THE STRATEGIC ROLE OF RAILWAY TRANSPORTATION IN THE FOREIGN TRADE OF THE REPUBLIC OF MOLDOVA

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Abstract: *This paper analyzes the foreign trade of the Republic of Moldova and aims to highlight the strategic role of the railways in this proces. The research methodology consisted of statistical data analysis and review of relevant theoretical sources. According to available statistical data, Moldova's trade is oriented towards the western markets. The most exported products are insulated wires and agricultural products, while the most imported ones are fossil fuels and electronics. The main transport mode used in trading is the road transport, also being the most accessible and flexible one. The railway transportation has a lower carbon print and is often cost optimal. The most imported and exported goods are typically resistant to spoilage and suitable for long distance transportation. Unfortunately the national railway system is not completely compatible with the EU one, creating a disadvantage in Moldova's foreign trade and TranEuropean integration. A modern railway system would allow local businesses to export or import products with a lower carbon print and more efficiently. During this research was defined the contemporary trade orientation of the Republic of Moldova, alongside with the National Railway system's flaws that prevent the efficient usage of this transportation mode. By overlapping this data, it was possible to determine the necessary improvements that will enhance the strategic role of the railway transportation in the foreign trade of the Republic of Moldova. The European Mechanism of Integration focuses not only on the process itself but also on durability and resilience of the applied measures.*

Key words: *foreign trade, railways, commerce, transportation, train, logistics, integration*

JEL: F18; F02; F55; F67

Introduction

No country could enjoy prosperity in isolation, there is always a need for cooperation with its neighbors and other nations. Foreign trade is essential for a healthy economy. It allows supplying goods to a nation that naturally doesn't have access to it or has it in a smaller amount, while the excess internal product can also be exchanged. Transportation plays a key role in foreign trade, for it allows the goods to be moved from one country to another, meanwhile also being one of the main sources of pollution.

No country in the world will stop the transportation of goods to reduce the greenhouse gas emissions. This is where the concept of green logistics appeared, at the intersection of two needs, freight transport and the reduction of carbon emission. Green logistics promotes sustainable, resilient and often cost efficient transport modes. One of the most effective green logistics transportation is rail mode.

The research goals of this paper are:

- To determinate the main trade direction
- To analyse the current state of national railway system
- To define the strategic role of the rail mode in Moldova's foreign trade

The methodology used for this research implied the analysis of statistical data and study of relevant theoretical materials.

The Republic of Moldova has built a strong market relationship with its neighbors and EU member states. The goods are constantly imported from and exported to the western market. The trade towards EU countries is significantly higher than non EU members.

Railway transportation is known for its emission efficiency, low costs, and big load capacity. The Republic of Moldova has an old railway network that doesn't always respond to contemporary trade needs, but even this way it still has an important strategic role in the national economy. A further improvement of the national railway network would have a great impact on Moldova's foreign trade and economy.

Basic content

Trade is extremely necessary for a healthy economy and building a nation's wealth. One of the negative effects of this process is pollution through carbon dioxide emissions. To reduce the impact of emissions on nature, countries use diverse transportation modes that allow cutting the costs, move goods more efficiently and reduce the emissions as much as possible. Trains are known for being cost efficient and have a lower greenhouse gas emissions, while having a bigger load capacity than road transportation. A big disadvantage of this transportation mode is the infrastructure, unlike road transport, trains need a built railway line. The train mode accessibility depends completely on the existing railway lines system.

The contemporary foreign trade of the Republic of Moldova is western oriented, the western markets not being very accessible through the rail system. The Moldovan railway network was intensively developed during soviet occupation, and reflects the trading objectives of that era. It was built with a soviet gauge of 1520 mm, which limitates access to the European lines that were built with a standard 1435 mm gauge. This reduces the train usage, a sustainable transport mode, in the favor of road transport, a more polluting one.

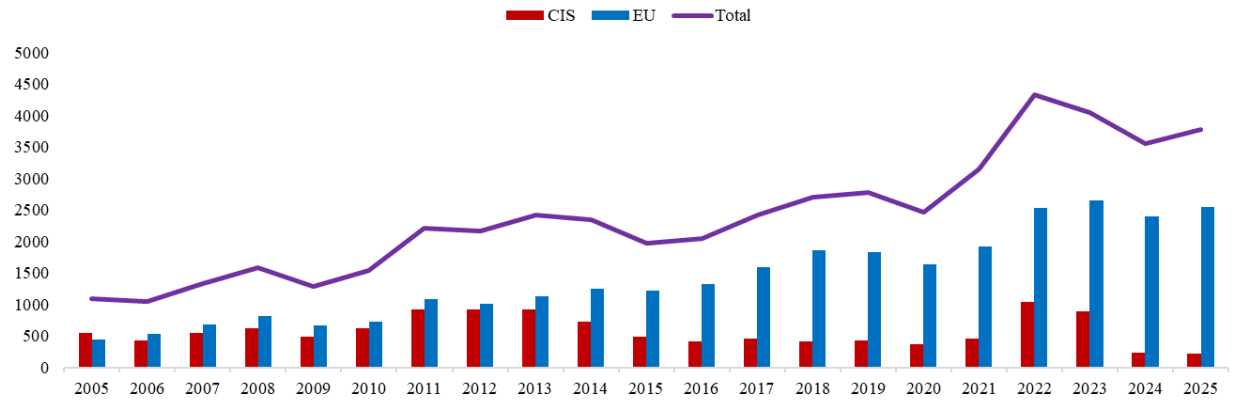

Figure 1. The Republic of Moldova's export, 2005-2025, mil USD

Source: made by author based on BNS

Right after gaining its independence, the Republic of Moldova was mainly exporting its products to the former soviet republics, with whom there was already built an economical relationship. In the past two decades though, the exports to European Union member countries have constantly exceeded the Commonwealth of Independent States one, the EU member states becoming the main strategic partners. "For Moldova, access to foreign markets is an essential factor driving the growth of exports. In this context, regional integration is a phenomenon that stimulates penetration into new markets, attracts foreign investment, and promotes economic development." [Antoci, 2018] Penetrating the European markets meant a step further for the Moldovan foreign trade. At first, the switch to a new market was a bit forced. First in 2006 by the first Russia embargo on wines, at that time 80%-90% of Moldovan wines were exported to the Russian Federation. Then again in 2014 by the second Russian embargo. However, the impediments created for Moldova on eastern markets only moved it even further on the new western ones. It created a situation in which the only survivors were those who decided to adapt, evolve and enter the western markets.

Table 1. The Republic of Moldova's export, 2020-2025, mil USD

Year	2020	2021	2022	2023	2025
Total Export	3 144.5	4 332.1	4 048.6	3 555.1	3 782,7
CIS Export	466.2	1 043.0	897	241.6	224.2
EU Export	1 919.5	2 537.5	2 646.7	2 392.4	2 554.4

Source: BNS

During 2020-2025, the level of the Republic of Moldova's exports fluctuated between 2.4 billion and 4.3 billion USD, reaching a peak in 2022 when the export value was 4.33 billion US dollars. According to the National Bureau of Statistics of the Republic of Moldova, exports to the EU significantly prevail over those to the CIS. In 2025 the value of exports towards the EU exceeded the CIS one 11 times.

When analyzing the export by countries, Romania comes up as the main foreign market, 30% of Moldova's exports are directed to its neighbor. The second export share by country is held by the other neighbor, Ukraine, where 8% of export value is distributed.

The insulated wires account for 12% of the total export value, which is the biggest share for a single product. The greatest group of products, however, are agriculture ones: sunflower seeds - 7%, wheat -6%, corn-2% and so on. Cumulatively agricultural products generate over a quarter of the export value.

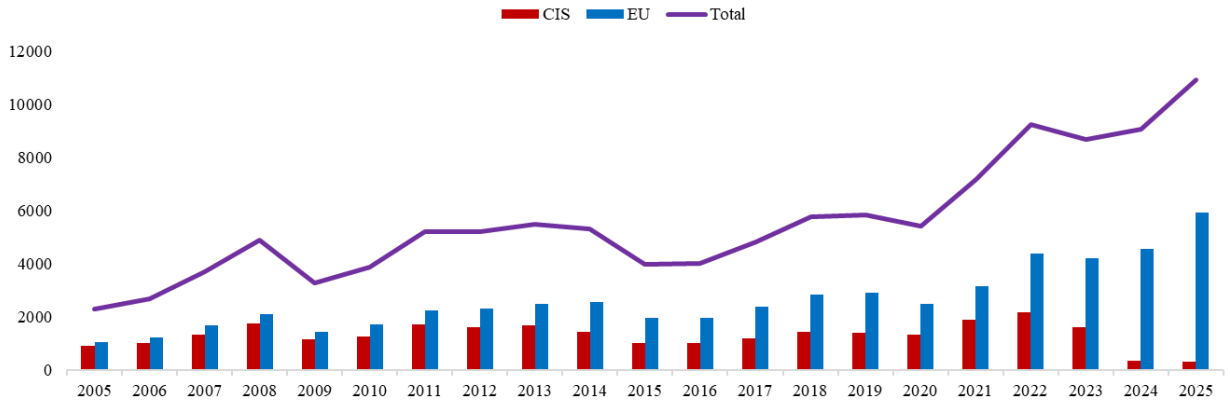

Figure 2. The Republic of Moldova's import, 2005-2025, mil USD

Source: made by author based on BNS data

The Republic of Moldova's imports are also mainly coming from the west. In 2024 and 2025 the CIS import value dropped drastically, being four-five times lower than in 2023.

When analysing the import origins, the neighbors, Romania and Ukraine, come up with the biggest import share, alongside with China. 18% of imports originate from Romania, 13% from China and 12% from Ukraine.

According to The Observatory of Economic Complexity, the greatest import value is generated by the refined petroleum and petroleum gas, accounting for 10% and 5% respectively. Mineral fuels, oils, waxes and its distilled derivatives hold a share of over 16% of the total import value. The second category by its value is electrical machinery and electronics, representing 11% of the import, and incorporating products like: telephones -3%, insulated wire-2%, computers-1%, refrigerators-1%, and so on.

By analyzing the foreign trade it is clear that the main trading partners are the neighboring countries and EU member states. This is a very important aspect because it dictates the transportation modes that could be used. The most popular and accessible one is road transportation. It is easy to contract,

only requires vehicle maintenance and a functional road. The load capacity of road transportation is lower compared to trains, and might require multiple transport units which means a higher cost. "Regarding goods exports, railway transport accounted for only 1.5% of the total, thus occupying a marginal position compared to road transport, which dominates the export structure with 81.2%, and maritime transport, which contributes 14.2%." [Stancu, Burlui, 2025]

Green logistics is a massive and complex concept that borders both economy and ecology and tries to find a solution for climate change that is not only efficient but also financially acceptable. Transportation is a huge source of urban pollution but at the same time it's indispensable for economic activity. Big corporations are implementing green logistics strategies to reduce the carbon emission, cut operational costs and use that as a base for green marketing. The young consumers tend to support cooperative responsible companies.

The need for a cost efficient, resilient and sustainable transport mode is what gives railway transportation such an importance. The rail mode fits all the needed criteria: sustainable, low cost, resilient.

When it comes to sustainability, trains are known for a lower carbon emission per loaded cargo compared to road transportation. Moreover, trains can run not just on fossil fuel, there are also hybrid trains that have even a lower carbon emission, and electric trains with zero emissions.

The cost efficiency comes from big load capacity. The bigger the loading of a train is, the lower the cost per transported unit will be. And usually the capacity of one train is a few times bigger than one of a truck.

The resilience was proven decade by decade. Once built, a railway line serves decades, if maintained properly of course. The train is not held back by: rains, storms, snowfalls, fog, etc, unless the severity of those is extremely unusual.

The railway transportation's potential is not valued completely and the current state of Moldovan national railway network is not motivating. The local rail lines were built to achieve a different trade objective than today's. The gouge is too wide, the soviet 1520 mm instead of the standard 1435 mm, which means longer time spent at the border for train adaptations. The complete absence of electrical line which makes the usage of electrical trains impossible. The only ones to fit are fuel and hybrid ones, but the CFM does not register hybrid trains in its possession, only fossil fuel ones.

The current state of the national railway network is not highly attractive for potential exporters or importers. The lack of innovation and modernization caused a decrease in rail mode usage, this eventually created some financial difficulties for CFM. The Railway of Moldova held unused assets, which over the years were put up for auction, including containers produced in the USSR between 1983 and 1991, whose value ranged from under 2 000 to over 12 000 MDL. Furthermore, the administration conducted auctions for the lease of assets that were not used in the operational process, including repair facilities, ticket offices, administrative buildings, and loading-unloading ramps. These real estate assets remained unutilized due to the decline in railway operations.

The national railway system requires changes and modernizations before it could be valued at its full potential. "Although freight railway transport initially faces challenges such as slower transit times and infrastructure harmonization, long-term operational savings and compliance with environmental requirements outweigh these disadvantages" [Hamuraru, Bulat, 2026] Starting a massive transition from road transportation to rail mode will take a lot of time and effort. The main factor that could drive a shift in logistic preferences is corporate responsibility. Companies try to reduce the greenhouse gas emissions caused by operational processes. Transport is one of the main polluting factors and this is where the concept of green logistics kicks in.

Innovating the national railway systems will make it more attractive for local companies that export in the neighboring countries and EU. A switch from road transport to rail mode will have a positive impact on the environment, for the trains are more sustainable than road transportations. One of the strategic advantages mentioned before was the cost efficiency. The capacity that previously was

loaded in a few trucks, easily could be transported by a single train, the bigger the transported cargo the smaller the cost per transported unit. This implies that an increase in demand will lead to a lower cost, but only when a significant enough number of companies will switch to rail mode.
Road transportation accounts for over 80% of exported goods. This share is incredibly big and very damaging for the environment. Investing and modernising the national railway network will increase the demand of its usage. An increase in train usage will eventually lead to a decrease of road transport which is the most polluting mode at the moment. The national railway network needs to be adapted to the standard gauge of 1520 mm, this will decrease the time spent by trains at the border and will make the connection to European rail corridors much simpler.
Another improvement would be construction of electrical lines, although this kind of project is planned, building the line won't be enough. An electrical rail line woluld be efficient only if there was at least one train to use it by the destination. Electrical lines can be used by both electrical and non-electrical trains. Only electrical ones are in need of those lines, alongside hybrid trains that could use the electricity from those railways, and save fuel for non-electrical segments of the rail road.
Switching from transporting the greatest exported categories using road transportation to rail mode will unlock a few strategic advantages for Moldova in foreign trade. One of the very important effects would be the long-term cost optimization, that would eventually reflect in a higher profitability.
Furthermore, the carbon emissions would decrease. Even if the Republic of Moldova doesn't have many big factories that populate and there is no pressure from outside to decrease the overall greenhouse gas emissions of the country, the responsibility for a sustainable economy is still there. Each nation, no matter the producing capacity, should treat the matter of the environment with high responsibility. Decreasing carbon print is one of the main objectives of European Mechanism of Integration.
European nations become more united during a crisis, but this is not what European integration is about. The Integration process means to unite people, simplify transitional processes without erasing one's nationality or ethnicity. Uniting multiple nations with historical conflicts between them was a hard mission from the very beginning, but "the future of the EU will depend on integrationist progress".[Techau, 2026] The integration applies not only to EU members but to the bordering countries as well. European Mechanism of Integrations focuses on:

- Durability
- Decarbonization
- The complementarity of transport modes
- The synergy between transportation, energy and digitalisation

The main objective of this mechanism is to create and develop a TransEuropean Network that would include: roads, railways, energy systems and other networks that connect European nations. This is a grandiose European project that will facilitate transnational European collaborations. It aims to modernise the existing transitional networks like railways, roads and electric systems. By developing its national railway network, alongside with its energetical one, Moldova is making another step toward European Integration.
The Republic of Moldova chose an European vector, it's a political decision and an economic one. For two decades the trade with the EU has been overshadowing the trade with eastern partners. The national railway network is not adapted to the modern economical needs of the country, but has a good potential for integration.
The resilience and process stability that rail mode offers exceeds the road transportation. The built railroads have a predefined trajectory, there is no deviation and the circulation on the rail is completely planned. This combination of factors lead to a high predictability. Trains tend to be on time, there are no delays caused by bad weather, unlike road transport.

Conclusions

The foreign trade of the Republic of Moldova is constantly growing. In 2025 the value of total import hit the 10 billion USD mark. During the past few years the export value has varied between 3 and 4

billion USD. The main strategic partners are EU countries. Half of both imports and exports are coming from or going to the EU member states. The geographical position of Moldova and its partners indicate towards terrestrial transport means. The main way of transport is the road mode, the most flexible one. The most sustainable, resilient and long-term cost efficient is the rail mode.

The railway transportation mode has a series of advantages. Its impact on the environment is less damaging when compared with road transport. The rail mode tends to be more stable, has less delays and the routes are very carefully planned. The load capacity is one of the key aspects, a big cargo assures a lower cost per transported unit.

Although these advantages are present, in the context of Moldovan railways, there are a series of improvements that ought to be done.

Transition to the standard gauge. This means that over 1200 km of railway lines have to be changed. A very costly process that will take time and maybe create discomfort in the rail industry for a while but it is worth it for the long-term efficiency. The Republic of Moldova had to implement the standard gauge and connect to the European rail corridors.

Electrification of the railways and introducing electrical or hybrid trains. On this day there is an approved project of electrification of a segment of Iasi-Ungheni rail line. However electrification of one segment is not enough, if there is no electrical or hybrid train to use it, the electrification of the line is pointless.

Connection to the European corridors. Following the transition to the standard gauge, connection to the European rail corridor expands the area of possible rail trade.

By implementing these three Moldova will integrate better with its European allies. These measures perfectly fit the European Mechanism of Integration, whose purpose is to facilitate cooperation between European nations, make it more energetically efficient and lower the greenhouse gas emissions. The Republic of Moldova proved numerous times its desire to cooperate with western partners, and its belonging to the European area. The echo of a soviet past still creates some impediments when it comes to European Integration. And the EU willingness to accept new members and help them integrate properly, is a crucial aspect of the integration process.

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