, Romania must focus on two indicators, TAO0132 and TAP0133. Strengthening the national system of emergency intervention services, ensuring adequate resources for IGSU and addressing employees' needs are essential. Effective management and investments will increase the possibilities to achieve this target and be more resilient to natural disasters, industrial accidents and extreme climatic events.

Considering the general objective of the paper, namely analyzing the current state of Romania's progress in achieving Sustainable Development Target No. 3 and identifying the necessary steps for its fulfillment, it can be said that the present research has been successful in fulfilling its purpose, but there are also limitations that should be highlighted.

The first one is related to the time period being taken into account, which stopped at the year 2021, it would have been ideal to include data up to date, but these data is not available yet.

The second limitation is related to the TAN0131 indicator and the elimination of the number of interventions of voluntary and private emergency services. For a complete analysis, all voluntary and private services for emergencies at the national level could be consulted, and the number of interventions can be taken into account, even if the percentage of their interventions is very small (1.5%).

Reaching the 3 indicators and in implementing implicitly development target no. 3, will have an important contribution to the closing of the gap presently registered by Romania for the Sustainable Development Goal no. 1 - "No poverty". Strengthening the national system for emergency intervention, rehabilitation and compensation services in natural disasters, industrial accidents or extreme weather events will have a general contribution towards the economic and social situation of Romania's improvement and fighting poverty.

References

- Astara, O. H. (2014). Culture as the fourth pillar of sustainable development. *Sustainable Development, Culture, Traditions, 1a(2a)*.
- Barbu, A., Catană S.A., Deselnicu D.C., Cioca L.I., & Ioanid A. (2022). Factors Influencing Consumer Behavior toward Green Products: A Systematic Literature Review. *International Journal of Environmental Research and Public Health*, 19(24), <https://doi.org/10.3390/ijerph192416568>.
- Deselnicu D.C., Militaru G., Deselnicu V., Zăinescu G. & Albu L. (2018). Towards a circular economy - a Zero Waste programme for Europe. *Proceedings of the International*

- Conference on Advanced Materials and Systems (ICAMS 2018)*, pp. 563-568. Retrieved from: <https://www.academia.edu/download/67924225/icams-2018.xi.pdf>.
- European Commission. (2022). *Advancing towards Zero-Pollution: EU joins call for ambitious global agreement to end plastic pollution by 2040* (2022). Retrieved from: https://environment.ec.europa.eu/index_en.
- Eurostat. (2023). *Sustainable development in the European Union: Monitoring report on progress towards the SDGs in an EU context 2023*. Retrieved from <https://ec.europa.eu/eurostat/documents/15234730/16817772/KS-04-23-184-EN-N.pdf>
- General Inspectorate for Emergency Situations – IGSU (2025). *Official Website*. Retrieved from: <https://igsu.ro/>.
- International Society for Industrial Ecology (2025). Official website. Retrieved from: <http://www.is4ie.org/>.
- Keiner, M. (2005). *History, definition(s) and models of sustainable development*. ETH Zurich.
- Polèse, M. (2001). *The social sustainability of cities: Diversity and the management of change*. University of Toronto Press.
- United Nations. (1974). *Charter of Economic Rights and Duties of States General Assembly Resolution 3281 (XXIX)*. New York, NY.
- United Nations (2015). *Transforming our world: The 2030 agenda for sustainable development*. Retrieved from <https://sdgs.un.org/2030agenda>
- United Nations. (2024, May 9). *Sustainable Development Goals*. Retrieved from <https://sdgs.un.org/>
- World Commission on Environment and Development (WCED). (1987). *Our common future (The Brundtland Report)*. Oxford University Press.