CORE AND COMPREHENSIVE RAILWAY NETWORKS AS AN ELEMENT OF EU AND NATIONAL LOGISTICS SYSTEM

MIROSŁAW CHABEREK, WIESŁAW JAROSIEWICZ

a WSB University in Torun, Poland
b President of the Railway Transport Office (UTK) (2006–2010), Director of the Department of Railways in Ministry of Infrastructure (1999–2005), Poland

ABSTRACT

Both the level of organisation of the very logistics processes and logistics system within which a given logistic process is implemented define the quality of economic processes logistics service. Transport processes are subprocesses of almost every logistics process, and transport system is a sub-system of logistics system. Thus, one of the key requirements of logistics services is their integration and interoperability. The interoperability of channels and, more broadly, logistics systems is based on providing such unified operational and technical parameters that enable free flow of resources without any restrictions and stoppages in different locations, especially in contact points of logistics systems of particular countries.

The aim of this paper is to analyse and present the programme of EU activities in the scope of development and modernisation of European railway logistics channels. This paper defines the core and comprehensive network of logistics channels in Europe, discusses priorities for their development and defines required activities, especially with regard to railway logistics channels comprising core and comprehensive network of logistics channels in Europe. The added value of this paper is the list of strategic activities of the EU in terms of transport as seen through methodology and the language of logistics.

ARTICLE INFO

Available online 23 May 2017

Keywords: logistics, logistic system, logistics channel, development of the railway network

JEL: R42.

Doi: 10.19197/tbr.v16i2.77
INTRODUCTION

Each business activity needs logistics support for its implementation. This support is about active, organised process, that will provide all resources (human, physical, information) necessary to implement the main process (or core one) aiming to satisfy a given need, in the form of manufacturing a given element – a product or a service. The logistics process takes it real technological, organisational shape and necessary economic parameters, when servicing a core process for which it provides necessary resources in the right place and time, in the right amount, for the right price. These are the aims of logistics, the aims of logistics processes.

The second area, shaping the mentioned above real organisational and economic shape of logistics processes is logistics system. Every process, also logistics one, requires a necessary system to be implemented. For example, manufacturing process requires a system in the form of suitable devices, manufacturing machinery, production technology etc., with the use of which the manufacturing process can be implemented. The same applies to logistics process. To be implemented it requires logistics system. The main components of logistics systems include logistics channels (roads, routes, main communication channels, motorways), wheel routes, railways channels, waterways (inland waterway channels), sea, transmission (pipelines), air, optic, IT motorways channels etc. What is more, logistics systems include also all logistics centres, thanks to which two main functions of logistics in economic systems can be implemented meaning: service and integration function. Elements of logistics system include also all types of warehouses, storage houses, ports, devices for loading/unloading, lifts, cranes etc. The logistics system of a country, region or enterprise is made of economic organisations dealing in outsourcing of logistics services, as well as of legal regulations defining the movement of goods, as for example customs law or traffic law. The quality of logistics service depends on the quality of logistics systems. Having that in mind, and after having considered the capital intensity and time consuming nature of construction and maintenance of the majority of logistics systems components, as well as their common use during the implementation of international logistics processes in the processes of logistics services for global economy, one of the key requirements of logistics services is their integration and interoperability. The interoperability of channels and, more broadly, logistics systems is based on providing such unified operational and technical parameters that enable free flow of resources without any restrictions and stoppages in different locations, especially in contact points of logistics systems of particular countries. For example, in case of railway logistics channels, trains should cross borders without the need to stop, for example to change locomotives or railroad engineers. The area of issues in need of interpretation is very broad. From the historic perspective of transport systems development, the issue of interoperability is more present in the area of such sub-systems as air, sea or even road transport. When it comes to railway transport, the interoperability processes did not expand in such a broad scope, for many reasons. European Union from the very beginning takes measures to ensure proper, interoperable development of European logistics system components, including railway transport. Ensuring efficient movement of people and goods is the basics of the national and EU market functioning, economic, social and territorial cohesion of selected countries. In the context of broadly understood problem of logistics systems deve-
opment, especially in the context of one of the elements being the most capital intensive and time consuming next to the road channels namely railway logistics channels, the problem of their interoperability becomes a crucial issue. Unfortunately, in the current investment practice in this scope, in Poland the issue of interoperability was not given appropriate attention, probably due to the little knowledge in the field of substantial matter of the problem, and also probably due to its complex technical, technological and economic nature.

Due to the above, the Authors, being aware of the abovementioned issues related to the interoperability of railway logistics channels in Poland, both in theory and in practice, by the publication of this paper aim to make the railway interoperability idea a well-known issue, drawing from official sources and own opinions.

The idea of interoperability is intrinsic for the essence of modern understanding of logistics. Interoperability is the main tool of implementation the service and integration function of logistics. Logistics approach to this issue provides a broad perspective, so necessary for the modern practice, which to a large extent prevents quasi-rational solutions. More detailed discussion of technical and technological, organisational and economic issues of interoperability of railway logistics channels is planned for a separate article in the upcoming issue of Torun Business Review. This paper is, therefore, the first, from among at least three to be published in TBR which aims to present the essence and economic meaning of interoperability of railway system and the influence interoperability has on the level of logistics service. The final stage will present the implementation analysis of railway logistics channels interoperability programme and possible consequences of significant delays and negligences in this regard in Poland as of today.

This paper first defines the subject of analysis and assessment, i.e. the core and comprehensive network of logistics channels in Europe, discusses priorities for their development and defines required activities, especially with regard to railway logistics channels in Poland comprising core and comprehensive network of logistics channels in Europe. The added value of this paper is the list of strategic activities of the EU in terms of transport as seen through methodology and the language of logistics. There are in EU documents logistics references to the discussed matters, they are, however, often incidental, non-systemic, often improperly explained and interpreted, therefore they sound artificial and are difficult to understand. Systemic approach to logistics processes turned out to be extremely helpful, also in the practical approach of the authors, both from the methodological and practical perspective.

RETROSPECTION OF RAILWAY INFRASTRUCTURE DEVELOPMENT PROGRAMME OF EU

The assumptions of logistic channels development policy, as key components of EU logistics system were developed in the 1980s. Legal basics to create Trans-European
Transport Networks – TEN-T were established in Maastricht in 1992. During the meeting of the European Council in Essen in 1994, 14 main projects of TEN-T were approved for the EU Member States. In 1996, European Parliament and the Council adopted first “Guidelines defining the TEN-T policy and infrastructure planning” which in 2004 were enriched with a set of crucial changes taking into account new Member States of the EU and defined financial and organisational instruments for programme implementation.

Legal basics in terms of logistics infrastructure development of EU is the Treaty Establishing the European Community [Traktat między..., 2004], which in art. 3 states, that the aim of the EU is the support of economic, social and territorial cohesion and solidarity between Member States. The second fundamental document, crucial for the discussed subject, is Treaty on the Functioning of the European Union [Traktat między..., 2004], defining, in its art. 4, the competences between EU and Member States in terms of economic, social and territorial cohesion. Article 170, referring to transport networks, states that within the framework of a system of open and competitive markets, the trans-European Networks should promote the interconnection and interoperability of national networks, as well as access to such networks. Moreover, this article emphasises need to link landlocked and peripheral regions with the central regions of the Union. In articles 174-178 it is stated that Member States should conduct their economic policies and coordinate them in such a way as to attain the objectives concerning economic, social and territorial cohesion.

The strategic dimension of the cohesion policy in the transport sector is defined in the so called White Paper of the EC of 28 March 2011, which states, that:

- transport systems of the eastern and western parts of Europe must be united,
- to fully reflect the transport needs of the whole continent and of 500 million citizens,
- in the coming decades oil will become a scarce resource and 96% of transport depends on oil, therefore transport must become more ecological,
- new technologies for vehicles and traffic management will be a key to lower transport emissions in the EU as in the rest of the world.

Therefore, White Paper assumes that cohesion policy must be revised to obtain more competitive and resource-efficient transport system through:

- halving the use of ‘conventionally-fuelled’ cars in urban transport by 2030 and phasing them out in cities by 2050,
- achieve essentially CO2-free city logistics in major urban centres by 2030,
- shifting 30% of road freight over 300 km to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050,
- tripling the length of the existing high-speed rail network by 2030 and maintain a railway network in all Member States,
- by 2050, complete a European high-speed rail network. The majority of medium-distance passenger transport should go by rail.

---

1 Trans-European Transport Networks (TEN-T) – EU programme concerning set of road, rail, air and water transport networks. It forms a part of Trans-European Networks (TEN). The guidelines covering aims, priorities and general direction of activities within trans-European networks were defined in Decision No. 1692/96 of the European Parliament and of the Council of 23 July 1996.
A fully functional multimodal TEN-T core network built by 2030, with a high quality and capacity of this network by 2050 will be a key to implement all of the strategic goals mentioned above. In view of the basic logistics functions i.e. service and integration function, by 2050, the connection of all airports (belonging to the core network) to the rail network, (preferably high-speed) should be implemented. At the same time, all core seaports should be sufficiently connected to the rail freight and (where possible) inland waterway system.

Moreover, the White Paper contains the following provisions:

• by 2020, establish the framework for a European multimodal transport information, management and payment system,
• by 2050, move close to zero fatalities in road transport,
• move towards full application of “user pays” and “polluter pays” principles for environmental degradation.

Wanting to ensure the efficiency of activities within the abovementioned goals, in 2011 the project of Regulation of the European Parliament and of the Council on the Union guidelines for the development of the trans-European transport network was developed. This regulation, from the factual perspective, was an update and development of the document mentioned before from 2004, titled: Guidelines defining the TEN-T policy and infrastructure planning, which was later accordingly updated by decision no. 661/2010 of the European Parliament and of the Council. The aim of the new resolution was to define principles for comprehensive and integrated trans-European transport network, ensuring a basis for sustainable development of all types of transport and contribute significantly to the added value within European railway network covering all Member States.

The regulation defined the following 5 most important priorities:

1. fill in missing sections of TEN-T, especially their cross-border sections;
2. eliminate the differences in quality and availability and the so called “bottlenecks”;
3. provide multimodal connections across all means of transport;
4. reduce greenhouse gas emissions by 60% till 2050;
5. ensure interoperability also in terms of regulations and exploitation requirements.


It is a crucial document, being the basis for planning and designing works concerning the transport networks in given EU Member States.

It must be noted, that the above regulation was slightly amended by updating the Annex III with new maps. The change was made by way of Commission delegated regulation no. 473/2014 of 17 January 2014, which entered into force on 30 May 2014. (OJ of the European Union of 9 May 2014).

The trans-European transport network infrastructure consists of infrastructure necessary for railway, inland waterway, road, sea, air and multimodal transport. Trans-European transport network should be designed, developed and operated in a resource-efficient way by:
development, improvement and maintenance of existing transport infrastructure;

- optimisation of infrastructure integration and interconnection;

- the deployment of new technologies and applications, for example telematic ones, where such deployment is economically justified;

- taking into account possible synergies with other networks, in particular trans-European energy or telecommunication networks;

- the assessment of strategic environmental impacts, taking into account the effects of climate change;

- taking into account the opportunity to expand infrastructure capacity where necessary;

- consideration of the vulnerability of transport infrastructure with regard to a changing climate, as well as natural disasters and other threats;

- consideration of particular conditions in different parts of Europe, in particular, tourism aspects and topographical features of the region concerned.

Regulation (EU) of the European Parliament and of the Council no. 1315/2013, therefore defined a long-term trans-European logistics networks development strategy, taking into account railway, sea, air, inland waterways and multimodal networks. The guidelines defined in this regulation concern technical standards and interoperability requirements for logistics infrastructure covered by TEN-T. This regulation introduced also the terms of core and comprehensive network. It was established, that comprehensive network of logistics channels shall ensure the accessibility and connectivity of all European Union regions. Core network, on the other hand, shall cover these parts of comprehensive network, that are strategically important to implement the goals of logistics services of EU economic area.

Within these projects, new transport and logistics infrastructure shall be developed and the existing one shall be modernised. Implementation of the defined projects will be possible among others through resource-efficient use of the network, reducing transportation costs.

CORE NETWORK

Core network logistics channels cover the most important traffic routes together with intermodal points, servicing long-distance flows, both of passengers and goods. Their main function is to enable the implementation of cross-border links within the Union. Core network logistics channels are multimodal – meaning they are open to different means of transport. They cross at least two borders and – if possible – involve at least three transport means. Where appropriate they may include motorways of the sea. The list of core network corridors is defined by the first part of Annex I to the Regulation no. 1316/2013.

The logistics infrastructure in the form of passenger corridors should be accessible for all passengers, including elderly people, persons of reduced mobility meaning disabled passengers, in accordance with relevant provisions defined in the EU law. Logistics channels core network shall ensure connections between all Member States. Member States shall take appropriate actions to develop core network in such a way for it to meet
the requirements of Regulation of 11 December 2013 mentioned above. It provides, that the Commission shall evaluate the implementation of core network in particular countries in 2023. In order to ensure resource-efficient use of logistics infrastructure with regard to passengers and goods, it was assumed, that when implementing core network new technologies shall be used, telematic applications are to be employed and necessary rules of management and use of infrastructure shall be followed. What is more, core network infrastructure shall meet all requirements defined in the regulation, and in the case of railway transport infrastructure the following shall be ensured:

- full electrification of the line tracks and provision of necessary equipment;
- for freight lines axle load of at least 22,5 t, 100 km/h line speed and the possibility of running trains with a length of 740 m;
- full deployment of ERTMS$^2$.

Part of logistics channels of core network passing through Poland is shown in Figures 1 and 2.

To facilitate the coordination of core network channels construction process, the European Commission appoints, in consultation with Member States concerned and after consultation with European Parliament and the Council, one or more European Coordinators. European Coordinator acts on the behalf and for the European Commission, which provides necessary administrative support. The remit of the European Coordinator shall concern a single core network corridor or the implementation of ERTMS systems for railways or the implementation of motorways of the sea. The tasks of European Coordinator cover work plan and its implementation with the help of their secretariat and consultative forum, and with the help of working groups – if such were appointed. The work plan shall include, in particular, a description of the characteristics of cross-border sections and usage objectives of the core network corridor and covers:

- analysis of necessary investments, including a list of projects concerning transport infrastructure provided for renewal or redeployment in the context of all types of transports, characteristic for a given core network logistics channel;
- procedures analysis for the implementation of interoperable systems of traffic management;
- plan for removal of physical, technical, operational and administrative barriers within all types of transport and between them and a plan for transport and multimodal services efficiency improvement;
- description of means improving the administrative and technical abilities to manage a given project;
- description of possible influence of climate change on the infrastructure;
- measures which shall be taken to reduce the greenhouse gas emissions, noise and other unfavourable factors which influence the environment.

$^2$ European Rail Traffic Management System
Fig. 1. Core network of freight railway lines, ports and rail-road terminals

Fig. 2. Logistics channels core network – railways (passengers) and airports
The technical equipment associated with railway lines may include equipment for the boarding and alighting of passengers and the loading and unloading of cargo in stations, logistic platforms and freight terminals. It may include also such solutions as automatic gauge-changing facilities for rail, tools necessary to ensure the safe, secure and efficient operation of vehicles, including their reduced impact on the environment and measures improving interoperability of a given channel.

The core network construction programme is also about promoting efficient ways to provide accessible and comprehensible information to all citizens regarding interconnections, interoperability and multimodality. The programme is also about activities reducing external costs, resulting from congestion and any types of pollution, reducing any noise and emissions through the introduction to the said networks security technology and compatible identification standards for the sources and roots of emission, by way of development and implementation of telematic applications for given types of transport and among them. Therefore, Member States shall ensure that transport infrastructure provides safe and secure passenger and freight movements. Environmental assessment concerning infrastructure plans and projects must be carried out in accordance with the EU law concerning environment protection, including Directives 92/43/EEC, 2000/60/EC, 2001/42/EC, 2009/147/EC and 2011/92/EU.

COMPREHENSIVE NETWORK

Logistics channels comprehensive network was defined in Regulation (EU) of the European Parliament and of the Council no. 1315/2013 concerning Union guidelines for the development of the trans-European transport network of 11 December 2013. This network of logistics channels shall be completed by 31 December 2050. Parts of logistics channels of comprehensive network in Poland and its surroundings are presented in Fig. 3 and Fig. 4. Member States shall ensure that comprehensive network railway logistics channels meet the following conditions:

- network should be equipped with ERTMS – it does not apply to isolated networks;
- they should comply with the requirements of the Technical Specification for Interoperability – TSI – except where allowed by the relevant TSI or under the procedure provided for in interoperability directive;
- network should be fully electrified – it does not apply to isolated networks;
- they should comply with the requirements laid down in Directive of the European Parliament and of the Council 2012/34/EU concerning access to freight terminals.

In duly justified cases, at the request of a Member State, the Commission may grant an exemption in respect of requirements that go beyond the requirements of Interoperability Directive concerning ERTMS and electrification.

The regulation covers also priorities for railway infrastructure projects which cover, among others:
Mirosław Chaberek, Wiesław Jarosiewicz

- deploying ERTMS;
- migrating to 1,435 mm nominal track gauge;
- mitigating the impact of noise and vibration caused by rail transport, in particular by the use of solutions for rolling stock and for infrastructure, which shall also include noise protection barriers;
- meeting the interoperability requirements;
- improving the safety of level crossings;
- connecting railway transport infrastructure with inland waterway port infrastructure – when necessary;
- improvement of availability, interoperability, multimodality and efficiency of the network, also by selling multimodal tickets and coordination of travel timetables.

According to the Regulation no. 1315/2013, railway logistics channel is composed of such elements as:

- railway lines, both conventional and high-speed ones, including sidings, tunnels, as well as bridges;
- freight terminals and logistic platforms for the handling of goods between rail and other means of transport;
- stations located along the lines indicated in the Annex provided for railway passengers servicing and changing to other means of transport;
- equipment associated with railway infrastructure;
- telematic applications.

Key:

<table>
<thead>
<tr>
<th>Comprehensive Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional rail / Completed</td>
</tr>
<tr>
<td>Conventional rail / To be upgraded</td>
</tr>
<tr>
<td>Conventional rail / Planned</td>
</tr>
<tr>
<td>High speed rail / Completed</td>
</tr>
<tr>
<td>To be upgraded to high speed rail</td>
</tr>
<tr>
<td>High speed rail / Planned</td>
</tr>
</tbody>
</table>

Fig. 3. Comprehensive Network: railway lines, ports and rail-road terminals
Telematic applications are the basic element of information logistics channels. They facilitate the flow and exchange of information within different means of transport and between them in accordance with general logistics aims, i.e. providing the right information, in the right place, time, amount and at the right price. Such information resources are necessary for the safety of movement and transported goods, as well as environment protection. It also makes the facilitation of different administrative procedures easier. Logistics information functioning on the basis of telematic applications facilitates, or even makes possible, smooth connection of logistics chains organised within comprehensive network logistics channels with regional or local networks logistics channels. Therefore, telematic applications should be implemented, as far as possible, across the whole EU to ensure interoperability of current and future logistics channels.

CONCLUSION

As noted in the Introduction, both the level of organisation of the very logistics processes and logistics system within which a given logistic process is implemented define the quality of logistics service for economic and social processes. Transport processes are sub-processes of almost every logistics process, and transport system is a sub-system of logistics system. No wonder that the EU devotes so much attention to the development of logistics channels.
Pursuant to the EU decision, core network of logistics channels should be ready by 2030. The year 2050 is the deadline for completion of comprehensive network.

The developed components of the logistics system in such a long period should adapt the emerging innovative solutions. Logistics channels of both core and comprehensive network shall be modernised and should follow innovative technical solutions and transport technologies. It will be necessary to use alternative propulsion systems and to build new electricity supply systems.

Member States should take every possible step to ensure that projects are implemented in accordance with EU and national laws concerning environment, climate protection, safety, competition, state aid, public procurement, public aid. It is assumed, that EU, once certain conditions are met, will support, also financially, the projects in order to connect the trans-European transport network on the basis of infrastructure of neighbouring countries.

The European Commission and its authorities in collaboration with European Railway Agency (currently European Union Agency for Railways) supervise the development of the European transport network, in accordance with art. 52 of the abovementioned Regulation of the European Parliament and of the Council no. 1315/2013 of 11 December 2013. The Commission is supported by the Committee defined in the regulation (EU) no. 182/2011. In accordance with the abovementioned regulation, Member States shall inform the European Commission, on a regular basis, in clear and sufficient manner on the progress made in the scope of projects implementation and on the investments made in this regard. It concerns providing annual data with the use of specially designed system.

In particular, Member States need to submit to the European Commission summaries of national plans and programmes concerning the development of trans-European transport network and after their approval, they should be submitted for information purposes.

Every two years, starting from 21 December 2013, the European Commission shall publish reports on the progress of the European network development as well as information concerning the use of financial aid with regard to particular means of transport and other elements of core network and comprehensive network in every Member State. By 31 December 2023, the European Commission, with the help of European Coordinators, after obtaining feedback from Member States, shall review the implementation of core network, assessing among others the progress and consistency of implementation with the provisions of the Regulation of the European Parliament and of the Council no. 1315/2013 of 11 December 2013. What is more, the Commission shall evaluate, together with Member States, whether the new lines defined in the decision no. 661/2010/EU shall be added to the core network. Within the review, an assessment will be made, which will verify whether the core network should be modified taking into account possible changes in the transport flow and national investment plans. In such a case, the European Commission may submit a request to amend the said regulation. Member States may appoint a contact authority to facilitate and coordinate the process of permit issuing for the implementation of projects being the subject of common interest, in particular cross-borders ones.
In case of significant delay in the commencement or completion of works on the core network, the Commission is entitled to require explanations within three months which will include the reasons behind such delay and, on the basis of the received answers, it may run consultations to solve the problem.

REFERENCES


Decyzja Parlamentu Europejskiego i Rady nr 661/2010/UE z dnia 7 lipca 2010 r. w sprawie unijnych wytycznych dotyczących rozwoju transeuropejskiej sieci transportowej (Dz. U. L 204 z 5.8.2010)

Decyzja Parlamentu Europejskiego i Rady nr 1692/96 z dnia 23 lipca 1996 r. w sprawie Wspólnotowych wytycznych dotyczących rozwoju transeuropejskiej sieci transportowej (Dz. U. L 228 z 9.9.1996)


Rozporządzenie Parlamentu Europejskiego i Rady (UE) nr 1316/2013 z dnia 11 grudnia 2013 r. (Dz. U. L 348 z 20.12.2013r.) ustanawiające instrument „Łącząc Europę”.

Rozporządzenie delegowane Komisji (UE) nr 473/2014 z dnia 17 stycznia 2014 r. zmieniające rozporządzenie nr 1315/2013 w sprawie unijnych wytycznych dotyczących rozwoju transeuropejskiej sieci transportowej z 11 grudnia 2013r.