
EU Inland Water Transport Development in the Face of Market and Regulatory Challenges

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Abstract:

Purpose: The main aim of the research is to: 1/ indicate and assess the importance of the inland navigation in the transport market and in the EU regulatory system, 2/ identify, classify and analyse the key factors, including opportunities and barriers to its development in the EU countries, 3/ evaluate the mid-term prospects and potential scenarios of inland navigation development.

Design/Methodology/Approach: At conducting this data-driven research, the following methods were applied: 1. critical literature analysis, 2 factor analysis (FA), 3. mining of data obtained from European Commission (EC) and Eurostat, as well as reports and studies issued by international organizations and institutes, such as ITF, D_STATIS, 4. market analysis (MA) and 5. comparative analysis (CA).

Findings: The research results indicate that inland navigation plays a marginal role in the EU transport market, and what more, it loses gradually the market share in favour of other more logistically advanced modes of transport. Only in a few countries, its share in the domestic market is relatively significant and can be maintained in the coming years. Its few advantages, including low GHG emissions, lose their significance in the face of numerous barriers and disruptions that occur more and more often in the freight transport by inland navigation. There is, therefore, a growing discrepancy between the real, i.e. market effects generated by inland navigation for EU transport and logistics system and a very high economic and financial support it receives from the regulatory sphere.

Practical Implications: The study reveals the significant inconsistencies and disproportions existed between the real role inland navigation plays in the EU transport market performance and the scope of financial, economic and programmatic support it receives from the EU regulator of this market. The current formula for its promotion should be changed in favour of shifting part of this support to rail and intermodal transport in the EU, to boost the transformation of the entire transport sector towards zero-emission.

Originality/Value: The research that can be treated as a kind of case study, defines the contemporary challenges facing the transport market regulator in the face of the ongoing profound change, which is the need to carry out the dynamic fuel and energy transformation in transport. This change is associated with the requirement to manage the entire sector, as well as individual transport branches, differently than before. This paper justifies this necessity and sets the path for further action.

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1. Introduction

In addition to the market which is commonly perceived as an autonomous mechanism for regulating the EU transport sector, an important regulator of its real sphere is the public regulatory system. The former regulates the internal relations between the participants in the exchange of transport services, i.e. representatives of the supply and demand sides. The second one defines the general conditions of access to the market and the profession of carrier, as well as the principles of conducting transport activities, set by transport policy entities.

Therefore, the transport market is also subject to the EU public regulation aimed at increasing in effectiveness of performed market processes as well as the efficiency of achieving strongly promoted as well as economically supported sustainable mobility goals.

The transport market-oriented regulation, implemented within the framework of the EU transport policy, uses rich set of legal, administrative, economic and financial instruments. They are used to make corrections of some regulatory deficiencies, incorporated within the unperfect transport markets' as well as to implement changes within the transport market, recognized as significant from adopted transport policy objectives.

Considering that one of the key strategic objective of the EU's transport policy is to promote and pursue sustainable transport development, it aims at reshaping the traditional model of existed demand distribution for transport services, i.e., the transport modal split with the dominant share of road transport in favour of more environmentally friendly modes of transport, i.e., rail, inland navigation and short sea shipping (EC, 2020b). They generate several or even a dozen times less external costs per unit of transport performance, i.e., tkm or pkm, than road transport. Inland waterway transport is undoubtedly one of the leaders in this area (EC, 2019a).

Taking into account only this aspect, in the opinion of the EC as the regulatory entity, inland waterway transport where hydrogen seems to be very promising alternative in relation to fossil fuels, is seen as a competitive alternative to road and rail transport. What's more, it offers an environment-friendly alternative in terms of both energy consumption and noise emissions.

Its energy consumption per km/ton of transported goods is approximately 17 % of that of road transport and 50 % of rail transport. In addition, it is emphasized that inland waterway transport ensures a high degree of safety, in particular when it comes to the carriage of dangerous goods, contributing at the same time to decongesting overloaded road networks, too (EC, 2019a; EC, 2023b; EUROACTIV, 2024).

Regulatory body, promoting the inland navigation as an effective and environmentally-friendly mode of freight transport usually indicates too, that as compared to other modes of transport which are often confronted with congestion and capacity problems, inland waterway transport is characterised by its energy efficiency and major capacity for increased exploitation, as well as reliability. Even though the last of these features seems to be a questionable argument in relation to reality (drought, floods, seasonal freezing, etc), the EC aims to promote and strengthen the inland waterways competitive position in the transport system, facilitating at the same time its integration into the intermodal logistics chain (Antolini, 2024; EC, 2023a).

It is due to the fact, that the EU transport regulator is aware that inland waterway transport plays still a significant role for the carriage of goods in some EU countries. 13 Member States have an interconnected waterway network and around 41,000 kilometres of waterways connect hundreds of cities and industrial regions (ECA, 2015; EC, 2021). For these reasons, mainly the potential for increasing the modal share of inland navigation in total EU freight transport market seems to be significant (CCNR, 2023; EC, 2023b).

Taking into account, on the one hand, the numerous initiatives and activities of the EU regulator, which strongly supports inland navigation in economic and financial dimension, as well as programmatically, and on the other hand, recognizing its real share in the EU transport market, author's main aim is to assess the real significance of the inland navigation in the EU transport market as well as its developing potential (EC, 2023a; EC, 2020a). Therefore, it is necessary to identify the key factors of its development and to point out the prospects as well as to assess them from the perspective of the development of the European transport market.

2. Methodology and Literature

To meet the already set research goals and evaluate properly the real significance of inland navigation in the EU transport system, indicating at the same time degree of convergence or divergence existed between the ambitious goals of the regulator and market realities, expressed in the share of this transport mode in the total freight transport market (modal split), a number of both quantitative and qualitative research methods and techniques were used. The following methods were mainly applied as part of the methodological triangulation formula: 1. critical literature analysis, 2. factor analysis (FA), 3. mining of data obtained from European Commission (EC),

Eurostat etc., as well as reports and studies issued by EC and other international organizations and institutes, 4. market and comparative analysis (MA, CA).

In this case, the method of FA was applied. It was regarded as the useful efficient tool when used to simplify complexity, that is typical for the conducted research subject (Shrestha, 2021). In turn, focusing on issues related to changes within the transport modal shift with respect to inland navigation, it was necessary to conduct a thorough analysis of the transport markets of the group of EU countries with the relatively largest share of inland navigation in their transport market. This required the use of CA to determine and assess the real effects of selected EU countries in pursuing their economic and environmental goals in transport sector supported to a greater or lesser extent by inland navigation (Takman and Gonzales, 2024).

Examining the relationships existing between the EU transport regulatory system, seen as a public tool determining the EU transport policy objectives, aimed at transforming it towards the sustainability standards, on one hand, and the effects of such challenging transformation, to be achieved in form of the expected modal shift oriented on more environmentally-friendly modes of transport, and in this inland waterway navigation on the other, it was necessary to thoroughly analyse the data on the transport modal split (market) contained in EU statistical reports and yearbooks.

In this case, the statistical yearbooks of the EC and Eurostat studies were particularly useful. Moreover, the basis for research and analysis were also statistical publication by European Court of Auditors (ECA), International Transport Forum (ITF), International Energy Agency (IEA) and Economic Commission for Europe (ECE).

The study is also based on data presented in reports and statement of such organizations and industry associations as European River-Sea-Transport Union e.V. (ERSTU), Central Commission for the Navigation of the Rhine (CCNR) and also European Federation of Inland Ports (EFIP) brings together nearly 200 inland ports and port authorities in 18 countries of the EU (UN ESC, 2024; CCNR, 2024).

In addition to these publications, it was also necessary, to examine and assess the regulatory system with regard to the EU inland waterway segment along with its progressive amendment that occurred in the recent time. In this respect it was necessary to perform an analysis of many legal documents regarding the promotion and procedures for implementing sustainable solutions for inland navigation and its promotion as well as support of development in the EU transport market.

As a result of this, it were taken into account numerous regulations, directives, decisions, etc., issued by the EC, the Council and the European Parliament EP (EC, 2020 a; EC 2023a, EP 2023). This category includes also White Papers on the EU's transport policy from 1991, 2001 and 2011, the New Green Deal and the Sustainable and Smart Mobility Strategy (EC, 2019b; EC, 2020b)). There were also taken into account official documents and communication from the EC over the period 2020-

2023. All these legal regulatory measures have indicated and set directions for the green transformation of the EU transport sector by 2025 and for further years of its progressive decarbonization strongly emphasizing the importance of inland waterway transport in this area.

In addition, a number of publications were analysed, mainly articles and studies focusing on both modal shift issues as well as transport policy goals and instruments aimed at boosting sustainable modal shift changes within EU transport market, while at the same time indicating the need for further dynamic development of inland waterway transport (Kurtulus and Cetin, 2020; Eng-Larsson and Kohn, 2012).

Among the numerous publications of this type that appeared in the period 2010 - 2023, three categories of studies can be distinguished. The first one concerns issues such as logistical support for modal shift and the role of green logistics in promotion leading role of inland navigation in this area (Eng-Larsson and Kohn, 2012; Eng-Larsson and Kohn, 2012).

The second category was focused on identifying the special role of river port hubs with their interconnection with other pro-ecological modes of transport and their hubs in creating a sustainable transport area that meets EU regulatory standards and requirements (Crabb and Leroy, 2012; Christen, 2021; ERSTU, 2022).

The third category of publications includes those studies that concern the intermodal (not only combined transport) and its stimulating role in creating a sustainable modal split in the EU transport market by shifting commodity flows from road to river transport and rail (IRU, 2024; ITF, 2022; Jonkeren *et al*, 2023; Jacob, 2023).

3. Balancing between the Regulator's Strategy and the Market Realities: Research Results

As already mentioned, inland navigation has been seen by the EC as a mode of transport that can significantly contribute to the structural transformation of the transport sector towards sustainability, being able, at the same time, to enhance meaningfully functioning of the EU transport market (EC, 2021, Jacobs, 2023). It is assumed that transport of goods by inland waterways is not only environmentally-friendly but also energy-efficient and has, unlike the European road network, a sufficient waterway capacity to cope with an increase in traffic. 4

For these reasons, inland navigation could both, impact to a large extent sustainable mobility in Europe, helping at the same time to green the last mile of city logistics and, being used to a greater extent than before, relieve heavily congested transport corridors. It seems to be potentially possible because ca. 41,000 kilometres of inland waterways flow through 25 of the EU countries, carrying around 150 billion tkm of cargo every year, in particular in densely populated and congested areas. Approximately 44,000 people work on inland vessels, of which 60% in goods

transport and 40% in passenger transport. However, in reality there are only a total 37,000 navigable kilometres connecting 13 EU countries where this mode of transport has a greater or lesser importance for freight transport.

Moreover, what should be emphasized here, about 15 000 kilometres of inland waterways are included in the trans-European transport network (TEN-T) of key EU transport connections. Despite this, in total in EU land transport, only 6% of the freight volume moves through the system of canals and navigational waterways (Jakob, 2023; PMLIP, 2015; IWT EP, 2022).

The existing potential of inland waterway transport infrastructure along with operators' carriage capacity, as well as same operational advantages of this mode of transport and the relatively low level of environmental nuisance it generates, provide the basis for the EC to create favourable conditions for its further development. It is considered that these factors indicating the advantages of inland navigation should encourage more companies to use this mode of transport.

However, to meet the shippers expectations, fulfilling at the same time the high regulatory requirements, the EU inland waterways transport sector has to overcome certain challenges. It needs to become greener, digital and climate resilient (Schroeder *et al.*, 2023; EC, 2023b). These include protecting waterways from the effects of flooding and drought, which have happened frequently in Europe in recent years.

Farther, inland waterway vessels need to become 'smart', and infrastructure, including in ports, needs to be improved. What's more, greater investment is also needed in digital technologies, as well as ensuring there is a sufficient and qualified workforce. In fact, the scale of needs is huge and actually applies only to 13 EU countries in which inland navigation plays a certain role in the completing their transport tasks.

Despite this, waterway transport is supported through the funding and financing programmes such as: Connecting Europe Facility, Horizon Europe, LIFE, the Innovation Fund, the Recovery and Resilience Facility and the EU Structural and Investment Funds (IWT EP, 2022; Jacob, 2023; UN ESC, 2024). The special EU waterway transport policy aiming for a better use of inland shipping to relieve congested transport corridors and assist the transport modes with moving to zero emission, climate resilience and digitalisation, also includes other forms and instruments of its support.

These include, without a doubt, the EU action programmes Naiades, created specifically to support the development of this mode of transport. The 1st NAIADES programme was launched already in 2005 and ran from 2006 until 2013 (Grzelakowski, 2019; EC, 2013). Then two more programs of this type were developed. The 2nd NAIADES supported the development of inland navigation in

the years 2014 - 2020 and the 3rd and current one runs from 2021 until 2027 (EC, 2023a; PMLIP, 2015; EFIP, 2022).

NAIADES III action programme was developed on the basis of the European Smart and Sustainable Mobility Strategy and the 'Strategic Inland Waterway Transport agenda for Europe' recommendations of the Naiades expert implementation group, initiated by INE and the European Green Deal and later on, the Fit for 55 Package. It sets out the strategic directions and activities for more freight transport to inland waterways, towards zero-emission and smart shipping as well as an attractive social and professional working environment.

NAIADES III counts 35 actions covering specific inland waterway transport measures and general transport measures such as TEN-T, combined transport, alternative refueling and state aid, that underpin the goal of shifting more freight to inland shipping, while working towards a zero emission and digital transport mode. Within the Naiades implementation expert group, the Commission, Member States, River Commissions and sector monitor and assist with the implementation of the action plan, first with the support of the Platina3 project, now with the Platina4 project. Inland Navigation Europe (INE) is member of the Naiades Commission expert group and of the Platina4 Advisory Committee (EC, 2023b; Jacob, 2023).

The EU-funded Platina projects provide coordination and support activities necessary to prepare IWT oriented policies. For example, the current Platina4 project that started in 2024 and will be implemented until 2026 is co-financed by the Horizon Europe Programme works on such topics as: 1. supporting and coordinating research and innovation activities focussing on green and connected IWT to find synergies in this area, 2. impact estimations of NAIADES III actions and supporting the policy discussions to achieve modal shift and zero-emission IWT and 3. updating the Strategic Research and Innovation Agenda for IWT.

It is also worth mentioning here such regulatory actions as those taken by the EC in recent years with the aim to support and stimulate the development of IWT. EU focused on revision of Urban Mobility Package with better use of inland waterways into cities in 2022 and proposal for e-documents for inland crew and vessels in 2023 as well as revision of RIS directive and combined transport directive.

These activities are part of the development strategies for IWT in the perspective of 2030 and 2050 aimed at and aim to increase its share in the EU's freight transport market. It is assumed that in 2030 automated mobility will be deployed at large scale and zero-emission vessels will become ready for market as well as transport by inland waterways and shortsea could be up by 25% and until 2050 by 50% (CCNR, 2024).

The scope of regulatory activities with respect to broadly understood inland water transport have been, however, much broader. They have been taken not only by EC

but also Parliament and Council as well as industry association and stakeholder organizations such as: European Inland Waterway Transport Platform (EIWTP), European Barge Union (EBU), European Skippers Organization (ESO), EDINNA, Inland Shipping Entrepreneurs (ISE) and ERSTU (IWP EP, 2022; ERSTU, 2022).

The vast regulatory and marketing oriented activities mentioned above, aimed at promoting, supporting and stimulating of the IWT development were, however, not reflected in market effects, expressed in increase its market share in the total EU's transport market. The market share of IWT, similarly to other modes of transport, results from market decisions taken by shippers, forwarders as well as by logistics operators and carriers themselves operating there.

Finally, in the EU transport market it is expressed in form of the modal split. In order to examine properly the impact of regulatory activity reflected in the form of UE transport policy on inland water transport, it is necessary to analyse and assess the changes that took place in the EU transport market in the field of modal split in the years 1995-2022. Data regarding this issue are presented in Table 1. These data indicate the percentage share of individual modes of transport in the total EU freight transport performance, measured in billion tonne-kilometres (tkm).

Table 1. *EU transport modal split (in %) in selected years of the period 1995-2022*

Year	Road	Rail	Inland	Pipelines	Sea	Air
1995	45.3	13.6	4.3	4.0	32.7	0.1
2000	46.5	12.5	4.1	3.9	32.9	0.1
2005	48.6	11.5	3.8	3.8	32.2	0.1
2010	49.4	11.4	4.5	3.5	31.2	0.1
2015	48.9	11.9	4.2	3.3	31.7	0.1
2020	53.4	11.5	4.0	2.8	28.1	0.1
2022	53.8	11.9	3.5	2.7	28.0	0.1

Source: EC, 2018, 2022, 2024.

The statistical data in Table 1 allow to determine the scale and rate of changes observed in the analysed period on the EU transport market while pointing out the marginal role played by inland navigation in the EU transport market and its market share gradually decreasing in the period under review. This downward trend will probably not be stopped and it will continue slowly under the pressure of ongoing market challenges (Grzelakowski, 2024).

It should be emphasized that a characteristic feature of the EU's transport market is that the existing there modal shift has in fact retained its original shape with virtually little change during the analysed period. Such market effect occurred despite relatively dynamic rate of growth in the volume of carried goods at that time, which was largely due to the increasing openness and liberalization of transport markets. As a result, transport performance in individual transport modes also increased

significantly. However, only two transport modes absorbed the largest part of the growing demand for transport services, i.e. road and sea transport (tab. 1). The rate of growth in specific time intervals, related to transport performance as per particular transport sectors is presented in Table 2.

Table 2. Growth rate of transport performance (bn tkm *) in the EU between 1995 and 2022 as per transport modes and total in %

Period of time	Road	Rail	Inland Waterways	Pipelines	Sea	Air	Total
1995 – 2022	65.6	10.3	0.1	-9.8	45.0	62.3	44.6
per year	1.9	0.4	0.0	-0.4	1.4	1.8	1.4
2000 - 2022	38.9	6.6	-8.7	-19.0	26.5	32.5	26.1
per year	1.5	0.3	-0.4	- 1.0	1.1	1.3	1.1
2021 - 2022	0.2	-0.4	-10.3	5.6	1.6	-2.7	0.3

Note: *Data presented in Table 2 were prepared on the same principles as the statistical data in Table 1.

Source: EC, 2018, 2022, 2024 and Eurostat, 2024.

The data presented in Table 2 proves that between 1995 and 2022, the transport performance in tkm achieved by the EU member countries increased by 44.6%, i.e., on average the by 1.4 % annually. The increase was observed, to the largest extent, in road transport (as much as 65.6%), air transport (62.3%) as well as maritime transport (45.0%).

The inland water transport recorded zero growth during that and the dynamics of the decline in its share in the total EU's transport market was particularly visible from 2020 onwardst. On average, the annual increase in transport performance at that time amounted to 1.1%, and the increase in the typically pro-ecological transport modes, such as maritime and inland waterways transport slowed down and only in rail freight transport remained unchanged (Table 2).

The modal split on the entire EU transport market and its distribution in the period 1995-2022, as an average for 27 countries, illustrates the changes in the modal structure of the transport market. However, in individual member states, the market shares of each transport mode, and in particular inland navigation, are at quite different levels, sometimes differing significantly from the EU average (Table 3). This is due to many diverse reasons, which to a large extent determines the nature and specificity of their transport and logistics markets (Statista, 2024).

Moreover, the number of factors influencing modal shift in each individual transport market, reflecting the selection of transport modes including inland waterways, is in fact widespread. Key determinants for selecting freight transport modes by shippers or forwarders relate to the shipment characteristics and may depend on cost, time and quality of different transport services, accessibility to high quality infrastructure, reliability etc. Considering that there is no single, uniform model determining the

distribution of demand for transport services and thus the multi-criteria choices of means of transport and service providers are the result of mass market decisions taken by shippers, forwarders and logistics service providers, the modal split patterns that exist there, show features specific to each transport system.

Table 3 presents, based on transport performance in the years 2015 and 2022, modal shift for the segment of land transport in selected EU countries, comparing them with the US transport modal split.

Table 3. *Modal split of freight transport on land by selected EU countries with the highest share of inland waterway transport in the market and USA in 2015 and 2022 (tkm in %)*

Country	Road		Rail		Inland waterways		Pipelines	
	2015	2022	2015	2022	2015	2022	2015	2022
EU-27	74.2	74.8	18.8	16.6	6.9	4.9	4.4	3.8
Austria	57.0	62.2	28.5	27.6	2.5	1.5	11.9	8.6
Belgium	71.2	58.3	10.9	22.1	15.6	16.0	2.4	3.7
France	82.2	84.9	11.2	10.3	2.8	1.9	3.8	2.9
Germany	69.5	71.9	18.7	19.3	8.9	6.6	2.8	2.7
Hungary	60.7	66.1	27.5	25.2	5.0	3.3	6.8	5.4
Kroatia	64.8	62.4	17.2	23.1	6.9	3.9	11.0	10.7
Luxembourg	85.7	86.3	6.7	6.2	7.6	7.5	----	----
Netherlands	49.2	49.8	5.8	6.3	43.1	38.9	5.4	5.9
Romania	37.1	52.7	30.8	24.9	29.7	20.1	2.3	2.3
Slovakia	49.4	57.0	30.2	25.9	2.6	2.2	17.8	14.9
U S A	40.4	43.1	35.3	30.8	6.4	5.9	17.9	20.3

Source: EU, 2018, 2022, 2024; Eurostat, 2024.

The analysis of the data in Table 3 shows that among 9 out of 10 EU countries examined with the highest market share of inland navigation in their transport market, i.e. above 2%, reported its plunge over the last seven years. Only in Belgium there was a slight increase. Among the surveyed countries, only three of them, namely the Netherlands, Romania and Belgium, have a share of inland navigation of more than 10% in their transport market.

Moreover, in the first two countries, which are leaders in this area, over the 7-year period under review, the decline in its share in the transport market is very significant, and in the Netherlands it amounted to 4.2%, and in Romania up to 9.6%. A relatively stable situation occurs only in Luxembourg.

The clear downward trend in the share of this mode of transport in the total transport market of the EU and the vast majority of member states, which has been continuing in recent years, is also visible in the USA, the country with the most balanced modal split among the studied group.

The results of the conducted analysis therefore provide a basis for formulating an opinion that the EU should rethink and revise its current transport policy strongly emphasizing the role and importance of this mode of transport, leaving the member states with the highest share in the transport market with strategic decisions regarding its further development.

This means that this mode of transport, which in many member states is practically negligible or does not exist at all, should be supported and financed by member states to a greater extent than before, while ensuring only the necessary regulatory support from the EC. Another possible option is to maintain the current forms and support in exchange for granting those countries where its importance is merely symbolic additional compensation for the development of their leading transport sectors.

4. Discussion

The lack of real, visible market effects of the EU transport policy concerning the inland waterway transport which has been under strong, comprehensive support of the regulator for many years, indicates not only excessive concentration on this mode of transport but also its overregulation.

In such circumstances equating it with other modes of transport which market share reaches 10 percent or more, seems to be completely unjustified. Such form of transport policy also indicates the scope of preferences granted to countries with a higher share of inland waterway transport in the transport market and thus indirectly discrimination against other countries.

This may also mean certain negative effects in terms of the added value that transport investments should generate for the EU economy. This issue therefore, requires further data-driven research which will allow for the identification of other potential direct and indirect benefits that the European Union economy derives from inland waterway transport.

For this reason, in order to deeper and broader understanding the real significance of this mode of transport for the EU economy as a whole, table 4 shows the share of the inland waterway transport in handling the EU external trade. EU external trade by mode of transport differs significantly from that presented solely in relation to transport carried out by individual modes of transport within the internal trade of this economic grouping as a whole.

In this segment of freight transport, the position of maritime transport is clearly visible with a high 74% share in the total volume of transported goods and then pipeline and road transport with an average 9-10% share of each of them, while inland waterway transport participates in handling of external trade on average at a

level of 0.8% to 0.9% in terms of the volume of transport in recent years, i.e., below 1.0%

Table 4. *EU external trade in value and volume terms and the market share of inland waterway transport in handling of EU external trade cargo in 2015, 2022 and 2023 in % (volume in millions of tonnes and value in billions of EUR)*

Year and way of measurement	EU total		%	Inland waterway		%
	Export	Import		Export	Import	Ex + Im
2015						
Value	1789.2	1729.2	100.0	3.0	3.3	0.2
Weight	650.4	1685.0	100.0	7.9	10.7	0.8
2022						
Value	2572.9	3003.1	100.0	6.6	13.8	0.2
Weight	695.3	1664.7	100.0	9.2	11.5	0.9
2023						
Value	2553.6	2512.8	100.0	5.8	3.3	0.2
Weight	676.6	1506.1	100.0	10.6	6.0	0.8

Source: EU, 2015, 2022, 2023; Eurostat, 2024.

The analysis of the data presented in Table 4 shows that over the years 2015-2022, both the value and volume of the EU's external trade showed significant growth dynamics and only in 2023 there was a visible decline in both dimensions (the effects of the war in Ukraine). Inland water transport, however, participates only 0.2% in handling freight mass in terms of its value and in the range of 0.8-0.9% in terms of transport volume.

A characteristic feature is that its share in the carriage of imported goods until 2023 was always higher by two or three percentage points in relation to the transport of goods in exports. For comparison, it can be indicated that the share of rail transport in 2022 in the transport of goods of the EU's external trade amounted to 3.3% in volume and 1.5% in value. This means that the role of inland waterway transport in servicing the EU's external trade is only complementary to that played by key means of transport in this respect and such a modal split cannot change in the future. Moreover, the reconfiguration of supply chains and the increase in their resilience to shocks will affect the further decline in the market share of inland navigation in handling the EU's external trade (New Silk Road).

When analysing in-depth the impact of inland waterway transport on the EU's economy and the creation of EU GDP, it is worth indicating its share in total employment in the transport sector and the number of companies that create jobs and add value in that transport sector, as well as the average annual turnover that these companies achieve. These three aspects are presented on the basis of available data from 2021 in Table 5.

Table 5. *Employment, number of enterprises and turnover in inland water transport in relation to the EU-27 total transport sector in 2021*

Subject of study	EU-27 total	EU IWT	%	Selected EU countries
1. Employment in 1000	10 182.3	41.4	0.41	in it: DE - 10.1, FR - 4.7, NL - 12,2 RO – 2.2
2. Number of enterprises	1 380 703	9792	0.71	in it: DE - 901, FR - 902, NL – 4364
3. Turnover ml EUR	1 506 668	8430	0.56	in it: DE–2225, FR–568, NL–3639

The data presented in Table 5 confirm that, in the macroeconomic dimension, inland waterway transport plays a negligible role in the transport sector of EU countries and therefore their economies. Its share in total employment in EU transport sector is only 0.41% and in the number of entities 0.71% while in the turnover in million EUR obtained in the transport sector it is only 0.56%. It should be remembered that these data concern both the activities carried out by inland navigation in the segment of goods and passenger transport.

These data also indicate that both efficiency and productivity in this transport sector are very low. It should also be emphasized that this mode of transport is strongly concentrated in terms of employment, the number of companies and the turnover achieved in the group of leading countries, such as the Netherlands, Germany, France and Romania.

They alone concentrate 71% of total employment, have over 55% of the total number of companies and achieve over 78% of financial turnover. They are also the promoters of further development of inland waterway transport in the EU based on the current strategy implemented by the regulator.

5. Conclusions

The research results indicate that: 1. Inland water transport plays a marginal role in the EU total transport market performance, and what's more, it loses gradually the market share in favour of other more logistically advanced modes of transport. Only in a few countries, such the Netherlands, Germany, France and Romania, its share in the domestic market is relatively significant and can be maintained in the coming years. 2. Its few advantages, including low GHG emissions, lose their significance in the face of numerous barriers and disruptions (drought, floods) that occur more and more often in the freight transport by inland navigation. 3.

There is, therefore, a growing discrepancy between the real, i.e. market and economic effects generated by inland water transport for EU transport and logistics system as well as whole economy, and a very high economic, financial and programmatic support it receives from the EC regulator.

This means that the current promotion formula of inland water transport should be changed in the EU in favour of shifting part of this support to rail and intermodal transport, to boost the transformation of the entire transport sector towards zero-emission by 2050 (EIB, 2024). Such a change is currently needed to carry out smoothly the dynamic energy transformation in the EU transport and is associated with the requirement to manage the entire sector, as well as individual transport modes differently than before.

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