

BUSINESS SUSTAINABILITY THROUGH THE APPLICATION OF THE CIRCULAR ECONOMY CONCEPT

SUSTENABILITATEA AFACERILOR PRIN APLICAREA CONCEPTULUI DE ECONOMIE CIRCULARĂ

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Abstract: *Current global economic transformations are to an increasing extent defined by the pursuit of continuous business expansion and the environmental limits constrained by ecological systems.*

Against this backdrop, the sustained use of linear economic framework based on production, consumption, and disposal uncovers structural deficiencies that undermine long-term economic sustainable resilience over time. The present study positions the circular economy as a systemic and strategic solution, aimed at aligning economic effectiveness with environmental constraints by promoting optimization, waste minimization, and continual reuse of materials. Based on 2024 European Union data, the analysis provides a comparative evaluation of key sustainability indicators across Romania, Germany, Sweden, and the Netherlands, evidencing marked differences in circular material utilization, recycling performance, and emissions intensity. Developed economies show higher integration of circular economy businesses through policy frameworks and technological upgrading in industry, while less developed countries reflect structural and institutional gaps in this domain. Furthermore, the paper emphasizes the importance of transforming business models at the sectoral level and examines the role of cross-border cooperation through the Moldova case study, where private-sector entities such as Terrecycling S.R.L. support alignment with EU standards. The results indicate that a circular transition necessitates a systemic restructuring, innovation-driven strategies, and coordinated governance to achieve sustainable development outcomes.

Keywords: circular economy, sustainability indicators, resource efficiency, EU environmental policy, waste management.

JEL CLASSIFICATION: Q53, Q56, Q57, Q58.

INTRODUCTION:

In the light of current global dynamics, sizeable number of challenges related to demographic expansion, such as environmental deterioration, climate change, growing socioeconomic disparities, and diminution of accessible natural resources are utterly connected with the current linear economic model. This approach is characterized by a ‘take-make-consume-waste’ direction, that maintains unsustainable consumption structures, accelerating depletion of natural resources and progressive ecological decline.

The linear economy will engender intense resource vulnerability and potential international tensions if it is sustained, threatening sustainable development, specifically amid the intersection of human capital proliferation, depreciating resources and environmental damage as observed in low- and middle-income countries.

A transformation towards circular economy has developed as a potential solution implementing the principles of resource reutilization through recycling and reapplication of materials. The circular economy model is perceived as a systemic structure that benefits businesses, societal interests, and ecological organization, as it facilitates new values in a resource-limited global context.

MAIN CONTENT:

The development of the sustainable circular economy is bound to proceed through multiple stages, because this transformation requires a gradual deconstruction of the traditional linear model, subsequently leading to the systematic reorganisation of productions and consumption frameworks into more resource efficient models. Due to this, entire value chains will need to be restructured in order to correspond to sustainability principles, modifying industries and corporate landscapes.

Companies that develop circular economy models need to engage with the different drivers of innovation and understand the differences between business development in industries as diverse as material-based industries, food processing, transportation, and mechanical engineering. Each sector and business model has to be transformed based on different logics. To avoid pitfalls, companies need to develop a deep understanding of the logics and fine-tune business models in order to maximize competitive performance. This can only be achieved through practice and through the opportunity of a number of employees to engage with aspects of the circular economy. (Larsson, 2018, p. 38) The transformation of circular business models involves adapting them to the specifics of each sector, leveraging existing resources and extending the life cycle of products (Timofei, 2023)

The progressive transition toward circular economy across European nations continues to reflect measurable outcomes, documented by national statistics data and reports indicating improvements in resource efficiency, waste reductions, and low-carbon industrial practices. In 2024, the EU's circular material uses rate and the proportion of material demand covered by recycled inputs reached 12.2%, marking the highest level of annual growth registered, comparing with previous years. This advancement of 1.5 since 2010 indicates improvement in sustainability actions, even if overall resource consumption remains greater than recycled material.

Table 1: Key Quantitative Indicators for National Sustainability Assessment

Country	Circular Material Use Rate (%)	Recycling Rate of Municipal Waste (%)	GHG Emissions per Capita (t CO ₂ eq)
Romania	1.3%, lowest in EU	<20%, below EU average	7.5 t CO ₂ eq per capita
Germany	~12.2%, below EU average	~68–69%, among the highest municipal recycling rates	8.3 t CO ₂ eq per capita
Netherlands	32.7%, highest in EU	>50%, high municipal recycling rate	8.8 t CO ₂ eq per capita
Sweden	>20%, above EU average	>50%, high municipal recycling rate	4.5 t CO ₂ eq per capita

Source: Author's own elaboration based on Eurostat (2026), Circular Material Use, Recycling of Municipal Waste, and Greenhouse Gas Emissions per Capita, European Union, 2024.

The analysis of national sustainability depends on quantitative indicators that assess the efficiency of resource consumption, waste management practices, and reduction of environmental impacts. In 2024, the circularity rate was highest in the Netherlands (32.7%), followed by Belgium (22.7%) and Italy (21.6%). The lowest rate was recorded in Romania (1.3%), Finland and Ireland (each 2.0%) and Portugal (3.0%).

Table 1 provides a comparative examination of the main sustainability indicators for 4 EU member countries, highlighting disparities in their methods of accomplishing environmentally responsible targets.

In 2024, Romania did not update GHG projections. Under the existing policy scenario (WEM) they point to a reduction in net GHG emissions (including LULUCF) of 69% and 66% by 2030 and 2050, respectively, compared to 1990. With additional measures (WAM), projected reductions are 74% and 75% for the same respective years (European Commission, 2024).

According to the EEA's early warning assessment, the Netherlands was considered to be on track to meet the 2025 target for preparing for reuse and the recycling of municipal waste, and the 2035 target for the landfilling of municipal waste. The same applies to the 2025 targets for the overall packaging recycling rate (ETC/CE, 2022). However, nature-related indicators are currently off track,

while climate-related indicators show that a lot of progress has been made in recent years, but further efforts are still needed to reach the 2030 targets. A key environment-related issue is not included in the assessments: the high emissions of ammonia and nitrogen oxides. The Netherlands has been struggling with the impact of nitrogen emissions since the 2019 Council of State ruling that too much nitrogen was being emitted and thus affecting natural areas. Farming and business are not allowed to expand without the proper permits. This hampers the construction sector, particularly regarding housing, renewable energy infrastructure and defence projects.

In Germany, The Recovery and Resilience Plan was published in April 2021 by the German government and was approved in June 2021 by the European Commission. In 2024, Germany submitted an amended national plan, which includes a chapter on REPowerEU. The available money amounts to €25.6 billion in grants under the Recovery and Resilience Facility for the German Recovery and Resilience Plan. This project is supporting flagship investments and reform projects, and it focuses on tackling the two great challenges of our time, climate change and the digital transition. Germany's plan allocates at least 42% of its measures to support climate objective and at least 52% to digital transition.

The measure **“CO2 building renovation: federal funding for efficient buildings”** obliges economic operators carrying out building renovation to ensure that at least 70% (by weight) of the non-hazardous construction and demolition waste generated on the construction site is prepared for re-use, recycling, and other material recovery in accordance with the waste hierarchy and the EU Protocol on Construction and Demolition Waste Management, including backfilling operations using waste as a substitute for other materials. The measure includes technical specifications for the durability, repairability and recyclability of renewable energy equipment.

Sweden is a knowledge-based economy and integrated in global value chains, which contribute to the high standards of living, well-being, income and gender equality.

A green industrial transition is currently gaining momentum in northern Sweden, and with it high and growing demand for fossil-free electricity. Several recent government initiatives aim to ensure a strong expansion of fossil-free electricity production. Sweden's recovery plan within the EU Recovery and Resilience Facility has the green transition as one of its focus areas, with specific reforms and investments primarily targeting carbon-intensive sectors.

During the last few years, there has been a significant increase in renewable energy production, mainly driven by the significant increase in wind power from 2.3 TWh in 2013 to 33.1 TWh in 2023. Solar panels are currently undergoing a technological leap: production almost doubled from 1.1 TWh in 2021 to 2 TWh in 2022. During that period, four nuclear power reactors were decommissioned without replacements.

In 2018, a greenhouse gas reduction mandate was introduced in the transport sector. It requires all suppliers of gasoline and diesel to blend in a percentage of biofuel. In 2024, the mandate was decreased significantly, which had a negative impact on the amount of biofuel consumed in Sweden. In August 2024, the government proposed increasing the mandate, but by only a fraction of the prior decrease.

REPUBLIC OF MOLDOVA STUDY-CASE:

The European Environment Agency's cooperation framework allows cooperating countries to engage in the Agency's activities and become part of Eionet. Cooperation with the EEA forms part of the Republic of Moldova's broader commitment to European integration. This was reaffirmed at the highest political level in the Joint Declaration following the first EU-Moldova Summit in July 2025, which references Moldova's participation in selected EU agencies, including the EEA.

The integrated partnerships in this environmental domain are not limited to the exchange of regulations, practices, or policies but creates supportive system for development of local ecological solutions, such as public waste management, reduction of toxic chemical substances, pollution caused by used tires, control of emissions from waste combustion, and development of climate strategies.

Against this backdrop, innovation-driven companies likewise Terrecycling are specializing in recycling and material resource of waste tires, facilitating in this way the realization of European sustainability standards and accelerating Moldova's transition toward circular economy model through the reintegration of recovered materials into industrial cycle.

Terrecycling S.R.L. is a company specialized in waste recycling and management in the Republic of Moldova. The company focuses on the extensive management of various waste categories, such as WEEE, ELVs, worn tires, packaging materials, batteries and accumulators, worn tires. Each waste stream is managed to assure traceability and legal compliance. Discarded materials are collected from generators, sorted and prepared for recycling, successively conveyed to EU-authorized recycling facilities, primarily Germany and Romania, but also in other member states where all the materials are processed in accordance with European environmental regulations.

Partnerships with accredited European recycles allows Terrecycling to maintain complete material tracking of tires from the generator to the recycling destination, providing the necessary documentation that proves the legality and regulatory alignments of all operations. This strategy aligns with circular economy principles, channelling reintegration of recovered resources back into industrial cycles and reducing dependence on primary resource inputs.

CONCLUSION:

In broader perspective, the emergence of the circular economy system reflects a comprehensive reassessment of how modern economies engage with environmental boundaries and constraints of environmental resources, acknowledging that traditional linear models are in growing measure not in accordance with the requirements of environmental resilience and sustainability.

This transformation extends beyond technological dimensions, bringing together institutional and behavioural transitions, synchronously demanding aligned interventions across policy systems, industrial ecosystems, and international cooperation networks.

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