SJIF Impact Factor (2024): 8.282 Journal DOI: 10.36713/epra0003 ISSN: 2250 – 2017
International Journal of Global Economic Light (JGEL)
Volume: 10 | Issue: 5 |May 2024

TRENDS AND STRATEGIES FOR THE DEVELOPMENT OF MULTIMODALITY

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Article DOI: https://doi.org/10.36713/epra16710
DOI No: 10.36713/epra16710

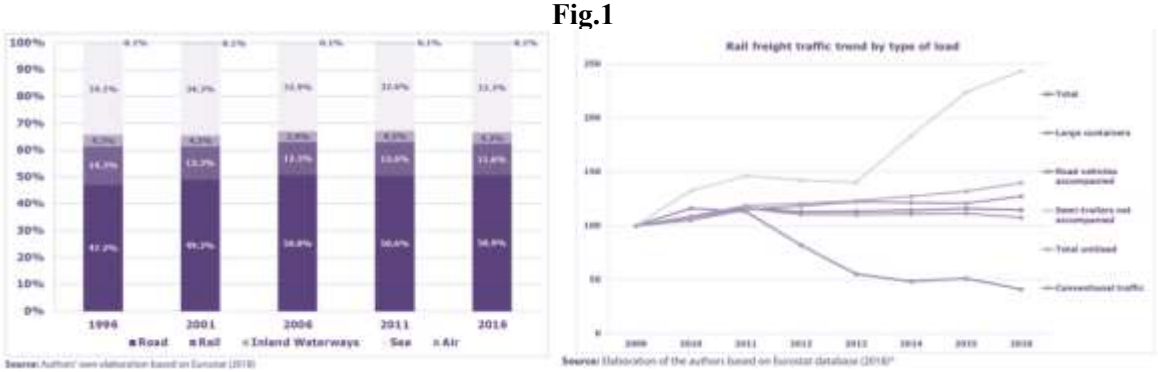
ABSTRACT
The construction of highways facilitated the adaptation of an economy to the road network, so that only a small proportion of industrial facilities were located near railway lines or canal networks. In addition, the competitiveness of rail transport is reduced due to a lack of flexibility on timetabled routes. This is in stark contrast to the freedom and flexibility of road transport, which is able to synchronize the freight movements and manufacturing and warehousing operations much better. In the "Studies for the TRAN Committee - Modal change in European transport: the way forward" , multimodality is identified as a potential solution to the question of sustainable freight transport.

KEYWORDS: *Freight, Strategies, Transport, Trends, Tariff, Import Duty, Customs Authorities, Maritime Shipping*

1. INTRODUCTION
Modal switching means switching from one transport mode to another as a result of a modified choice. Technological evolution has historically been the main driving factor that has caused transportation systems to change and evolve over time. And when one mode of transport becomes more profitable than another (for various reasons, in terms of cost, convenience, quality, speed or reliability) over the same route or in the same market, a modal shift may occur.

Modal choice is the result of a decision process to choose between different transport alternatives. The number of factors influencing modal shift and choice of modes of transport is wide. Key determinants of freight transport are related to cost, time and quality of services required and offered. The weight of the various determinants depends on the attributes of the shipment. In 2016 road transport accounts for about half of the total movement (50.9%), while almost a third are undertaken by sea transport (33.3%). Most of the remaining cargo is moved by rail (11.6%), followed by inland waterways (IWW) at 4.2%, with only a minor amount moved by air (0.1%) [6,7].

Fig.1



The segment of combined freight transport, in which cargo is transported in the same cargo unit (for example, a container, a swap body or a semi-trailer), which can be reloaded from one mode of transport to another, stands out with a rather positive trend with potential. Conversely, accompanied rail transport (ie the so-called "rolling

highway") has faced a continuous decline, proving that it is not the best way to shift goods from road to rail. Despite the numerous interventions and policy measures of the EU, there is still a long way to go to achieve full rail interoperability between Member States - of their infrastructure and the trains running on it. Cross-border railways are still problematic, as trains arriving at the border often still have to change locomotives and crews, as a result of various agreements, including those with unions. Furthermore, there are over 20 different national signaling and speed control systems in the European rail system, and each one is incompatible with the others. This greatly reduces the competitiveness of the railway sector [5].

Regarding inland waterway transport the demand for traditional commodities such as raw materials and agricultural waste is declining, and therefore their movement by means of barge transport is declining, while growth opportunities have been found particularly in higher value sectors such as chemical and container transport. Here, the lack of availability and lack of transparency of information on cargo flows, combined with limited ICT facilities, as well as a lack of standards for communication and information exchange, are identified as the most important technical obstacles to the interoperability of the sector. As a result, long barge waiting times occur at seaports, hindering the wider implementation of multimodal hinterland transport [1].

2. Problem

Maritime, rail and inland waterways can reduce overall transport and handling costs within the supply chain more than others, possibly as a result of their economies of scale (e.g. larger vessels and longer trains only if intermodal terminals are available. The latter are the key interface for accessing intermodal transport services and for ensuring efficient intermodal supply chains across the EU. In order to identify the potential for modal shift, the nodes and the most appropriate infrastructure that could play a role in shifting part of the road freight to more sustainable modes of transport An analysis of the emergence of types of last-mile infrastructure in the EU provides interesting results: for the intermodal transport to be possible, freight terminals should be accessible by trucks within 120 minutes.

2018 was declared the "Year of Multimodality" and in this connection, a high-level conference on European Multimodal Freight Transport was held in Sofia, where it was said that the development of multimodality depends on a number of factors - the technical, economic, political, social spheres and environment, but at the same time it has an adverse effect on their development.

The first session - "Towards a sustainable and integrated European multimodal transport system" addressed the challenges and opportunities, including opportunities such as digitization as well as innovative concepts for more sustainable and efficient multimodal transport and logistics chains in Europe and beyond. The comment is that all participants use cloud technology, but they are not connected to each other.

There is no overview of the market, which leads to its fragmentation and low margins. Critical information is not shared, and Ericsson gives an assessment of the state of the document flow, qualifying the process as complicated, expensive, outdated, slow, unreliable, etc.

In this regard, the proposal for electronic freight transport, presented by the Commission in the same year, could save an estimated 102 million man-hours spent annually on managing paper documents, which is expected to translate into savings of €20-27 billion until 2040.

Also according to Ericsson:

- All assets (people, items and information) of the transport system must be connected;
- Close cooperation is to be carried out to achieve new multimodal mobility services;
- Operation should be in an automated manner to enable shared and sustainable services.
- The use of 5G, IoT, Cloud, Application platform technologies will lead to services with significant added value.
- When we talk about integrated infrastructure, we mean the integration of transport, energy and digitization.

Regarding recent developments, the Commission planned to review a number of regulations in the transport sector last year .. I will give two of them as an example: Directive 2010/40/EU on the framework for the implementation of intelligent transport systems in the field of road transport and for interfaces with other types of transport . A

fundamental transformation of the European transport system is proposed, as digitalization will make it continuous and more efficient and will increase the level of safety, security, reliability and convenience. Intelligent Transport Systems (ITS) are identified as a key factor in building a connected and automated multimodal mobility system that combines new developments such as Mobility as a Service (MaaS) and Collaborative, Connected and Automated Mobility (CAM). In SSAM, the driver becomes the user of a shared fleet of vehicles that is fully integrated into a multimodal transport system, complemented by multimodal digital mobility services (MDMS), such as MaaS applications.

Congestion costs the EU economy over 1% of GDP per year in the form of time lost by citizens and workers, but also in the form of unreliable and inefficient logistics that power the economy. Traffic relief is expected (given that a zero-emission vehicle fleet should not lead to zero-emission congestion), which will also contribute to greater transport sustainability. Ideally, shared zero-emission vehicles would function as feeder services to the more efficient modes of transport.

Regulation (EU) No 1315/2013 on Union guidelines for the development of TEN-T. The two goals of TEN-T , whose development began in 1996 , are: the construction of a core network structured around nine multimodal corridors to be completed by 2030 and the construction of a complete network by 2050 in order to facilitate the accessibility of all European regions. A Commission assessment highlighted several aspects that "worked less", including: The TEN-T Regulation appears to be insufficiently relevant, especially with regard to the 2030 policy and targets, and that effectiveness is affected by delays in a number of projects and future effectiveness could be affected by an apparent lack of coordination capacity/resources.

In the context of the European Green Deal and the strategy for sustainable and smart mobility, three main problematic issues have been identified:

- Insufficient effectiveness of TEN-T to stimulate zero and low emission transport. For example, the network for alternative fuels in Bulgaria is literally non-existent, apart from a few charging stations for electric cars.
- Lack of readiness of TEN-T for the digital transition in transport.
- Insufficient resilience of the TEN-T infrastructure in the context of increasingly frequent and extreme weather phenomena.

In its "Strategy for sustainable and intelligent mobility - preparing European transport for the future" of 09.2020, the EU's vision is as follows:

- Mobility brings many benefits to its users, but it comes at a cost to our society and the most serious challenge facing the transport sector is essential to reduce emissions in the sector and increase its sustainability.
- In the context of the COVID-19 pandemic, a coordinated approach to connectivity and transport activity is crucial to overcoming any crisis.

Achieving environmentally friendly mobility should be the new leitmotif for the development of the transport sector. The goal is to reduce emissions from the transport sector by 90% by 2050. As intermediate goals, the EU sets:

By 2030:

o to have at least 30 million zero-emission vehicles on European roads;
o 100 European cities to be climate neutral;
o traffic on high-speed railway lines to be doubled;
o scheduled collective journeys of distances below 500 km should be carbon neutral within the EU;
o automated mobility to be implemented on a large scale;
o vessels with zero emissions to be prepared to be launched on the market [2].

An example of this is the Dutch company Port-Liner building two large electric barges, which are expected to be launched in the fall of 2019[1]. Key Stats: 18,000 estimated tons of CO2 reduction per year.

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20 foot batteries providing 15 hours of continuous operation.

A capacity of 280 containers of larger vessels with the power to run for 30 continuous hours. It is expected that 23,000 trucks will be removed from the roads annually as a result of the first 6 barges entering service.

However, the competition is developing even more innovative concepts, such as Japanese startup PowerX, which has signed a memorandum of understanding (MoU) with NYK shipping line to develop energy storage solutions (ESS) and develop an energy transfer vessel, to be known as the Power ARK, and an electric vessel[2]..

There are other alternatives: ammonia is heralded as one of the best zero-carbon fuel options for deep-sea shipping in particular . Fuel can be categorized as "brown" (produced from fossil sources), "blue" (produced from fossil sources with carbon capture) or "green" (produced from renewable hydrogen in a process called electrolysis). While the delivery of green ammonia will take time, the development of engine technology is advancing rapidly. In the AEngine Joint Development Project (JDP), MAN Energy Solutions, Eltronic FuelTech, the Technical University of Denmark and DNV are working together to develop the first dual-fuel ammonia fuel engines. With combustion testing scheduled for this spring, MAN's two-stroke model is expected to hit the market in 2024 [8,9].

By 2035: o be prepared for the market launch of large zero-emission aircraft:

Toulouse, 21 September 2020 - Airbus has unveiled three concepts for the world's first zero-emission commercial aircraft, which could enter service by 2035. Airbus believes hydrogen has tremendous potential as a clean aviation fuel and is likely to be the solution for aerospace and many other industries to meet their climate-neutral goals.

o Almost all passenger cars, vans, buses, as well as new heavy-duty vehicles to be with zero-emissions;
o Freight rail transport to be doubled;
o The traffic on high-speed railway lines to triple;
o The multimodal TEN-T, equipped for sustainable and intelligent transport with high-speed connectivity, to be put into operation.

- Digitization will become an indispensable source for the modernization of the entire system.
- The existing framework for intermodal transport needs significant renovation.

Multimodal logistics must be part of this transformation.

- - The lack of transhipment infrastructure, and in particular domestic multimodal terminals, is very pronounced in some parts of Europe and should be addressed as soon as possible. The missing links in the

multimodal infrastructure should be filled. In addition, the transport system should operate more efficiently as a whole with the help of advanced transshipment technologies. The EU needs data exchange on multimodality as well as intelligent traffic management systems for all modes of transport. Ultimately, all types of freight must be brought together through multimodal terminals and the Commission will take initiatives to better target EU funding and other policies to address these issues.

- Rail freight transport needs a serious boost by increasing capacity, strengthening cross-border coordination and cooperation between rail infrastructure managers, improving the overall management of the rail network and implementing new technologies such as digital connectivity and automation.

To achieve the necessary results, the EU Strategy needs incentives:
- The "polluter pays" and "user pays" principles should be applied immediately to all modes of transport.
- Fossil fuel subsidies should be ended.
- Creation of a European framework for harmonized measurement of greenhouse gas emissions from transport and logistics to help choose a sustainable solution.

Among the set of measures with which the EU envisages making connected and automated multimodal mobility a reality are:
- The full use of intelligent digital solutions and intelligent transport systems (ITS).
- The study of the possibilities for additional support of safe, intelligent and sustainable road transport.
- Future mobility should offer electronic options in all types of transport, both for specialists and for individual drivers.
- Efficient capacity allocation and traffic management.
- Updating technical specifications for interoperability to cover new technologies such as 5G and satellite data and to ensure an easy to upgrade and common rail system architecture.
- The completion and effective implementation of the Single European Sky.
- Giving impetus to scientific research and the implementation of innovative and sustainable technologies in the transport sector. The Commission fully supports the deployment of unmanned aerial vehicles and unmanned aircraft.
- - Ensuring that key digital enabling factors are in place, including e-mobility components, network infrastructure, cloud-to-edge resources, data and management technologies, and artificial intelligence.
- Ensuring the highest level and efficiency of the digital infrastructure, in particular through 5G technology.
- Promoting the use of artificial intelligence (AI), which is essential for the automation of all types of transport. Building a common European mobility data space by promoting the availability, access and exchange of data, especially in real time. Currently, they are often hindered by unclear regulatory conditions, lack of an EU market for data provision, lack of obligation to collect and share data, incompatible data collection and sharing tools and systems, different standards or data sovereignty concerns [3,4].
- Preparation of plan(s) for action in emergency crisis situations. Transport is one of the sectors most affected by the COVID-19 pandemic.
- Coordinated and prioritized investments within EU funding programs as well as enterprise investments in more sustainable and digital mobility in order to complete the TEN-T on time; the modernization of fleets and vehicle fleets in all modes of transport and strategic value chains (including batteries, raw materials, hydrogen and renewable and low-carbon fuels);
- Measures in the various modes of transport to strengthen the legislative framework on conditions for workers.

3. CONCLUSION

In conclusion, the following should be noted:

- Road freight transport will retain its predominant position.
- Rail transport could deliver further modal shift in specific segments of transport demand, but at the cost of huge investment.
- Infrastructure access charges and taxes can support modal shift.
- The development of technologies and new transport services can encourage modal shift for freight.

The sustainable European transport system that the EU is aiming for must be smart, flexible and adaptable to the ever-changing patterns and needs of the transport sector and be based on cutting-edge technological advances to ensure seamless, safe and secure connectivity for all economic actors.

However, in my opinion, the main factor in the development of sustainable transport remains the development and implementation of environmentally friendly fuels and propulsion systems. And the optimization of the operation

of multimodal logistics chains and the use of transport modes with higher energy efficiency will generally contribute to the sustainability of transport.

REFERENCES

1. *Atanasova C., Transforming Maritime Education for A Digital Industry, Strategies for Policy in Science and Education, 2023, Volume 31, Number 6s – Special Issue, pp. 9-18. ISSN 1310-0270 (Print); ISSN 1314-8575 (Online).*
2. *Dimitar Dimitrakiev, Vencislav Stankov, Christiana Atanasova, Simulator Training - Unique Powerful Instrument for Educating, Skills Creating, Mitigating Skills and Resilience Creating, Strategies for Policy in Science and Education, 2023, Volume 31, Number 6s – Special Issue, pp. 103-111. ISSN 1310-0270 (Print); ISSN 1314-8575 (Online).*
3. *Gancheva,Y., Development of storage base at the Port of Varna as a "Dry Port" - a part of port logistics centres in the Republic of Bulgaria, International virtual journal for science, technics and innovations for the industry, Year VI, Issue 7, 2012, p. 45-48, ISSN 131.*
4. *Gancheva, Y., Some Problems Related To The Exploitation Of Automated Container Terminals, Pedagogika-Pedagogy, Volume 93, Number 7s, 2021 ISSN 1314–8540 (Online) ISSN 0861–3982 (Print) p. 122-131*
5. *Kalinova, Zh., The Adaptation as a Driver for Organizational Ageing, Сборник с доклади от докторантска научна конференция. Варна: ВВМУ, 2019, с. 92-99. ISBN 978-619-7428-45-2.*
6. *Research for TRAN Committee - Modal shift in European transport: a way forward (europa.eu)*
7. *Resource.html (europa.eu)*
8. *NYK and PowerX to develop electric vessels – VPO (vpoglobal.com)*
9. *Harnessing ammonia as ship fuel - DNV*