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INTEGRATION OF SUSTAINABILITY IN ROAD FREIGHT TRANSPORT COMPANIES IN THE REPUBLIC OF MOLDOVA: BETWEEN POLYCRISIS, COMPLIANCE AND COMPETITIVENESS

BY

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Abstract. The last years of sustainable transition have been marked by the imprint of geopolitical, energy, climate and socio-economic crises. Road freight transport remains one of the sectors with a significant impact on the environment on the one hand, on the other hand it is impacted by the global polycrisis. In this context of economic survival, the probability that alignment with climate objectives will become less and less achievable is increasing. A gap appears between the need for sustainable transition and the real capacity of companies.

The article starts from the idea that sustainability in road freight transport can no longer be analysed separately from the broader context in which companies operate. Currently, the entrepreneurial environment is marked by an economic, energy, geopolitical and climate polycrisis, which increases uncertainty and makes many companies focus their attention, primarily, on survival, operational continuity and cost control. In these conditions, climate objectives risk being relegated to the background, even if the road freight transport sector remains one of the areas with a significant impact on the

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environment, through CO₂ emissions, high energy consumption, noise, congestion and infrastructure wear and tear.

The purpose of the research is to analyse the capacity of road freight transport companies in the Republic of Moldova to adapt to the requirements of sustainable transition.

Keywords: footprint, decarbonization, eco driving, framework, targets.

1. Introduction

In 2024, global greenhouse gas (GHG) emissions increased by 1.2% compared to the previous year and by 64% compared to 1990. The transport sector in 2024 generated approximately nine billion tons of carbon dioxide, of which 74.33% was generated by road transport (Climate TRACE, 2025). Globally, the largest contributors to GHG emissions are:

- the energy sector 29% and
- the transport sector with a contribution of 20.94%.

The road transport sector in the European Union (EU-27) generated the equivalent of 757 million tonnes of carbon dioxide in 2023, contributing 30% and being the largest source in the EU-27. Emissions generated by heavy and light trucks account for approximately 40% (European Commission, n.d.).

According to statistical data, in the Republic of Moldova, GHG emissions generated by road transport increased by 45% from 2001 to 2024 and carbon dioxide emissions by 33% (Statistica.md, 2025).

GHG emissions, especially carbon dioxide, resulting from human activities contribute to global warming. In 2024, the global temperature on the land surface and oceans was 1.29 degrees Celsius above the normal average (EDGAR/JRC, n.d.).

The report on the state of the planet's health in 2025 shows that seven of the nine limits have been exceeded:

- 5 of which are in the area of increased risk, one for the first time in 2025 left the safe zone;
- 2 are in the area of increased risk;
- 2 are in the safe zone.

Human activity has had a significant impact on planetary health and there is a trend towards increasing destabilization in the near future (Crucerescu and Gheorghiuță, 2026; Kitzmann *et al.*, 2025).

In this context, the relevance of sustainability policies and strategies is becoming increasingly pronounced and acute. Sustainability has become a key strategic factor for road freight transport companies, in the context of intensifying economic, social and environmental pressures generated by the polycrisis, as well as increasingly stringent compliance requirements at European and international levels. In the Republic of Moldova, the road freight

transport sector plays an important role in supporting trade and the competitiveness of the economy, but it faces challenges related to increasing operational costs, energy market volatility, labor shortages and the need to reduce environmental impact. Integrating sustainability principles offers companies the opportunity to respond to these challenges by optimizing resource consumption, reducing greenhouse gas emissions, improving operational performance and strengthening relationships with customers and business partners.

This article highlights the importance of adopting an integrated approach to sustainability in road freight transport companies in the Republic of Moldova, analyzing the interdependence between compliance with environmental standards, organizational resilience and competitive advantage. The study argues that sustainability is no longer just a compliance obligation, but a strategic development tool, capable of supporting companies' adaptation to changes in the economic and institutional environment (Litvin and Trach, 2020).

In this sense, sustainability contributes to increasing long-term competitiveness and more efficient integration of the sector into European and international logistics chains.

2. Methods and Materials

The research combines documentary analysis of OECD reports, European Commission documents, IRU studies and relevant public policies, with the analysis of a questionnaire applied to a sample of 51 road freight transport companies from the Republic of Moldova. The results show a low level of sustainable maturity. Only 5 companies in the sample monitor sustainability indicators, and most companies are essentially limited to complying with EURO requirements for trucks. At the same time, the analysis highlights that the decarbonization of transport will require considerable investments, both from the public and private sectors, as well as the existence of several complementary solutions, supported by the authorities through a technology-neutral approach. At the same time, important changes are emerging in European policies, with a gradual shift from vignette-based systems to charging mechanisms based on actual kilometers traveled and other external costs, such as noise and infrastructure degradation. At the national level, the pressure on the sector is also amplified by the objective of transferring 30% of road freight transport to rail by 2030.

The literature reviewed includes reports on the European strategy for SMEs in a sustainable and digital Europe, the IRU Green Compact, the dynamics of European road freight transport for the period 2024–2026, the prospects for the European transition to sustainability, and documents on decarbonization and road transport taxation. In addition to the documentary

analysis, a questionnaire was applied to road freight transport companies in the Republic of Moldova, which aimed to identify a system for monitoring performance indicators in the field of sustainability. Research methods such as: statistical data analysis, information synthesis, inductive and deductive reasoning, analogy, direct observation, and comparative analysis were used.

3. Results and Discussion

Policy reorients the main directions and brings to the fore priorities such as competitiveness, security and fairness. The main risk is that climate and environmental objectives could become secondary to monitoring competitiveness and security, the lack of policy coherence also poses a challenge. On the other hand, aligning climate and environmental objectives with the aforementioned priorities could provide progress towards achieving sustainability goals.

Priority objectives by 2030 include:

- reducing greenhouse gas emissions by 55% by 2030 and climate neutrality by 2050;
- strengthening resilience and reducing vulnerability to climate change;
- accelerating the transition to a circular economy;
- pursuing zero pollution and protecting the health and well-being of Europeans;
- protecting and restoring biodiversity;
- reducing environmental and climate pressures related to production and consumption (EEA Report, 2024).

Eurobarometer data for 2024 shows that:

- 21% of SMEs have a concrete strategy to reduce their carbon footprint,
- 19% do not have one but intend to,
- 66% minimise waste and save energy,
- 57% save materials,
- 49% water,
- 48% focus on recycling.

Obstacles mentioned by SMEs in the way of implementing sustainability actions are the following:

- 35% mentioned complex administrative or legal procedures,
- 26% mentioned complex environmental reporting requirements,
- 28% mentioned the cost of actions (Schulze *et al.*, 2025).

According to the qualitative study “Knowledge, attitudes and practices regarding environmental, social and governance (ESG) dimensions in the Republic of Moldova”, conducted by the CBS-AXA Center for Sociological Investigations and Marketing:

Large companies – with over 1000 employees are required to submit sustainability reports, the rest report voluntarily. Top management has an active

role in managing sustainable strategies. According to the respondents' answers, ESG performance indicators are superimposed on traditional systems, they do not have an isolated system.

Small companies – report voluntarily, the central role is played by the company founders, who adapt sustainable practices to the company's capabilities, operate without strategies, selectively implement certain principles, the driving factor is the need to ensure continuity and economic survival, do not monitor performance indicators.

Barriers – resistance to change among workers, lack of available time, lack of obligation, data management and reporting in a new format, costs, lack of expertise, unclear regulations and the absence of well-defined standards.

Opportunities – contribution and participation in actions aimed at achieving sustainable development goals, assuming an active role in achieving climate goals, improving the company's image, freer access to international markets, increasing competitiveness, prioritization by international partners, increasing the company's visibility (UNDP, 2026).

The current geopolitical situation, characterized by economic instability and conflicts, exerts pressure on the road transport sector through rising diesel prices, changing trade routes, inflation, decreasing transport volumes, especially on small companies.

Transporters are forced to adapt to the frequency of trips, detailed monitoring of fuel prices, adaptation of cost strategies, fleet planning and diminishing profit margins. At the same time, road freight transport is affected by high competition, driver shortages and customer pressure for lower rates (EMIS, n.d.).

The Energy Strategy 2050 of the Republic of Moldova adopted in 2025 proposes to promote efficient and sustainable freight transport and will pursue three strategic directions:

- Modal shift from road to rail - 30% shift from road to rail by 2030, and 60% by 2050;
- Electrification of public and freight transport - electrification of the main freight transport corridors by 2040;
- Promotion of alternative technologies for heavy transport - access to European financing for zero-emission logistics (Guvernul RM, 2025).

For a transport operator that only owns trucks, the modal shift from road to rail is a strategic threat that requires changing the entire business structure (Arvidsson, 2010). Decarbonization and electrification require huge investments from both the public and private sectors (Steurer and Bonilla, 2016). Effective negotiation with private sector actors is a decisive factor for the future of transport (Steurer and Bonilla, 2016).

In these conditions, the question arises: under the simultaneous pressure of geopolitical instability, fuel price volatility and new sustainability requirements, to what extent are road freight transport companies in the

Republic of Moldova prepared to adapt to the green transition and integrate sustainable practices into operational management?

In order to answer the proposed question, the data of a questionnaire in which 51 respondents from the field of road freight transport participated were analyzed.

The sample analyzed by the size of economic operators consists of:

- micro entities – 51%,
- small – 43.1%,
- medium-sized – 5.9%.

Of the total number of companies, only 9.8% (5 companies) monitor environmental and sustainability indicators, 91.2% (46 companies) - do not.

Fig.1 presents the respondents' perception of the current level of performance of companies in the road transport sector in the Republic of Moldova. The distribution of responses highlights a predominantly moderate assessment of the companies' performance:

- 49% of respondents consider the performance to be average;
- 25% consider the performance to be low;
- 16% consider the performance to be very low;
- only 10% consider the performance to be high.

The results suggest that the majority of road transport companies in the Republic of Moldova operate at a level of performance perceived as satisfactory, but without operational excellence. The fact that almost half of the respondents chose the "average" option indicates the existence of a relatively stable operation, but with numerous limitations regarding efficiency, competitiveness or development capacity.

At the same time, the cumulative share of 41% of the "low" and "very low" assessments highlights important difficulties in the sector, such as:

- insufficiently developed infrastructure;
- high fuel and maintenance costs;
- low degree of digitalization;
- high competitive pressure;
- limited access to financing and investment.

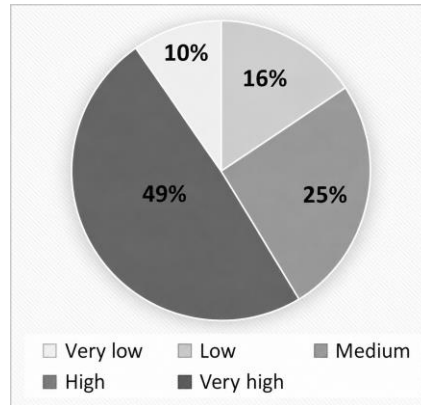


Fig. 1 – Current level of performance of enterprises, according to respondents.

Source: Author's calculations based on survey data, n = 51.

The low percentage of “high” responses (10%) and the total absence of “very high” assessments show that very few enterprises are perceived as having competitive performance at high standards. This may reflect a low level of innovation, difficulties in adapting to the requirements of the European market or limited managerial capacity.

Fig. 1 indicates that the road transport sector in the Republic of Moldova is in a predominantly average performance area, with significant trends towards low performance. The data suggest the need to implement modernization measures, managerial optimization and investments in technology and human resources to increase the competitiveness of enterprises in the field.

Fig. 2 highlights the perception of respondents regarding the evolution of the activity of road transport companies in the Republic of Moldova in the last three years. The distribution of responses indicates a predominantly negative trend regarding the evolution of the companies' activity:

- 41% of respondents believe that the company's activity has decreased significantly;
- 22% say that activity has decreased slightly;
- 16% believe that activity has remained relatively constant;
- 17% believe that activity has increased slightly;
- approximately 4% indicate a significant increase.

The data reflect a general perception of deterioration in the activity of road transport companies. Thus, the cumulative share of responses indicating a decrease (“significantly decreased” and “slightly decreased”) is 62.8%, which demonstrates that most companies have been negatively affected in recent years.

This evolution can be explained by several factors specific to the road transport sector in the Republic of Moldova:

- increasing fuel prices;
- regional economic instability;
- post-pandemic effects on logistics flows;
- high maintenance costs;
- shortage of professional drivers;
- strong competition on the international market;
- legislative and fiscal changes.

The relatively low percentage of companies that recorded increases (approximately 21% cumulatively) suggests that only a limited part of the companies have managed to adapt effectively to the current market conditions, probably through:

- investments in truck modernization;
- cost optimization;
- digitalization of logistics processes;
- expansion into foreign markets;
- diversification of transport services.

The fact that only 16% of respondents perceive the activity as relatively constant shows a high degree of volatility and instability in the sector.

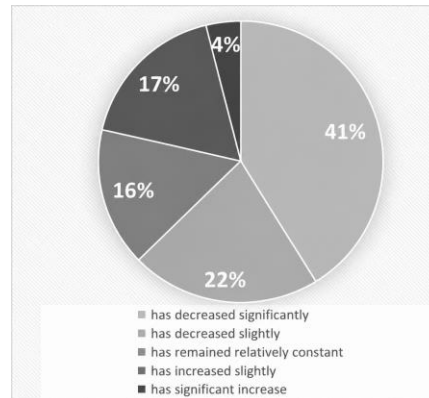


Fig. 2 – Evolution of business activity among road transport companies in the Republic of Moldova.

Source: Author's calculations based on survey data, n = 51.

4. Conclusions

Most respondents perceive a decrease in economic and operational performance, which confirms the existence of significant challenges in the sector. In this context, it becomes necessary to take actions of adaptation and

development strategies oriented towards operational efficiency, digitalization and increased competitiveness in the transport market.

The research results highlight the following trends:

- The road transport sector is at a low level of readiness for government policies in the field of sustainability,
- Average and low performance of companies and the negative evolution of the result of activity suggest that the transport sector does not have sufficient capacities for adaptation,
- The gap between the need for future compliance and reality is significant.

Given these aspects, it is proposed to develop a set of simple and easy-to-implement actions in the operational activity of enterprises, to facilitate the sustainable transition.

The proposed roadmap contains the following suggestions:

1. Promotion and monitoring of one or more sustainable objectives relevant to the sector (e.g. SDG 3-ensure healthy lives, SDG 8 promote economic growth, SDG 11 - sustainable cities and communities, SDG 12 - responsible consumption and production, SDG 13 - take urgent action to combat climate change and its impacts and SDG 17 - global partnership for sustainable development) (Guvernul RM, n.d.; Collaço *et al.*, 2022);

2. Formulation in Excel of a voluntary sustainability report (core) according to Commission Recommendation (EU) 2025/1710 of 30 July 2025 on a voluntary sustainability reporting standard for small and medium-sized enterprises (European Commission, 2025);

3. Calculating and monitoring the carbon footprint per tonne-km, not per vehicle - according to the GLEC Framework (Well-to-Tank (WTT) +Tank to Wheel (TTW)) (Smart Freight Centre, 2025);

4. Measuring and monitoring company performance, using sector benchmarks and target values;

5. Monitoring empty kilometres and

- fleet load factor, optimizing routes,
- introducing eco-driving practices (ATRI, 2025),
- adjusting times,
- reducing maximum permitted speed;

6. Using public data as a benchmark from the experience of EU-27 countries,

- empty kilometres target – 20% (Eurostat, 2024),
- weight capacity utilisation target 65%,
- WTW emissions target - 125 g CO₂e/t-km;

7. Comparison with the “best practices” of companies from EU-27 countries (DHL, DB Schenker) (DHL, 2025).

Taking into account the barriers and opportunities identified, the listed actions need to be adopted by the company founder, he should increase his level of expertise and transfer knowledge and information among employees,

participate in actions aimed at achieving sustainability and climate goals, and undertake information campaigns for partners about the introduction of the necessary actions for the sustainable transition, which would positively impact the company's image.

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INTEGRAREA SUSTENABILITĂȚII ÎN COMPANIILE DE
TRANSPORT RUTIER DE MĂRFURI DIN REPUBLICA MOLDOVA: ÎNTRE
POLICRIZĂ, CONFORMARE ȘI COMPETITIVITATE

(Rezumat)

Ultimii ani de tranziție sustenabilă au fost marcați de amprenta crizelor geopolitice, energetice, climatice și socio-economice. Transportul rutier de mărfuri rămâne a fi unul dintre sectoarele cu impact semnificativ asupra mediului pe de o parte, pe de altă parte este impactat de policriza globală. În acest context de supraviețuire economică, probabilitatea că alinierea spre obiectivele climatice va deveni tot mai puțin realizabilă, crește. Apare decalaj dintre necesitatea tranziției sustenabile și capacitatea reală a companiilor.

Articolul pornește de la ideea că sustenabilitatea în transportul rutier de mărfuri nu mai poate fi analizată separat de contextul mai larg în care activează companiile. În prezent, mediul antreprenorial este marcat de o policriză economică, energetică, geopolitică și climatică, ceea ce sporește incertitudinea și face ca multe firme să își concentreze atenția, în primul rând, pe supraviețuire, continuitate operațională și controlul costurilor. În aceste condiții, obiectivele climatice riscă să treacă pe plan secund, chiar dacă sectorul transportului rutier de mărfuri rămâne unul dintre domeniile cu impact important asupra mediului, prin emisii de CO₂, consum energetic ridicat, zgomot, congestie și uzura infrastructurii.

Scopul cercetării este analiza capacității companiilor de transport rutier de mărfuri din Republica Moldova de a se adapta la cerințele tranziției sustenabile.