CHALLENGES AND SOLUTIONS FOR SUSTAINABLE TRANSPORT IN THE ERA OF NEW ENVIRONMENTAL REQUIREMENTS IN BULGARIA AND TÜRKIYE

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Abstract: The background of the research is based upon the conclusions of the International Transport Forum (OECD, 2-21) that one of the big challenges for the environment comes from the transportation sector, which is responsible for approximately 23% of the discharged CO2 emissions; this quantity is expected to increase to 40% by 2030 and to 60% by 2050. The already expressed negative tendency is calling for new models for freight transport represented in the form of inter-modality. This means the logistics side of international economic relations, represented by land mode of transport (road and rail), inland waterways, short-sea shipping, and even airborne transport at short distances, should make use of viable combinations to decrease the harmful substances; it also concerns domestic transport policy which should stimulate non-road transportation solutions. The European Green Deal practically outlines the plan for the decarbonization of the economies of the member states of the union until 2050, with the aim of improving the well-being and health of European citizens and future generations with an accent over transport activities. Usually, logistics providers offer transport solutions, combining several modes, led by stakeholders' expectations for reduced time and costs of transferring goods, reliability, and frequency of services. The biggest challenge is to design a resilient transport network, where the users can easily switch between transport modes in real time, while there is enough evidence that combined transport solutions are in accordance with the contemporary requirements towards freight transport. Infrastructure investments, easing transborder connections and interoperability in general have a positive effect over the development of combined transport. This paper is addressing the opportunities and difficulties in employing combined transport solutions using the methodology SWOT-TOWS and applying the research results to the existing possibilities in Bulgaria and Turkey as a neighbor non-EU country in the role of advanced competitor in the development of

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combined transport solutions. The conclusions confirm that economic development and its interaction and dependence on international logistics development is the most important factor of the environment encouraging or detaining the combined transport solutions. It also affects investments in transport infrastructure, the application of ITS and AI, the technological factors influencing the general trends of transport development and in particular, freight transport.

Key words*:* combined transport, “green” international logistics, transport policy, strategic analysis

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Introduction

According to the research of ITF about the Decarbonizing Transport Initiative, one of the big challenges for the environment is that the transportation sector is responsible for approximately 23% of energy-related CO2 emissions, which are expected to increase to 40% by 2030 and to 60% by 2050 (International Transport Forum, 2019). This negative tendency requires multimodal freight transport models in international logistics, represented by land mode of transport (road and rail), inland waterways, and also transport at short distances, both sea and air. Transport policy at the national level should stimulate non-road transportation solutions, a part of which are the new approaches in last-mile logistics.

Usually, logistics providers offer multi-transport solutions, combining several modes, led by stakeholders’ expectations for reduced time and costs of goods transferring, reliability, and frequency of services. The difficulties arise from the already existing modal split due to political, economic and technological issues. The biggest challenge is to design a resilient transport network where users can easily switch between transport modes in real time. Still, in our opinion, logistics providers are already offering “green” solutions, creating a favorable environment for the choice made by clients.

The European Green Deal practically outlines the plan for the decarbonization of the economies of the member states of the union until 2050, with the aim of improving the well-being and health of European citizens and future generations. Part of it is the provision of efficient, safe, and environmentally friendly transport (European Council). This paper aims to discuss challenges and solutions for green freight transport based on multimodal solutions.

1. Literature review and methodology

Reducing the share of road transport on the way towards less polluting and more energy-efficient modes of transport is the main aim of European transport policy due to the negative consequences, due to the expected increase of road freight transport by 40% until 2030 and by over 80% until 2050 (Common Transport Policy). There is a strong support to intensify the use of multimodal solutions by multiple actions, which have proven their importance over time, such as:

1) The internalization of external costs in view that all the environmental outcomes connected with the surplus of transportation services should be covered in line with the polluter pays principle (OECD, 1975). A lot of measures have been performed towards internalization of external costs throughout the years, such as increasing taxes on heavy road vehicles, fuel taxes, etc. (OECD, 2022) The new trends in this field are linked to the effects of digitalization, aiming at highlighting the potential for making the mobility system more sustainable, showing the risks that could occur in cases of mismanagement (European Environment Agency, 2023).
2) More targeted infrastructure investments, aimed at better interconnections between the single modal networks. For instance, new projects envisaged by the CEF financial instrument of the EU will contribute to transport policy objectives such as enhancing major interoperable transport axes along the Core Network Corridors, improving safety and resilience of the network and increasing the capacity and performance of the rail, inland waterways and short sea shipping infrastructure, within an integrated multimodal transport system, with a view of obtaining the interconnections referred to;
3) Better use of information concerning traffic, capacities, availability of infrastructure, cargo and vehicle positioning.

In our opinion, combined transport is an adequate general response to the needs of resilient transport in the era of new environmental requirements. The definition of intermodal transport by OECD (OECD, 2006) is “movement of goods (in a single loading unit or a vehicle), by successive modes of transport without intermediate handling”. Within ASEAN, combined transport is considered “the carriage of goods by more than two modes of transport without any handling of the freight when changing the modes through an intermodal transport chain with one single contract of carrier”. In the USA, it refers to “Containerized Rail Transport”. The definition by the EU Commission from the past century is “a characteristic of a transport system that allows at least two different modes

to be used in an integrated manner in a door-to-door chain" (1977). Combined transport (CT) is key to achieving a carbon-neutral transport sector in the context of the European Green Deal. Combined Transport, with a range of benefits, contributes to a better quality of life and proposes a seamless transport solution, improving the productivity of the entire chain. (UIC, n.d.).

An extended view over the definition, market structure, and key elements of combined transport is presented by the 2020 Report on Combined Transport in Europe (UIC, 2020), based mainly on containerization, accompanied or unaccompanied trucks, with an accent on the possibilities of extended use of railway transport. The geographic scope is also discussed, dividing the combined freight into internal (domestic) and international. The European freight transport market is envisaged, with proof of the role of international combined transport. The topic is further followed in the UIRR Report of 2023 (Patru).

The authors accept the definition for combined transport of Eurostat: "multimodal (combined) transport of goods in the same intermodal transport unit by successive modes of transport without handling when changing modes" which is reflecting, to the full extent, the role of transport in the logistics chain. The modal split is visualized by Fig.1.

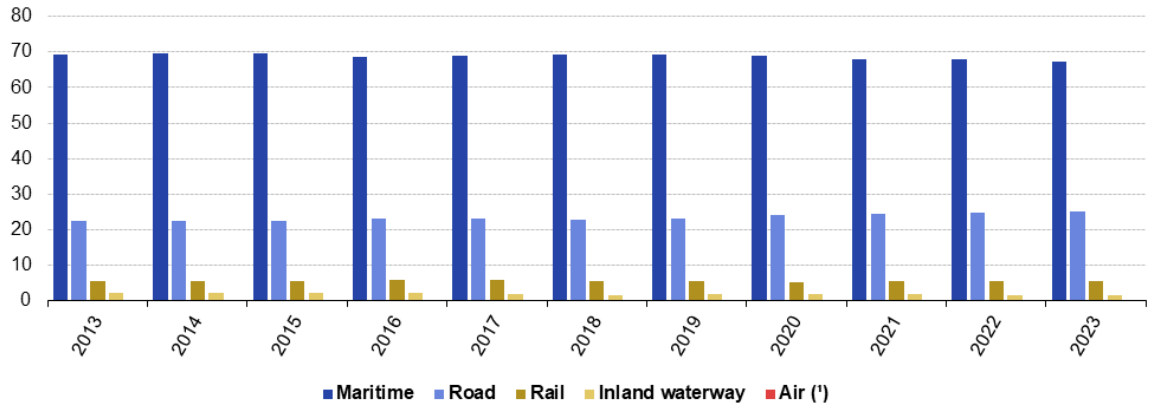

Figure 1. Freight transport modal split (Eurostat)

The data proves the role of maritime transport, with the biggest share in the international trade realization, followed by road transport, and still an insufficient participation of rail and inland waterways. Bearing in mind the opportunities of maritime transport to participate in international logistic chains with combined transport, the above-shown tendency is positive, but on the other hand, due to the limited share of rail and inland waterways, there is free potential for further development.

Due to the dynamics and urgent transition to digitalization in transport, the expectations are for the provision of better synchronized, smooth, and efficient transport services. The on-time information exchange is a further step towards cost optimization, energy savings, and above all, raising service quality.

Further, the big share of road transport with proposals for technological changes and transition to “low carbon combined transport” is discussed in a study of UIRR Zero Carbon Combined Transport (UIRR, 2025). Research on combined transport is done within UN ESCAP, by generating a multimodal transportation concept and a framework, proposing different definitions of combined transport. In fact, the number of definitions is one of the issues about combined transport in general.

In our opinion, the basic strength of combined transport is that it unites positive features of different modes, while eliminating the negative, thus cutting delivery costs, an important issue in international logistics chains. Combined transport becomes more important in view of the European Green Deal and the general tendency to diminish the destructive effects of freight transport on the environment.

To assess the situation about the combined transport from the point of view of its positive influence on business and the environment, the method SWOT-TOWS (Gonan Bozac, 2008) is applied, based on the results of secondary research. The outcomes are focused on strategic issues concerning the future of combined transport in the Republic of Bulgaria and the Republic of Turkey.

2. Situation analysis of the attitudes toward combined transport

As a result of deregulation, leading to the necessity of restructuring, refocusing, and changing business models, the private sector companies have taken the initiative in the field of inter-modality. Combined Transport is promoted within the EU, both legally and financially, providing support for projects relating to combined transport. The aim is to enable modal shift and reduce long-distance road freight transport through encouraging cooperation with rail transport and the other ecologically friendly modes; also, the achievement of the goal for transferring 30% of road freight over 300 km to other modes by 2030 and over 50% by 2050, outlined by EC transport policy in 2011 White Paper on Transport, is dependent on the good cooperation between different modes of transport and the seamless door-to-door freight services. The following types of actions support greater use of multimodal solutions:

1) Internalized external costs in all modes of transport, with a view to distributing them among the users, operators, and investors according to the “polluter pays” principle.
2) More targeted infrastructure investments, aiming at better interconnections between the single modal networks.
3) Better use of information (on traffic, capacities, availability of infrastructure, cargo, and vehicle positioning).

The public consultation carried out by the European Commission, based on an online questionnaire about the application of EU regulations over combined transport (Figure 2) showed different advantages and shortcomings, which are indicated in the SWOT table below.

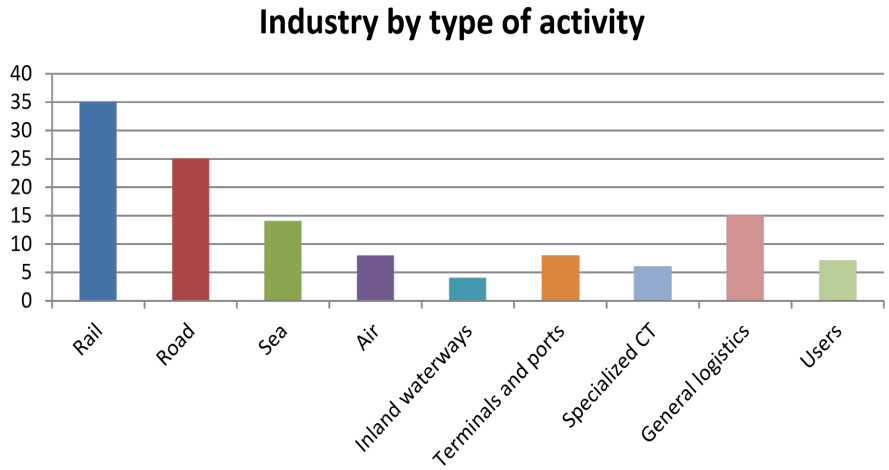

Figure 2. Interested parties in Combined Transport (individuals, NGOs, public authorities, business associations, large enterprises, industry, SME **(**(KombiConsult GmbH, 2915)

As far as the organizational forms of combined transport are concerned, the coverage “land transport”, followed in the transportation chain either by maritime transport or a combination “maritime/air transport”, was supported. An interesting result came from the assessment of the short-sea shipping (SSS), which is generally encouraged by European transport policy (SSS) (European Union, Document 51998PC0414(01)) and the distance at which it will be applied. Also, tri-modal (or more) combinations, in particular road with rail + SSS and road with rail + inland waterway, are considered relevant.

The research results clearly determine that attitudes toward combined transport on the side of the interested parties listed above are positive overall, though still initiatives are more policy-driven than market-driven, with expressed preferences for logistics chains including land, sea, and air modes of transport.

3. SWOT-TOWS analysis of the combined transport in international logistics

The analysis starts with a SWOT Matrix for combined transport. Each of the quoted strengths, weaknesses, opportunities, and threats is carefully derived from secondary literature research and is evaluated by number 1. For quality analysis, all four categories are divided into three subcategories, namely organizational, economic (business) and legal, and the overall impact of them is calculated as a sum of the elements included in them. The results are also presented by a SWOT Graph.

Table 1
SWOT Matrix for combined transport

Strengths	Score	Weaknesses	Score
Organizational	**4**	**Organizational**	**4**
1) Technologies without transshipment for better protection of the transported goods.	1	1) Reduction of the average speed of movement, due to the different possibilities and requirements in the individual modes of	1
2) Standard, closed, sealed, and bar-coded packaging reduces the risks of mis-sending goods.	1	transport, included in a combined transport chain.	
3) The simplification of loading speeds up the turnover, hence shorter delivery periods, and increases the commercial security of transport.	1	2) Lack of sufficient capacity for carrying out combined transport (for example, block trains) as well as appropriate infrastructure (logistics centers, cargo villages for combined transport, offering conditions for	1
4) Fewer inspections since containers are subject to pre-control and accordingly sealed.	1	different loads).	
Economic (business)	**3**	3) Insufficient administrative capacity of all interested parties to use the possibilities of financial instruments, grants, and state aid.	1
1) Further cost reductions (no vehicle detention, decreased insurance fees) due to the lack of transshipment operations	1	4) Insufficient personnel with appropriate education and qualifications for the needs of combined transport.	1
2) Delivery costs optimization through fuel savings and fewer loading and unloading operations	1	**Economic (business)**	**2**
3) Possibility of carrier choice to obtain the best rates for each route stretch	1	1) As per calculations in the National plan for development of combined transport in Bulgaria until 2023, the direct costs of combined door-to-door transport, incl.	1
Legal	**3**	overloading, on rail distances below 550 km	
1) Important issues solved, increasing the possibility of using the ecological transport modes (rail and waterborne transport), and reducing road accidents	1	are higher than those for road transport.	
		2) Lack of equal and transparent access to private railroad terminals.	1
		Legal	**1**
2) Increased ability to negotiate terms per stage or stretch of the route, since each supplier is responsible for its service.	1	Outdated bilateral border agreements that hinder the effective and efficient reception and transfer of freight trains and especially	1
3) Single Contract of Carriage, though the carrier's liability is divided per stage of services.	1	block trains, between container hubs	
Overall score	**10**	**Overall score**	**7**

Opportunities	Score	Threats	Score
Organizational	**6**	**Organizational**	**3**
1) CT operations bring new ecologically acceptable and sustainable alternatives; increasing the use of rail transportation is expected to lessen the congestion levels and the harmful emissions of noise and poisonous gases, such as CO_2.	1	1) Delays in the implementation of projects for the modernization of port and rail infrastructure	1
		2) Part of the functioning industrial and newly constructed logistics areas are not connected to the railway network.	1
		3) Technological and IT security inconsistencies (for example, regarding the capacity of ports for simultaneous handling of container ships, automation, working information channels, such as EDI and blockchains between ports, intermodal terminals, container lines, customs, and other government institutions, warehouses, carriers, and use of Intelligent transport systems (ITS)	1
2) Rail interoperability and deployment of ITS contribute to reducing costs for rail carriers.	1		
3) Modernization of rail and port infrastructure, thus increasing the competitiveness of CT.	1		
4) Introduction of an electronic document exchange system to replace paper documents and stamping.	1		
5) Establishment of an electronic information exchange system at seaports, which will further bring an increased efficiency in containerships' processing.	1	**Economic (business)**	**1**
		Difficulties in the predictability of the costs and time for the passage of containers through the ports, due to the existing customs system	1
Economic (business)	**3**	**Legal**	**2**
1) The existing road, rail, and port infrastructure for combined transport provides good coverage of major production centers and urbanized areas, with assured connections to sea and river ports and airports	1	1) Multiple definitions of combined transport leading to deviations between the interested parties.	1
		2) The different rate of accepting and implementing the control authorities' rules by the EC members (the "transposition act"); issues arising about the quantitative aspects of combined transport (in the quantitative field, concerning weights and measures of the transportation process components)	1
2) International trade relations, served by developed container shipping over the past decade, with generally available land and port infrastructure capacity.	1		
3) Liberalized rail and road freight transport with multiple licensed carriers providing services in a highly competitive environment.	1		
Legal	**1**		
Solving legal problems within the EU (the European Commission revised the Directive on CT in 2023 for a stronger support to the shift from road freight to lower emission transport modes such as inland waterways, maritime transport, and rail) (European Commission, 2023)	1		
Overall score	**10**	**Overall score**	**6**

The SWOT Graph clearly indicates that the right side, formed by the weaknesses and threats, is prevailing. This means that despite the political efforts and the general interest concerning combined transport, there are still issues for its application from the point of view of finding resilient solutions for international logistics chains.

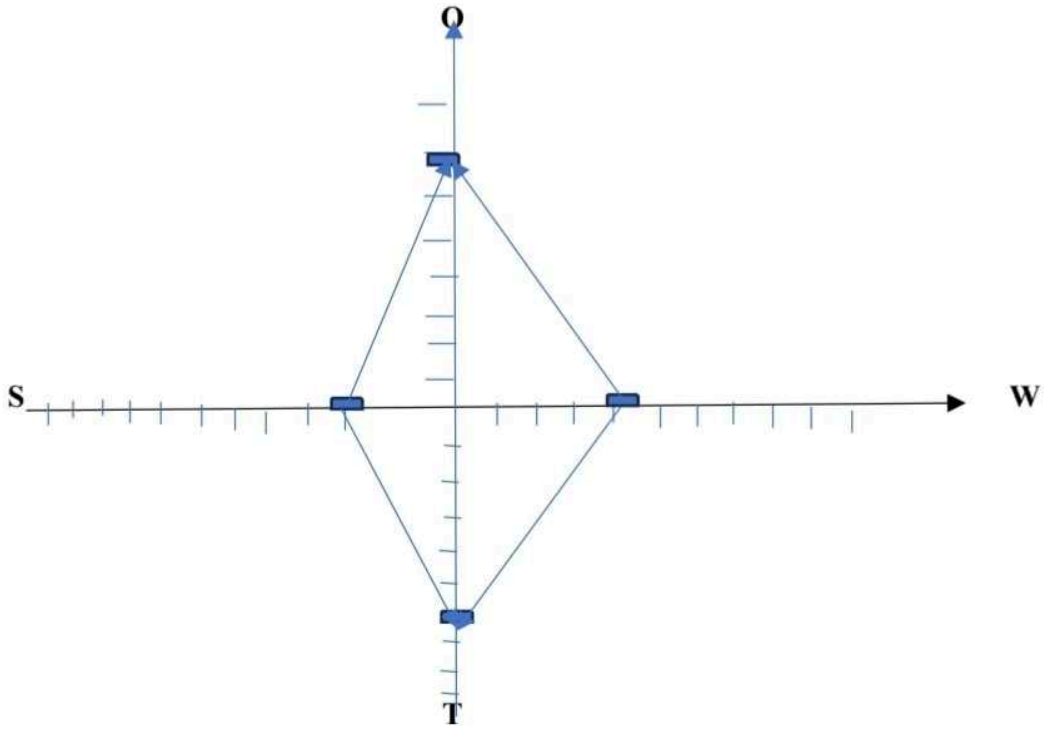

Figure 3. SWOT Graph

Further, the combinations between weaknesses/threats (W/T), strengths/threats (S/T), weaknesses/opportunities (W/O) and strengths/opportunities are developed with suggestions for strategic measures aimed at improving the existing situation and drive attention towards successful efforts for applying combined transport solutions in international logistics.

Table 2
TOWS Matrix for combined transport (suggestions for change management)

	Weaknesses	Strengths
	W/T	**S/T**
Opportunities	**Comparing weaknesses/threats in organization**, we may propose a strategy to speed up the realization of investment projects about the transport infrastructure to overcome the speed reduction, enable more capacity for carrying out combined transport, etc. Despite the efforts in this field, there are still issues, so, incentives to use the possibilities of financial instruments, grants and state aid should be made aware to the interested parties, like different forms of European financing, through proper orientation. Also, the lack of specific infrastructure, such as logistics centers, cargo villages for combined transport and new container terminals in ports should be considered. The training of personnel for the needs of combined transport is another issue, bearing in mind the general withdrawal of trainees for the transport sector. Also, technological barriers connected with IT and digitalization should be removed as a part of the general picture. **Comparing weaknesses/threats in the economic (business) field**, we have to propose combined door-to-door transport to be included mainly in international logistics chains. Clients are easily discouraged if they find discrepancies or unequal treatment in terminals, so measures should be directed to encourage private terminal operators to do their business transparently. As far as customs operations are concerned, it is difficult to make suggestions or recommendations, only that everything connected with border-crossings should be prepared correctly beforehand. **Comparing the legal weaknesses/threats** we recommend an urgent revision of the outdated bilateral border agreements to make the process of transferring block trains between container hubs more efficient. As far as the multiple definitions of combined transport are concerned, it is enough if in practical adaptation of combined transport, the interested parties agree on one of the existing. The transport policy of the different Member States should speed up the process of transposition and implementation of rules on combined transport since only unified rules would motivate the implementation.	**Comparing strengths/threats in organizational**, there is a good overall progress determined by high quality and reliability of service, due to improved packaging, simplified loading operations and no trans bordering. Policies should speed up infrastructure renovation as well as the establishment of railway connections to newly constructed logistics areas so that the strengths could be realized. The service reliability will be further improved through future digitalization and automation of processes. **Comparing strengths/threats in the economic (business) field**, the prospects for cost reductions are real, due to speeding up the turnover of vehicles and rolling stock, less insurance payments because of the reduces risks while completing trans boarding and loading. The choice of operators and rates should also be considered. Hence, the only recommendation is for the improvement of the existing customs system, which is currently slowing down the passage of containers through the ports. **Comparing the legal strengths/threats** we focus on the ecological side and safety of combined transport, particularly if rail and waterborne transport comprise parts of the logistics chains, while limiting the participation of road transport, to reduce road accidents. Overall, there are positive signals for the users in terms of negotiating terms per stage of the logistics chain, while they can make a Single carriage contract. The existence of multiple definitions would not be considered in case of urgent transposition and implementation of technical rules by the control authorities of the different Member States

	W/O	S/O
Threats	**Comparing weaknesses to opportunities in the field of organization,** we can recommend furthering the achievement of rail interoperability, deployment of ITS, while putting strong efforts in the modernization of rail and port infrastructure, as well as of specific infrastructure (such as terminals) to increase the competitiveness of combined transport. The positive outcomes will solve the issues of average speed reduction, the insufficient capacity for carrying out combined transport. The introduction of electronic document exchange is another positive measure to ease the formalities. The issues connected to insufficient administrative capacity and personnel in general with appropriate education and qualification for the needs of combined transport must be solved first of all by presenting a vision, in view of the increased digitalization and IT applications.	**Comparing strengths to opportunities in the field of organization,** we can clearly identify the opportunities for a higher quality and security of transportation services, due to reduced risks in connection with loading/transshipment and introducing the electronic exchange of documents and information, which also contributes to speeding up deliveries. The favorable process is further backed up by infrastructure modernization and particularly by reaching railway interoperability. Besides the demand side, which expects better efficiency of operations, the combined transport alternatives, if applied, are completely in accordance with the requirements for a sustainable and environmentally friendly transport process.
	Comparing weaknesses to opportunities in the economic (business) field, there are stimuli for combined transport solutions on the demand side, such as developed international trade relations backed up by the supply side, represented by container shipping, licensed road carriers, etc., with numerous options to select carriers. Also, the transport infrastructure to be used by combined transport is comparatively well-developed. Further, the proposed business solutions should be based on lower costs due to less detention, lack of transshipment operations, and general savings on loading operations and fuel costs optimization.	**Comparing strengths to opportunities in the economic (business) field** indicates clearly that there are enough foundations to expect cost optimization on the side of clients, backed up by the rights to choose suitable carriers in a developed market (due to liberalization of trade and transport offerings), according to the needs as well as comparatively good infrastructure coverage of the transportation process.
	Comparing the legal weaknesses to the legal opportunities, we can suggest encouraging the shift from road freight to lower emission transport modes such as inland waterways, maritime transport, and rail by suitable policy measures. Also, to form better prerequisites for the use of railway transport in combined transport logistics chains, the outdated bilateral border agreements should be renewed, and the transfer of block trains, as well as other freight trains between container hubs made easier.	**Comparing the legal strengths to the legal opportunities,** we can identify the Single Contract of Carriage, divided into different stages, decreasing the role of road travel, and besides the increased role of ecological transport modes, such as rail and waterborne transport, a real intention to fight road accidents. A positive outcome linked with the shift from road freight to lower emission transportation modes such as inland waterways, maritime transport and rail is to be expected after the revised version of the Directive on CT is approved, maybe by the end of 2023.

4. Transferring the analysis results to the situation of combined transport in Turkey and Bulgaria

4.1. Combined transport in the Republic of Turkey

Located at the crossroads of Europe and Asia, the Republic of Turkey is one of the most important trading partners for countries on both continents, giving it a great advantage in both importing and exporting goods. As a peninsula which has coastal lines in Mediterranean, Aegean and Black Sea, the transport policy of Turkey is based upon the idea of a balanced transport system, integrating road, rail and maritime transport and providing opportunities for combined transport decisions.

The Republic of Turkey is among the most important trading partners of the Republic of Bulgaria outside the EU. In this regard, the Bulgarian-Turkish border, which is external to the Community, is among the busiest, and this leads to delays in supply chains and additional costs for businesses. In previous periods, in the field of Ro-La transportation, Holding Bulgarian State Railways developed technology for the transportation of freight cars by rail between the Halkali (Turkey) - Dragoman (Bulgaria) terminals, but the initiative never started.

Bearing in mind the role of combined transport for a resilient and sustainable freight transport system, the following recommendations are relevant:

- Further investments in renovation and modernization of railway infrastructure for improved access and connectivity of different types of transport infrastructure, and for the construction of new terminals for combined transport.
- Investments in rolling stock, such as general implementation of innovative technologies for combined transport, from organizational, such as block trains, to the equipment applied, including containers, swap bodies, semi-trailers, etc. For instance, benchmarking shows a widespread measure aiming at specialized rolling stock (wagons) for the carriage of intermodal transport units (such as Ro-La schemes).
- Tax relief for combined transport when the towing vehicle is transported by train.
- Liberalization of specific road corridors for the initial and final stages of Ro-La connections between terminals and nearby border stations (i.e. no bilateral authorization is required for the cargo transportation on these

corridors, starting and ending between the nominated terminals of the Ro-La connections).

- Schemes and measures to reduce costs in combined transport (such as concessions on infrastructure charges, subsidization, and compensation for congestion costs).
- Introduction of fiscal incentives to reduce or exempt taxes, which should further motivate interested parties to use combined transport.

As far as the role of railway transport and the possibilities for inclusion in the international logistics chain, the Connecting Europe Facility (CEF), Cohesion Policy, and the Recovery and Resilience Facility (RESF) are suitable funding opportunities that can drive the much-needed modernization of the rail sector. In our opinion, in connection with the negotiations for future accession to the Community and in accordance with the White Paper on European Transport Policy from 2010, the Republic of Turkey actively supports initiatives in the field of combined transport, due to which there are considerable outcomes. First, "freight villages" were developed (Aksoy Okan, 2015) to ensure the enhanced attractiveness of combined transport, an increase in customer satisfaction, and the share of freight transportation, as well as the prevention of pollution. This is an example of good international practices, with potential to be applied in Bulgaria as well.

In Turkish national and international operations, different forms of intermodal transport can be distinguished:

(a) Road-rail operations for the transport of containers, swap-bodies, semi-trailers, or trucks that are carried on Ro-La wagons.

(b) Block train services and international container train services in Turkey are also developing in international logistics. Several national and international partnerships have been established, with the participation of operators, such as BALCO and the Turkish Chambers and Commodity Exchange Association. A "National Combined Transportation Strategy Document Draft" has been prepared under the EU Twinning Project for Strengthening Intermodal Transport in Turkey. In this context, it aims to establish a safe, balanced, convenient, sustainable, and environmentally friendly transportation infrastructure in Turkey. Considering the goals of Turkey in the period after 2023, the development of the railway network in the direction of block train transportation is very promising for the future in the name of increasing the cargoes of countries such as Turkey and China.

(c) Roll-on-roll-off (RO-RO) maritime operations for the transport of lorries, semi-trailers, containers, or swap-bodies to ships on their own wheels or on wheels attached to them for this purpose. This also covers national

and international ferry services, including railway ferries and national short-sea shipping. Also, the importance of sea–rail inter-modality was studied based upon a case between Turkey and Italy, indicating that Turkey needs to invest in the rail connections of the ports.

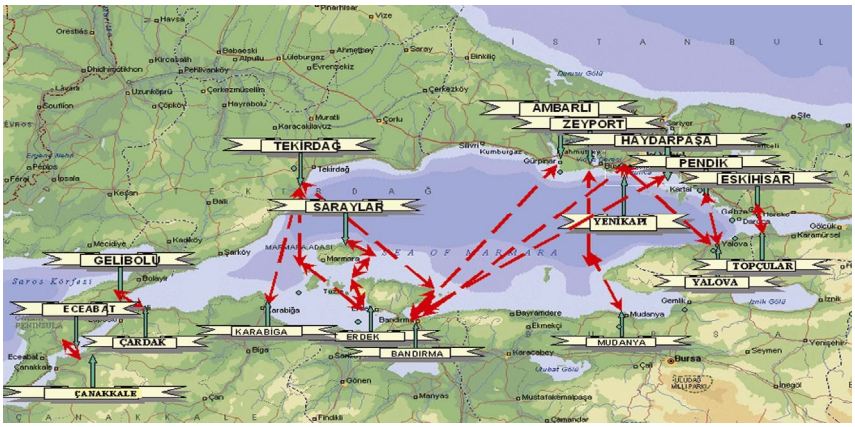

Figure 4. RO-RO services in Marmara region
(Source: Turkish Undersecretariat for Maritime Affairs)

The Republic of Turkey and the Republic of Bulgaria have been initiators of international RO-RO ferry boat services to Western Europe in the 1980s and the early 1990s. Consequently, there are already traditions established, and again, this is an example of good practice about the development of international logistics in times of political turbulence, leading to transportation issues, as was the case for road operators in the Balkan area at that time.

Figure 5. Combined transport of Turkey in the Black Sea region

4.2. Combined transport in Bulgaria

As a member of the EU, Bulgarian transport and forwarding companies, supported by the state authorities, are further exploring the opportunities of combined transport. Since the beginning of Black Sea rail ferry services in 1978, for over 39 years the service has been operated by the Bulgarian shipping company Navigation Maritime Bulgaria as a liner operator working within the framework of a triple intergovernmental agreement between Bulgaria, Ukraine and Georgia regarding operation of direct rail ferry service between ports of Varna (Bulgaria), Chornomorsk (Ukraine) and Poti/Batumi (Georgia). However, since the beginning of the Russian-Ukrainian war, this opportunity has been practically eliminated.

Figure 6. Rail ferry service of Bulgaria

The Ministry of Transport and Communications has launched a procedure to support intermodal operators and the development of existing terminals. The total amount of funding is 34.5 million leva, provided by the Transport Connectivity Program 2021-2027 (Ministry of transport and communication of Bulgaria, 2022). The program aims to support combined transport terminal operators by providing funds for the modernization and expansion of existing infrastructure. The grant for each project is from 1.5 million leva to 4 million BGL, with applicants receiving financial support from the Transport Connectivity Program up to 50% of the eligible implementation costs.

The funds are provided for the purchase of new zero-emission shunting equipment, the implementation of modern IT systems for transport management, and the improvement of the railway and road infrastructure of the terminals. The investments are aimed at all regions of the country, except for the South-West region (Ministry of transport and communications of Republic Bulgaria, 2025).

Conclusions

After presenting evidence that combined transport solutions are in accordance with the contemporary requirements regarding new models of freight transport at an organizational level, it is necessary to overcome geographic obstacles (land-sea-river connections) or to provide opportunities for an increased use of rail transport, combined transport has its potential for wider application in the international logistics decisions.

Infrastructure investments, easing trans-border connections and interoperability, in general, have a positive effect on the development of combined transport. These, however, must be supported by political decisions and economic measures directed both to the operators and the users to encourage the development of new alternatives and their urgent acceptance and implementations.

The decisive factor is economic development, and its interaction and dependence on international logistics, simultaneously encouraging combined transport solutions to protect the environment. The second important factor, closely following the first, is linked to the investments in transport infrastructure, the application of ITS and AI, and the technologies influencing the general trends of transport and particularly, freight transport.

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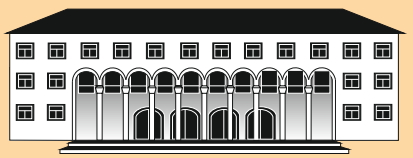

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CONTENTS