

An Analysis of the Municipal Waste Management of Romania and Bulgaria in the European Context

Mari-Isabella Stan

„Ovidius” University of Constanta, Faculty of Law and Administrative Sciences, Romania
stanisabella@yahoo.com

Abstract

Since municipal waste accounts for 7% - 10% of all waste generated in the European Union, this issue drums up major interest at the institutional level, given that increasing the levels of collected waste poses significant challenges to the environment and human health. The European Union adopted a legislative package which promotes the shift towards a more sustainable development model, known as the circular economy. The aim of this article is to analyze the dynamics of municipal waste management in Romania and Bulgaria in the European context, as there are deficiencies in these countries' implementation of the European waste management legislation. Eurostat's data for the 2000-2020 time horizon was used for the undertaken analysis. The results of the study show that both Romania and Bulgaria are facing similar challenges in terms of waste management due to the fact that some of the European directives have not been transposed into the national legislation.

Key words: municipal waste, Romania, Bulgaria, sustainable development, circular economy

J.E.L. classification: Q01, Q53

1. Introduction

The municipal waste issue preoccupies European Union's institutions, since the increasing levels of collected waste pose significant challenges to the environment and human health, with municipal waste accounting for approximately 7%-10% of all waste generated in the European Union (Directive UE/2018/851).

The *2030 Agenda for Sustainable Development* has identified 17 Sustainable Development Goals (SDGs) and 169 targets structured around five pillars, which included all three aspects of sustainable development - social, economic, and environmental. At EU's level, the European Commission has made a commitment to implement the *2030 Agenda for Sustainable Development*, focusing on performing specific actions which will lead to tangible progress in the areas of the Sustainable Development Goals (SDGs).

Every year, the European Union produces more than 2.5 billion tons of waste, which is why, in 2018, it adopted the Circular Economy Package, which set new legally binding objectives for waste recycling and landfill reduction, with fixed deadlines (European Parliament, 2018) in order to promote the shift towards a more sustainable development model.

Subsequently, in 2020, the European Commission presented a new *Circular Economy Action Plan for a Cleaner and More Competitive Europe* aimed at reducing waste through better resource management, with a focus on accelerating the radical changes requested by the *European Green Deal* - Europe's new agenda for sustainable growth (European Commission, COM/2020/98 final).

In 2021, the Resolution on the new *Circular Economy Action Plan* was adopted, which considered this to be the way for the EU and European businesses to remain innovative and competitive on the global market, while reducing their negative environmental footprint (European Parliament, 2020/2077(INI)).

Therefore, the waste problem at EU's level is a complex one and it needs to be treated seriously by the Member States, as waste is not only an environmental problem, but also a cause of economic losses.

The aim of this paper is to carry out a dynamic analysis of municipal waste management in Romania and Bulgaria in the European context, given that there are deficiencies in these countries' implementation of the European waste management legislation.

2. Literature review

At EU's level, waste can often be seen as a resource that can generate added value. Since the implementation of economic instruments can maximize the environmental benefits (Directive 2008/98/EC), the management of material waste must be sustainable in order to protect, preserve and improve the quality of the environment, protect human health, ensure prudent, efficient and rational use of natural resources, promote the circular economy's principles (Directive EU/2018/851).

Waste has a direct and indirect negative impact on the environment, the citizens' well-being and the economy, and the clean-up costs are an economic burden on society (Directive UE/2018/851). EU waste management legislation and specialized literature classify as municipal waste both household waste and waste from other sources - public institutions, companies, industrial enterprises, the education sector, health services, accommodation and restaurant services, construction activities, which is similar in nature and composition to household waste - or the waste generated in the residential area - habitable and non-residential area - commercial/business district, corporate institutions/construction/demolition services of buildings and special structures (Bello, Al-Ghouti and Abu-Dieyeh, 2022, p. 2). Municipal waste also includes, inter alia, the waste resulted from the maintenance of parks and gardens, green space management being the responsibility of the local public administration (Stan, 2022, p. 61).

A country's economic growth is necessary, but not always sufficient so as to ensure economic development. Thus, a consequence of a linear economic development based on the intensive use of natural resources, with a negative impact on the environment and waste production, is that it does not ensure economic and social sustainability (Vuță *et al.*, 2018, p. 169). The transition to the circular economy is an exceptional opportunity to transform the economy and make it more sustainable, to contribute to achieving climate goals and to preserve world's resources, to create local jobs (European Commission, COM/2018/029 final), given that the circular economy is a production and consumption model that involves sharing, reusing, repairing, refurbishing, and recycling existing materials and products as long as possible.

The circular economy is a philosophy through which broader sustainability issues in society can be tackled (Marsh, Velenturf and Bernal, 2022, p. 2), being seen as a necessary and pragmatic solution for reconciling the connection between the pace of economic growth and the pressure on the resources provided by the environment (Căuțișanu *et al.*, 2018, p. 182), and it needs to be embraced in everyday life by each economic agent, and also by households and governments (Bongers and Casas, 2022, p. 2).

In the European Commission's Action Plan, key circular sectors, such as plastics, textiles, waste electrical and electronic equipment, food, water and nutrients, packaging, batteries and vehicles, buildings and constructions, were established (European Parliament, 2021), the circular economy applying to all sectors of activity as it has the capacity to achieve synergies which, through cumulation, can lead to new development opportunities (Târțiu *et al.*, 2019, p. 14). For example, plastic waste impacts the marine environment and poses a threat to economy, in general, to tourism, fish farming, aquaculture, maritime transportation, in particular, and for the coastal communities. Construction and demolition waste is a potential source for recycling and reuse in the construction industry, the construction sector being a key area with a significant economic and environmental impact, thus contributing to economic growth (Stan and Vintilă, 2021, p. 172; Aivaz and Avram, 2021, p. 475). Therefore, growth in the construction sector largely depends on the size of the business (Stan, 2021, p. 227), being one of the most resource and waste intensive economic activities (Sáez-de-Guinoa *et al.*, 2022, p. 1), thus economic operators need to have a clear perspective on the necessary investments for waste management.

Lately, strategies and regulations which are in force in the business sphere increasingly require companies to improve their social and environmental performances, which are assessed via corporate social responsibility (CSR) practices. Aivaz (2021a, p. 52) highlighted the fact that these practices are or should be a very present preoccupation for the activities of business support services, where

economic entities' initiatives or companies' annual CSR reports demonstrate the increasing involvement of companies in responsible business practices. Whereas there are many examples of successful CSR endeavors, there are still many situations in which companies' activities do not correspond to responsible behavior. In the Romanian business sector, where each company chooses, at its establishment, a core activity that generically defines its future operations, there is an operational subcategory that encompasses in an interesting way many of the activities of interest to the sustainability principles. The results of studies carried out based on results indicators, by fields of activity (Aivaz and Căpățână, 2021, p. 289; Aivaz and Micu, 2021, p. 324; Aivaz, 2021b, p. 2; Aivaz, 2021c, p. 31; Aivaz, 2021d, p. 9) suggest that although stakeholders control resources which may be important to companies, the relationships established with them should be properly managed, so as to ensure the revenues and profits that the companies seek. Therefore, at a time when business orientation is competing to promote a balanced working environment, the attention to the environment is increasingly pressing, and innovation is a key to performance, operational diversity in the form of support services is of particular interest, and waste management can be incorporated into the object of activity of all the businesses.

Municipal waste, which is usually in close proximity to the citizens, has a very high degree of public visibility and important consequences for the environment and the health of the population. (Directive UE/2018/851). Its management is the responsibility of the local administration, thus contributing to the achievement of national targets. Hence, although the responsibility for municipal waste management lies with the local public administration, through the public sanitation services organized at the level of the administrative-territorial units, contracts for sanitation services may be concluded with economic agents in the field.

The municipal waste management issue deals with waste generation, storage at source, collection, transport, processing, and disposal at its final destination, implicitly regulation and monitoring, while complying with the legislation, health regulations and economic framework, so as to achieve environmental sustainability. Therefore, municipal waste management requires an efficient waste management system through the active involvement of citizens and enterprises and a detailed financing system (Directive UE/2018/851). Moreover, public and private decision-makers must integrate the environmental component into their development strategy in order to prevent their activities from irreversibly degrading the environment, in line with the two fundamental principles: prevention and sustainable development (Brașoveanu, 2013, p. 148).

3. Research methodology

The aim of this research is to carry out a quantitative, dynamic analysis of municipal waste management in Romania and Bulgaria. The specific objective of the research is to analyze, by means of statistical indicators representative of the distribution series, the municipal waste per capita (kg) generated in Romania and Bulgaria compared to European Union's level.

For the undertaken analysis, we have used data provided by Eurostat, the Statistical Office of the European Communities, for the 2000-2020 period. The analyzed database was formed by applying several filters: the theme *circular economy indicators, production and consumption*, and the indicator *municipal waste production per capita* were selected. The indicator measures the waste collected by or on behalf of municipal authorities and disposed of through the waste management system and it consists largely of waste generated by households, although similar waste from sources such as commerce, offices and public institutions may also be included.

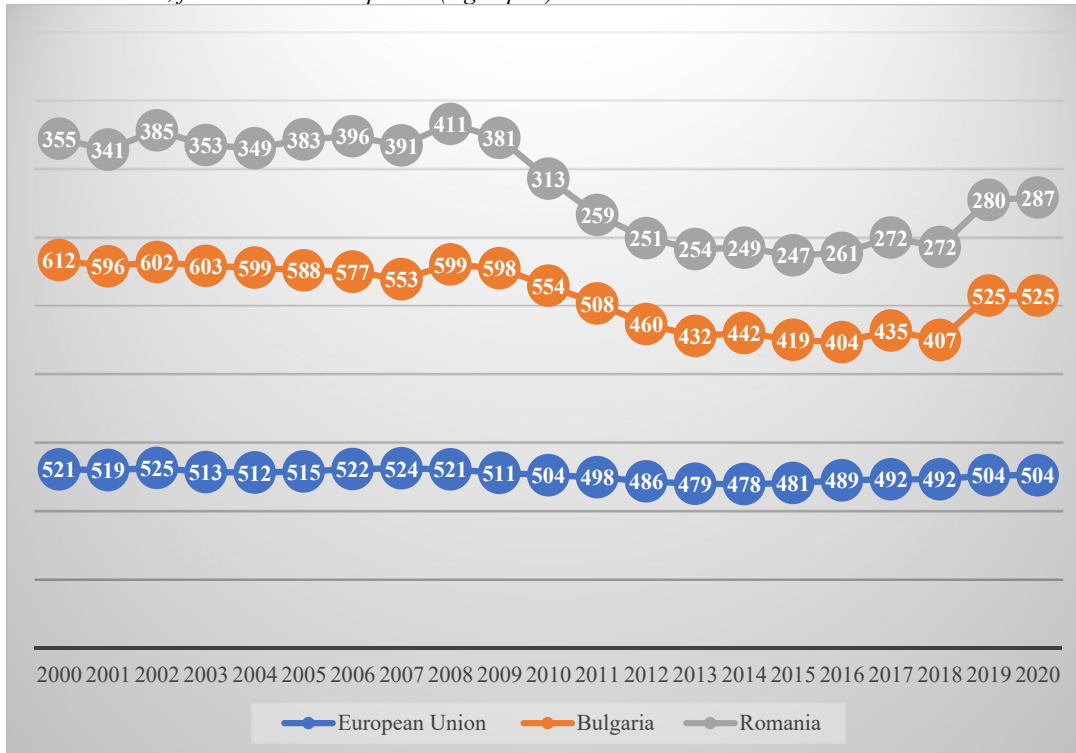
The data processing, the systematization of results, and obtaining indicators used for the statistical analysis were performed using the Statistical Program for the Social Sciences (SPSS).

4. Findings

The article analyzes the amount of municipal waste generated by Romania and Bulgaria compared to European Union's level, for the 2000-2020 time period. Municipal waste generation varies considerably between the EU Member States.

Figure no. 1 shows that, for the 21-year period analyzed, the amount of municipal waste at EU's level has been relatively constant, at around 500 kg/capita.

Figure no. 1 The amount of municipal waste generated by Romania and Bulgaria compared to European Union's level, for the 2000-2020 period (Kg/capita)



Source: Author's own processing

Thus, a person in the European Union generated, on average, an amount of 504.29 kg/capita of municipal waste for the analyzed period (Figure no. 2). In 2020, the amount of municipal waste generated by a person in the European Union was 505 kg/capita, a decrease of 17 kg being recorded since 2000. In 2012 the highest amount of municipal waste generated was recorded, i.e., 525 kg/capita and in 2014 the lowest amount of municipal waste generated, i.e., 478 kg/capita (Table no. 1).

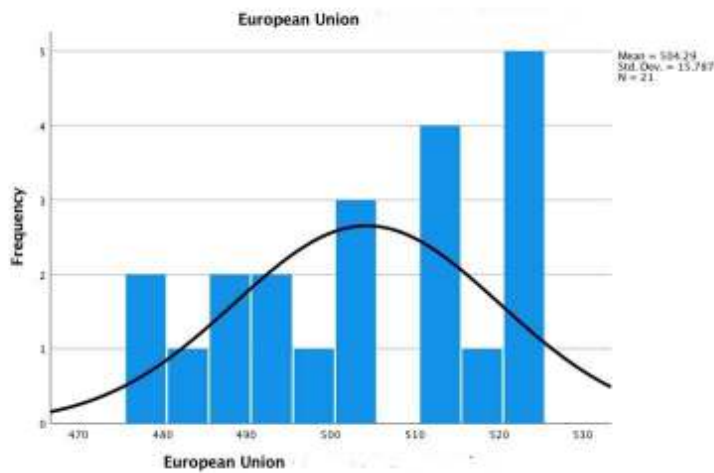
Table no. 1 The statistical description of the "amount of waste" indicator

		European Union	Bulgaria	Romania
N	Valid	21	21	21
	Missing	0	0	0
Mean		504.29	525.62	318.57
Range		47	208	164
Minimum		478	404	247
Maximum		525	612	411

Source: Author's own processing

One can notice a relatively constant trend with slight fluctuations in municipal waste generation for the 2000-2020 period at EU's level.

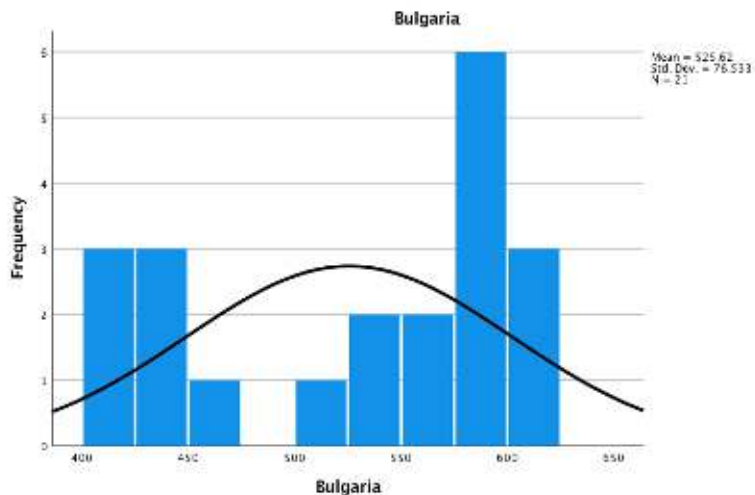
Figure no. 2 Histogram of waste amounts at European Union’s level



Source: Author’s own processing

For the analyzed period, in Bulgaria, one person has generated, on average, an amount of 525.62 kg/capita of municipal waste (Figure no. 3). In 2020, the amount of municipal waste generated by a person in Bulgaria was 525 kg/capita compared to 2000, a decrease of 87 kg being recorded. One can see that in the year 2000 there was the highest amount of municipal waste generated, i.e., 612 kg/capita, and in 2016 the lowest amount of municipal waste generated, 404 kg/capita (Table no. 1).

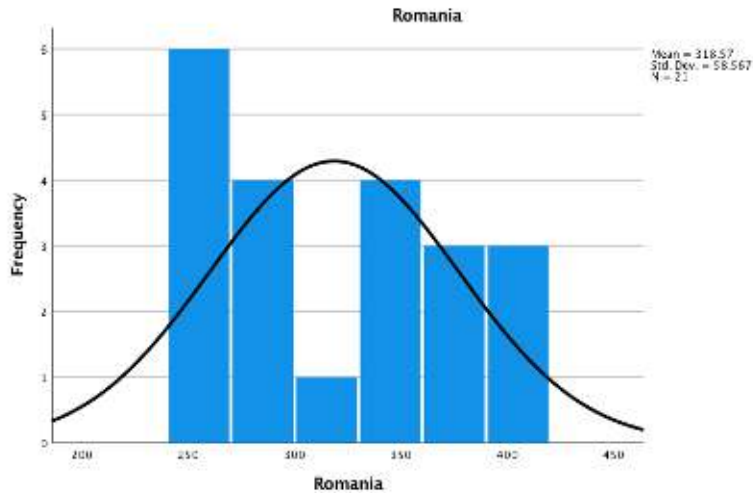
Figure no. 3 Histogram of waste amounts at the level of Bulgaria



Source: Author’s own processing

In Romania, a person produced, on average, an amount of 318.57 kg/capita of municipal waste for the analyzed period (Figure no. 4). In 2020, the amount of municipal waste generated by a person in Romania was 287 kg/capita, a decrease of 68 kg being recorded, compared to 2000. In 2008 the highest amount of municipal waste generated was recorded, i.e., 411 kg/capita, and in 2015 the lowest amount of municipal waste generated, i.e., 247 kg/capita (Table no. 1).

Figure no. 4 Histogram of waste amounts at the level of Romania



Source: Author's own processing

Thus, in the 21-year period under review, in Bulgaria there was an increase of about 4.23% in the average amount of municipal waste per person compared to EU's average value (504.29 kg/capita). On the other hand, Romania recorded a decrease of 36.82% in the average amount of municipal waste per person, below the European average. One can see that in the two EU Member States analyzed the amount of municipal waste per capita varied according to the way it was collected, transported, processed, and disposed of at its final destination.

Being former communist countries, Bulgaria and Romania are facing serious challenges in meeting the criteria of the Directive 1999/31/EC on the landfill of waste, namely closing non-compliant landfills or upgrading them in order to meet the current EU standards.

In Romania, over the last 30 years the amount of waste has increased, exceeding the technical and financial capacity related to the collection and storage at the level of administrative-territorial units. Thus, in 2017, Romania was referred by the European Commission to the Court of Justice of the European Union for non-compliance with the obligation to revise and adopt the National Waste Management Plan and the Waste Generation Prevention Program, in accordance with the European directives on waste and circular economy.

In 2021, the European Commission requested Romania and Bulgaria to correctly implement the Directive on the landfill of waste (Directive 1999/31/EC) and the Waste Framework Directive (Directive 2008/98/EC) (European Commission, 2021).

Therefore, both Romania and Bulgaria are facing similar challenges in waste management, such as: a part of the European directives have not been transposed into national legislation, many non-compliant landfills are still not closed (as a consequence, both countries are in infringement proceedings), recycling targets for 2020 have not been reached, such as the 50% reuse and recycling rate of the total amount of municipal waste, etc.; the two countries have always been seen as twin sisters, since joining the EU and in terms of their evolution over the years (Apostol and Stan, 2021, p. 51).

Consequently, the highest priority direction for waste reduction is the prevention of waste generation (Soltanian *et al.*, 2022, p.3), as this is the most effective way of improving the efficient use of resources and reducing the impact of waste on the environment (Directive EU/2018/851).

5. Conclusions

As a result, inadequate waste management poses a significant challenge to the environment, human health and, implicitly, to the achievement of the SDGs.

The fight against waste should be a common effort of all stakeholders (relevant authorities, businesses, producers and consumers), in order to generate substantial environmental, economic and social benefits and to accelerate the transition to a circular economy.

While the transition to a circular economy is already underway at European level, with the Member States being at various stages of implementation, in Romania the implementation of the circular model is characterized as modest and fragile (Vermeșan, Mangău and Tiuc, 2020, p. 2), moreover, in Bulgaria it has proceeded slowly, requiring fundamental changes in the production and consumption systems (Sterew and Ivanova, 2019, p. 765).

Therefore, most sectors of economic activity need sustainable solutions to the problems they are facing today, whereas the transition to a circular economy is the solution for achieving the goals that need to be met in the future.

6. References

- Aivaz, K.A., Avram, C., 2021. An analysis of the performance of the companies in Constanța County which operate in the real estate transactions field in the context of sustainable development. *Technium Social Sciences Journal*, 26(1), pp. 475-487, <https://doi.org/10.47577/tssj.v26i1.5315>.
- Aivaz, K.A., 2021a. Financial Performance Trends and Corporate Responsibility Incentives in a Group of Support Services in Constanța County, Romania. *Annals of “Dunarea de Jos” University of Galati Fascicle I. Economics and Applied Informatics*, XXVII(1), pp. 52-60, <https://doi.org/10.35219/eai15840409167>.
- Aivaz, K.A., Căpățână, A., 2021. An analysis of the Return on Assets of HORECA Companies in Constanța County in the Context of the Recovery Pursuits after the Shock Produced by the COVID-19 Pandemic. *Technium Social Sciences Journal*, 25(1), pp. 289-303, <https://doi.org/10.47577/tssj.v25i1.5096>.
- Aivaz, K.A., Micu, A., 2021. An analysis of the impact of the COVID-19 pandemic on the number of tourists arriving in Romania using the correspondence factor analysis. *Technium Social Sciences Journal*, 24(1), pp. 324-335, <https://doi.org/10.47577/tssj.v24i1.4843>.
- Aivaz, K.A., 2021b. The Dynamics of the Degree of Investment at the Level of Economic Agents whose Main Activity is Agriculture, Forestry and Fishing in the Context of the Concerns regarding Coastal Development. *Ovidius University Annals, Economic Sciences Series*, XXI(1), pp. 2-8.
- Aivaz, K.A., 2021c. Investigating the impact of subsidy revenues on turnover at the level of companies in agriculture, forestry and fishing in the coastal area of the Black Sea. *Annals of “Dunarea de Jos” University of Galati Fascicle I. Economics and Applied Informatics*, XXVII(2), pp. 31-38, <https://doi.org/10.35219/eai15840409189>.
- Aivaz, K.A., 2021d. The Dynamics and Challenges related to the Sustainable Development of Marine Fishing and Aquaculture Activities. Spatial Maritime Planning and Solutions in the Coastal Region of Romania. *Ovidius University Annals, Economic Sciences Series*, XXI(1), pp. 9-17.
- Apostol, A.M., Stan, M.I., 2021. Comparative study on the analysis of digital governance in Romania and Bulgaria. *Technium Social Sciences Journal*, 24(1), pp. 38-53. <https://doi.org/10.47577/tssj.v24i1.4842>.
- Bello, A. S., Al-Ghouthi, M.A., Abu-Dieyeh, M, H. 2022. Sustainable and long-term management of municipal solid waste: A review. *Bioresource Technology Reports*, 18, 101067, <https://doi.org/10.1016/j.biteb.2022.101067>.
- Bongers, A., Casas, P., 2022. The circular economy and the optimal recycling rate: A macroeconomic approach. *Ecological Economics*, 199, 107504, <https://doi.org/10.1016/j.ecolecon.2022.107504>.
- Brașoveanu F., 2013. The Role of the Approval Procedure of Economic and Social Activities with Environmental Impact. *Ovidius University Annals, Economic Sciences Series*, XIII(1), pp. 148-151.
- Căuțișanu, C., Asandului, L., Borza, M., Turturean, C., 2018. Quantitative Approach to Circular Economy in the OECD Countries. *Amfiteatru Economic*, 20(48), pp. 262-277, https://www.amfiteatruconomic.ro/temp/Article_2718.pdf.
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance). [online] Available at: <<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32008L0098>> [Accessed 13 June 2022].
- Directive 2018/851/EU of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (Text with EEA relevance). [online] Available at: <<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018L0851>> [Accessed 11 June 2022].
- European Commission, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS: A new Circular Economy Action Plan For a cleaner and more competitive Europe, Brussels, 11.3.2020, COM(2020) 98 final, [online] Available at:

<<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A98%3AFIN>> [Accessed 11 June 2022].

- European Commission, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on a monitoring framework for the circular economy, COM/2018/029 final, [online] Available at: <<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A29%3AFIN>> [Accessed 14 June 2022].
- European Commission, *Waste: European Commission calls on Romania, Bulgaria, Croatia, Greece and Slovakia to improve waste treatment [Deșeuri: Comisia solicită României, Bulgariei, Croației, Greciei și Slovaciei să îmbunătățească tratarea deșeurilor]*, 2021, [online] Available at: <https://romania.representation.ec.europa.eu/news/deseuri-comisia-solicita-romaniei-bulgariei-croației-greciei-si-slovaciei-sa-imbunatateasca-tratarea-2021-11-12_ro> [Accessed 11 June 2022].
- Marsh, A.T.M., Velenturf, A.P.M., Bernal, S.A., 2022. Circular Economy strategies for concrete: implementation and integration. *Journal of Cleaner Production*, 362, 132486, <https://doi.org/10.1016/j.jclepro.2022.132486>.
- European Parliament/Parlamentul European, *Circular economy: definition, importance and benefits [Economia circulară: definiție, importanță și beneficii]*, 2018, [online] Available at: <<https://www.europarl.europa.eu/news/ro/headlines/economy/20151201STO05603/economia-circulara-definitie-importanta-si-beneficii>> [Accessed 14 June 2022].
- European Parliament/Parlamentul European, *European Parliament resolution of 10 February 2021 on the new Circular Economy Action Plan [Rezoluția Parlamentului European din 10 februarie 2021 referitoare la noul plan de acțiune privind economia circulară]*, 2020/2077(INI), [online] Available at: <https://www.europarl.europa.eu/doceo/document/TA-9-2021-0040_RO.html> [Accessed 11 June 2022].
- European Parliament/Parlamentul European, *How does the European Union want to achieve a circular economy by 2050? [Cum dorește Uniunea Europeană să ajungă la o economie circulară până în 2050?]*, 2021, [online] Available at: <<https://www.europarl.europa.eu/news/ro/headlines/society/20210128STO96607/cum-doreste-ue-sa-obtina-o-economie-circulara-pana-in-2050>> [Accessed 13 June 2022].
- Sáez-de-Guinoa, A., Zambrana-Vasquez, D., Fernández, V., Bartolomé, C., 2022. Circular Economy in the European Construction Sector: A Review of Strategies for Implementation in Building Renovation. *Energies*, 15(13), 4747, pp. 1-27, <https://doi.org/10.3390/en15134747>.
- Soltanian, S., Kalogirou, S.A., Ranjbari, M., Amiri, H., Mahian, O., Khoshnevisan, B., Jafary, T., Nizami, A.-S., Gupta, V.K., Aghaei, S., Peng, W., Tabatabaei, M., Aghbashlo, M., 2022. Exergetic sustainability analysis of municipal solid waste treatment systems: A systematic critical review. *Renewable and Sustainable Energy Reviews*, 156, 111975, <https://doi.org/10.1016/j.rser.2021.111975>.
- Stan, M.I., 2021. Issues concerning the dynamics of labor productivity at the level of the companies in Constanta County operating in the Construction sector before and after the COVID-19 pandemic. *Technium Social Sciences Journal*, 25(1), pp. 225–241, <https://doi.org/10.47577/tssj.v25i1.5095>.
- Stan, M.I., 2022. Are public administrations the only ones responsible for organizing the administration of green spaces within the localities? An assessment of the perception of the citizens of Constanța municipality in the context of sustainable development. *Technium Social Sciences Journal*, 31(1), pp. 58–74, <https://doi.org/10.47577/tssj.v31i1.6510>.
- Stan, M.I., Vintilă D.F., 2021. An Investigation of the Structure of Fixed Assets of Construction Companies in the Context of Coastal Area Development. *Ovidius University Annals, Economic Sciences Series*, XXI(1), pp. 171-178.
- Sterew, N., Ivanova, V., 2019. From sustainability to a model of circular economy – the example of Bulgaria. *Proceedings of INTCESS 2019 - 6th International Conference on Education and Social Sciences, 4-6 February 2019, Dubai, U.A.E*, pp. 757-766, [online] Available at: <https://www.ocerints.org/intcess19_e-publication/papers/150.pdf> [Accessed 16 June 2022].
- Târțiu, V. E. (coordonator), Ștefănescu, M., Petrache, A.-M., Gurău, C.R., 2019. SPOS Strategy and Policy Studies 2018, Study no. 3 - Transition to a Circular Economy. From waste management to a green economy in Romania. European Institute of Romania [Studii de Strategie și Politici SPOS 2018, Studiul nr. 3 - Tranziția către o economie circulară. De la managementul deșeurilor la o economie verde în România. *Institutul European din România*], [online] Available at: <http://ier.gov.ro/wp-content/uploads/2019/03/Final_Studiul-3_Spos-2018_Economie-circular%C4%83-1.pdf> [Accessed 13 June 2022].
- United Nations, 2015. *Transforming our world: the 2030 Agenda for Sustainable Development*. [online] Available at: <<https://sdgs.un.org/2030agenda>> [Accessed 11 June 2022].

- Vermeșan, H., Mangău A., Tiuc A.-E., 2020. Perspectives of Circular Economy in Romanian Space. *Sustainability*, 12(17), 6819, <https://doi.org/10.3390/su12176819>.
- Vuță, M., Vuță. M., Enciu, A. Cioacă, S.I., 2018. Assessment of the Circular Economy’s Impact in the EU Economic Growth. *Amfiteatru Economic*, 20(48), pp. 248-261, [online] Available at: <https://www.amfiteatruconomic.ro/temp/Article_2717.pdf> [Accessed 13 June 2022].