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Environmental Versus Economic Effects of Inland Water Freight Transport Development in the EU

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Abstract:

Purpose: *The main aim of the research is to assess the impact of the inland water freight transport development on the EU economy, as well as environment, by comparing it with other modes of transport.*
Methodology: *To conduct this data-driven research, the following methods were applied: 1. critical literature analysis, 2 Data mining and analysis, 3. market analysis and 4. comparative analysis.*
Findings: *The research results indicate that inland water freight transport which share in the EU transport market is already marginal and systematically decreasing, has little importance for the economy of the EU. It plays more significant role for the trasnsport sector and the econom only in a few countries. Simultaneously, this mode of transport generates a relatively low level of GHG emissions. However, this positive feature is losing its importance due to numerous disruptions impacting inland water navigation, lowering its operational potential, caused by unpredictable weather and climatic conditions. As a result, there is a large difference between the economic effects that inland navigation generates for the transport and logistics sector as well as the EU economy on one hand and the regulatory support it receives on the other.*
Practical Implications: *The disproportionately low economic and environmental benefits of inland waterway freight development compared to other modes of transport indicate the need to shift some of the forms of support provided to it towards rail and intermodal transport. This would be a more efficient path to a faster energy transformation of the EU transport sector, accelerating at the same time economic and social benefits forEUs economy.*
Originality/Value: *This study indicates the need for a significant change in the regulatory system of the EU transport sector. It should be more strongly reoriented towards the implementation of the sustainable development strategy, and not only, as the regulator currently pushes for, the environmental strategy, which is only its segment based on ecological standards. Without making this change and managing it properly, the EU will not only fail to achieve the assumed energy transformation goals in the transport sector, but also, by continuing the current narrow formula for implementing the sustainable development strategy, lead to deep and, in many cases, negative structural changes of an economic and social nature in transport sector.*

Keywords: *EU inland water freight transport, environmental effects, economic and social effects, modal versus sectoral transport regulation.*

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1. Introduction

By pushing forward the strategy for decarbonizing transport by 2050, the EU clearly promotes pro-ecological modes of transport, including inland waterway transport. Within the framework of the assumed green energy transformation, inland water transport is seen as a competitive alternative to road and rail transport. 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.

What's more, EC strongly emphasizes 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 usually overloaded road networks, too (EC, 2019: EC, 2023a; EUROACTIV, 2024).

Furthemore, the EU transport regulator takes into account that inland waterway freight 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 km of waterways connect hundreds of cities and industrial regions (ECA, 2015; EC, 2021). For these reasons, EC has aimed to generate additional potential for increasing the share of inland freight navigation in total freight transport market since 2001 (CCNR, 2023; EC 2023b).

However, numerous initiatives and programs taken by EC, aimed at supporting inland freight navigation not only programmatically but also in economic and financial dimension, did not take into sufficient account the real inland freight navigation performance as well as its share in the total EU transport market and the economy.

Therefore, the research process has been focused on recognizing real market and economic effects of the EU inland waterway freight transport development. The main research aim is to assess the real significance of the inland freight navigation in the EU freight transport market as well as its developing potential (EC, 2023b; EC, 2020a). This objective is consistent with the main research problem which aims at define and investigate the degree of convergence or divergence existed between the ambitious EU's transport policy goals regarding inland freight navigation and the economic realities. In this way, it will be possible to determine the possibilities of their implementation in the real sphere of the EU's transport system.

2. Literature and Methodology

To meet the research goals and evaluate properly the real significance of inland waterway freight transport for the EU's economy, there were used a number of both quantitative and qualitative research methods and techniques. As a part of the methodological triangulation formula the following methods were applied: critical literature analysis, factor analysis (FA), mining of data obtained from EC, Eurostat, etc., as well as reports and studies issued by EC and other international organizations and institutes, and market and comparative analysis (MA, CA).

Examining the impact of the EU transport regulatory system aimed at transformation its transport sector towards more environmentally-friendly modes of transport with special regard to the inland waterway navigation, it was necessary to thoroughly analyse the data concerning the EU transport market development in recent years. 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 European Federation of Inland Ports (EFIP). The last one brings together nearly 200 inland ports and port authorities in 18 countries of the EU (UN ESC, 2020a; CNRR, 2024).

In addition to the publications and secondary sources already mentioned, it was also necessary to examine and assess the regulatory system with regard to the EU inland waterway transport along with its progressive amendment that occurred in the recent time. As a result, there were taken into account numerous regulations, directives, decisions, etc., issued by the EC and the Council and the European Parliament EP (EC, 2020: 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 2020-2024. Moreover a great deal of publications were analysed, mainly articles and studies focusing on both modal shift issues as well as transport policy goals, relating mainly to supporting the further dynamic development of inland waterway transport (Kurtulus, Cetin, 2020; Eng_Larson,Kohn, 2012).

Among the numerous publications of this type that appeared in the period 2010 - 2024, 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-Larson, Kohn, 2012). The second category was focused on identifying the special role of river port and inland navigation hubs with their interconnection with other pro-ecological modes of transport and their hubs in creating a sustainable transport area (Crabb, Leroy, 2012; Christen et al, 2021; ERSTU, 2022).

The third category of publications includes those studies that concern the intermodal 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 all; CE Delft, 2020; Jacob, 2023).

3. Inland Waterway Freight Transport Policy: Research Part IA

Inland freight navigation is seen by the EC as a mode of transport that can significantly contribute to the structural transformation of the transport sector towards sustainability, being at the same time able to meaningly enhance operational processes of the EU transport market (EC, 2021; Jacobs, 2023). That is why, the EU regulator has promoted the inland navigation as an effective and environmentally-friendly mode of freight transport since more than two decades. Its ecological and consequently economic advantages in relation to rail and road transport are presented in Table 1.

Table 1. *GHG emissions (g/t-km) and transport cost of road, railway and inland water transport in €/km*

Freight transport mode	GHG emissions (g/t-km)	Transport cost (€) 200 km	1,000 km
Road	137	0.143	0.088
Railway	24	0.160	0.074
Inland waterway	33	0.027	0.020

Source: *ECA, 2015; CCNR, 2024; PLANCO, 2017; ECA, 2019a.*

For this reason, taking into account the significant ecological (emissions) and economic (carriage costs) advantages of water transport in all the areas presented in the table 1, the EU transport regulator usually also emphasizes 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 waterway transport competitive position in the whole transport system, facilitating at the same time persistently its integration into the intermodal logistics supply chain (Antolini, 2024; EC, 2023a).

In addition, it is assumed that inland waterway freight transport is not only environmentally-friendly but also energy-efficient and has, unlike the European road network, a sufficient transport capacity to cope with an increase in traffic. For these reasons, in the EC opinion 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. 41000 km of inland waterways flow through 25 of the EU countries, which anable to perform ca. 150 bn tkm every year, and in this in particular in densely populated and congested areas. Moreover, approximately 44 000 employees found the job on inland vessels, of which 60% in goods transport and 40% in passenger transport. On the other hand, however, in reality there are only a total 37 000 navigable km connecting 13 EU countries, i.e., just less than half of all EU member states where this mode of transport has a greater or lesser importance for freight carriage (CCNR, 2024; ERSTU, 2022).

Moreover, what should be emphasized here, only about 15 000 km of inland waterways are included in the trans-European transport network (TEN-T), being a part of the key EU transport corridors. Despite such a technical potential and existed infrastructure capacity, in total, the EU inland waterway transport via the navigable waterways and canals moves only ca. 6% of the freight volume nawadays, which is even less than 4% of the total EU freight transport performance (Jacob, 2023; PMLIP, 2025; IWT EP, 2022).

Somewhat contrary to the recently seen market realities and evidend facts, in the opinions of the EC, the currently existed 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 substantial basis 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 growing shippers' logistics expectations, fulfilling at the same time the high regulatory requirements, the EU inland waterway freight transport has to overcome certain challenges. It needs to become greener, digitally stronger and climate resilient. These include protecting waterways from the effects of flooding and drought, which affected frequently in Europe in recent years. Further, inland waterway vessels need to become 'smart', and infrastructure, including in ports, needs to be significantly improved. It is estimated that final completing the core network for IWT will cost no less than €27 billion (Jacob, 2022; 2016).

What is more, greater investments are also needed in digital technologies, as well as ensuring a sufficient and qualified workforce. Striving to meet zero emission requirements, EU inland navigation calls on EC to support choice of HVO in 2025. In fact, the scale of needs and above all financial ones is huge and may exceed in total € 42 billion. What is particularly worth considering, is that such a huge amount of public money would be transferred to only 13 countries in the EU, in which IWT plays a certain role in their transport systems, while absolutely dominant part only to five of them.

4. Inland Waterway Freight Transport Development Programmes: Research part IB

EC considering its strategy of further, wider support of the development of freight inland water transport to be justified, pursues its goals 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 (IWP EP, 2022; PMLIP, 2015; UN ESC, 2024).

The special EU inland 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, has also taken into account other forms and instruments of its support. These include the EU action programmes Naiades, dedicated 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, 2024; 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). The main targets and operational tasks addressed by the Naiades programmes are presented in Figure 1.

Figure 1. *The main areas covered by Naiades action programs*

Source: *ECA, 2019; ICCT, 2024.*

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, 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. They need to 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 EC, member states, River Commissions and IWT 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).

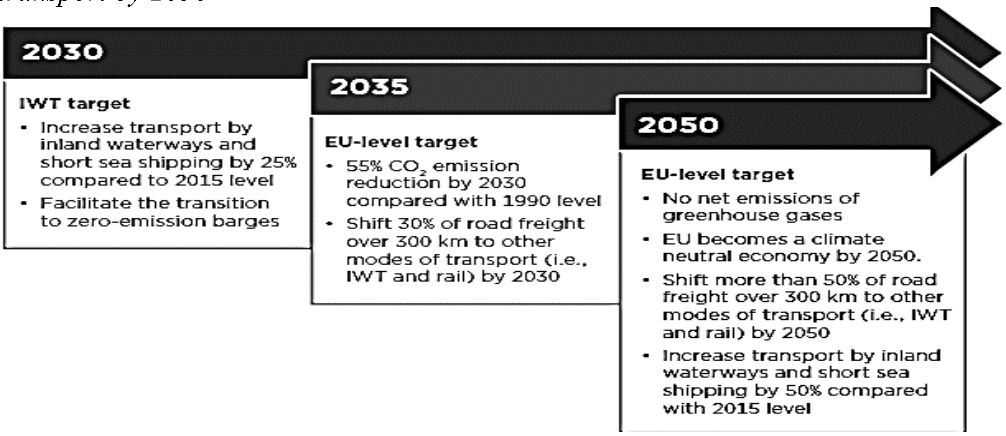
The EU-funded Platina projects provide coordination and support activities necessary to prepare IWT oriented policies. For example, the current Platina4 project that started in 2024 and will be implemented until 2026 is co-financed by the Horizon Europe Programme works on such topics as: 1. supporting 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 (CCNR, 2024; Antolini, 2024).

The regulatory activities taken by the EC in recent years with the aim to support and stimulate the development of IWT, were 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, 2025 and 2050 aimed at increasing 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 key aims concerning the EU inland water transport development as a modern, smart and sustainable mode of transport by 2050 are presented in Figure 2.

Figure 2. *The key EU's targets concerning the development of inland waterway transport by 2050*



Source: *ICCT, 2024.*

The scope of regulatory activities with respect to broadly understood inland water transport have been, however, much broader. They have been undertaken 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 (Christen *et al.,* 2021; IWP EP, 2022).

5. The Extremely Poor Market Effects of the Inland Water Freight Transport Development: Research part IIA

The vast regulatory activities aimed at promoting and supporting of the IWT development have been not reflected, however, in strengthening its market position, i.e. in increasing its market share in the total EU 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, it is expressed in form of the modal split (Grzelakowski, 2024).

Examining the impact of the EU regulatory activity reflected in the form of its transport policy on inland freight water transport, there has been analysed and assessed the changes that took place in the EU transport market, i.e. in the market modal split in the years 1995-2023.

Data regarding this issue are presented in Table 2. The data indicate the percentage share of individual modes of transport in the total EU freight transport performance, measured in billion tonne-kilometres (t-km).

Table 2. *EU transport modal split in selected years of the period 1995-2023 (in %)*

Year	Road	Rail	Inland Waterway	Pipelines	Sea	Air
1995	45.3	13.6	4.3	4.032.7	0.1	
2000	46.5	12.5	4.1	3.932.9	0.1	
2005	48.6	11.5	3.8	3.832.2	0.1	
2010	49.4	11.4	4.5	3.5	31.2	0.1
2015	48.9	11.9	4.2	3.331.7	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
2023	52.6	11.5	3.4	2.6	29.7	0.1

Source: *EC, 2018; 2022; 2024.*

The statistical data in Table 2 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 gradually decreasing market share 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 is worth paying special attention to the fact that the currently existing modal shift has 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 (Grzelakowski, 2024).

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. 2). The rate of growth in specific time intervals, related to transport performance as per particular transport sectors is presented in Table 3.

Table 3. *Growth rate of transport performance (bn t-km) in the EU between 1995 and 2023 as per transport modes and total in %.*

Period of time	**Road**	**Rail**	**Inland Waterways**	**Pipelines**	**Sea**	**Air**	**Total**
1995 – 2023 per year	66.4 1.7	5.6 0.2	-4.5 -0.2	-12.8 - 0.5	52.1 1.5	54.1 1.6	43.0 1.3
2000 - 2023 per year	34.5 2.0	2.0 0.1	-12.9 - 0.5	-21.8 - 1.1	32.6 1.2	25.8 1.0	24.7 1.0
2022 - 2023	- 3.2	- 4.3	- 4.6	- 3.4	3.9	- 5.0	- 1.4

Source: *EC, 2018; 2022; 2024; Eurostat, 2024c.*

The data presented in Table 3 proves that between 1995 and 2023, the transport performance in tkm achieved by the EU member countries increased by 43.0%, i.e. on average by 1.3 % annually. The increase was observed, to the largest extent, in road transport (as much as 66.4%), air transport (54.1%) as well as maritime transport (52.1%). The inland water transport recorded a downturn trend of -4,5% at that time and the dynamics of the decline in its share in the total EU's transport market was particularly visible from 2020 onwards.

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. This is due to many diverse reasons, which to a large extent determines the nature and specificity of their transport and logistics markets (Eurostat, 2024).

The analysis of the data shows that in 9 out of 10 EU countries examined with the highest market share of inland navigation in their transport market, i.e. above 2%, it has been reported visible 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 the 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 stable situation is only in Luxembourg.

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 vital role of this mode of transport, leaving the member states with the highest share in the transport market with strategic decisions regarding its further development (Grzelakowski, 2024).

6. The Wider Economic Effects of IWT Development: Research part IIB

No visible real market effects related to the development of the EU inland waterway freight transport, with simultaneous strong regulatory support for this mode of transport, does not provide any basis for a justified comparison in research terms, i.e. economic as well as social and logistical, with other modes of transport with the market share of 10 percent or more.

Moreover, such a strongly preferential form of implementing transport policy in favour of IWT indicates the scope of economic support 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 gained 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 EU economy derives from inland freight waterway transport (Grzelakowski, 2024).

However, it should be clearly emphasized that the segment of passenger transport by inland waterways, which is not the subject of research here, should be considered, and this is beyond any discussion, as an effective, ecological and desirable form of passenger transport that should be supported by the EU within its transport policy.

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. generally 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 as well as 2022 - 2024 in % (volume in millions of tonnes and value in billions of EUR)*

Year and way of measurement	EU total Export	EU total Import	%	Inland waterway Export	Inland waterway 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
2024						
Value	2584.1	2434.0	100.0	6.2	3.0	0.2
Weight	661.1	1481.7	100.0	11.5	6.2	0.8

Source: *EC, 2018; 2022, 2024; Eurostat, 2024b; Eurostat, 2024d.*

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. However, since 2023 the opposite trend is noted in both dimensions examined (the effects of the war in Ukraine). Inland freight 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, however, 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 will not be changed 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.

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 2022 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 2022*

Subject of study	EU-27 total	EU IWT	%	Selected EU countries
Employment in 1000	10 378.1	42.0	0.41	DE - 10.3, FR - 5.1, NL - 12,3 RO – 2.5
Number of enterprises	1 420 297	9912	0.69	DE - 858, FR - 926, NL - 4442
Turnover ml EUR	1 893 090	11 309	0.59	DE–2225, FR–568, NL - 3639

***Source:** EC, 2018; 2022; 2024; Eurostat, 2024d, Eurostat, 2024b.*

The data presented in Table 5 confirm that, in the macroeconomic dimension, inland waterway freight 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 companies 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 relatively 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. These four countries concentrated 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 freight waterway transport, based on the current strategy implemented by the EU regulator.

7. Discussion

The results of the conducted research indicate low market and economic effects resulting from the development of the EU inland waterway freight transport, while emphasizing its advantages in the ecological dimension which are strongly exposed by the transport regulator. However, the assessment of its importance and role at the EU level differs significantly from that which inland waterway freight transport plays at the national level, especially in those countries that have a large potential for its development and where it has already played a significant role in freight transport sector (Grzelakowski, 2024).

This applies primarily to the countries situated along the Rhine, Danube, Scheldt and Elbe. The volume of cargo transported on Rhine amounted to 292 million tons in 2023, and 30-40 million tons have been moved on Danube in recent two years. As a result, the IWT share in the import and export of goods in main EU ports was quite meaningful and accounted for: Rotterdam – 45,5 %, Antwerp – 39%, Constanta – 22% and Hamburg – 7,8% in 2022 (Eurostat, 2024a; Eurostat, 2024b; Eurostat, 2024c).

In turn, in the context of the actions taken by EC for a much greater than before inclusion of IWFT in intermodal transport activities, it should be emphasized that this is not and will not be an easy task. Taking into account the overall intermodal freight activity and the share performed by IWFT in the EU in 2022, only a few countries are noted to have achieved some results in this area.

And so, in terms of overall IWT activity, Germany (48.2 billion t-km), the Netherlands (46.6 billion t-km), and Romania (13.5 billion t-km) had the highest levels by tonne-km, while Belgium (19.8%), the Netherlands (12.5%), and Hungary (11.7%) achieved the highest IWT shares among all freight modes (Tianlin et al, 2024).

For the five countries that reported intermodal transport data in terms of tonne-km in containers carriage, the Netherlands had the highest share of IWT freight (in t-km) shipped via intermodal transport, at 12.7%, followed by Germany (10.2%), Belgium (9.4%), France (6.1%), and Luxembourg (0.5%) (CCNR, 2024; ICCT, 2024; Tianlin et al., 2024). This means that in fact only these countries have the real chance of achieving the regulator's goals in this area.

8. Conclusions

The research results confirm that the share of inland waterway freight transport in the total transport market of the EU shows a constant downward trend. The EU inland waterway freight transport plays there a rather marginal role, 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 freight transport market is relatively significant and may be maintained in next years. Its few advantages, including low GHG emissions and energy consumption, lose their significance in the face of numerous barriers and disruptions, such as drought, floods, changing water level, frequently imposed freight surcharges, etc., that occur more and more often in the freight transport by inland navigation.

As a result, there is a growing discrepancy between the real, i.e. market and economic effects generated by inland water freight 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 (Grzelakowski, 2024).

This means that the currently used formula for supporting inland waterway freight transport in the EU as part of its transport policy should be rethink and modified. It ought to be changed and reoriented in favour of shifting part of provided economic support to rail and intermodal transport, to boost the transformation of the entire transport sector towards zero-emission by 2050 (EIB, 2024).

Shifting demand from inland navigation to rail and intermodal transport could generate more market and economic as well as environmental effects for the freight sector of inland waterway itself, enabling at the same time much more efficient support for the smooth green transformation of the EU transport system.

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