Janusz Dyduch
Prof. dr hab. inż., Prezes Stowarzyszenia Inżynierów i Techników Komunikacji RP,
Uniwersytet Technologiczno- Humanistyczny w Radomiu

Henryk Zielaskiewicz
Dyrektor Biura Analiz Nieruchomości
i Projektów Logistycznych PKP S.A. Centrala

DOI: 10.35117/A_ENG_18_09_06

The network layout of terminals is a condition for the further development of intermodal transport

Abstract: In recent years, dynamic development of intermodal transport has been observed in Poland, the rope infrastructure is being modernized, new terminals are being created. However, the process of their formation is chaotic. A number of makeshift terminals are created which do not meet the service standards. The intermodal terminal network in Poland has a strong diversity, density that does not cover the impact of the entire country. European Union recommendations indicate that the distance between terminals should not exceed 150 km. For the development of this transport segment, it is advisable to create a coherent network of intermodal terminals managed by a national operator.

Keywords: TSL field; Intermodal transport; Terminal network; National operator

The flow of goods and services is the foundation of the single European market. Its creation was not and is not possible without systematic logistical support. One of the essential conditions for the functioning of the common transport market is its sustainable development, inter alia on the basis of ensuring the same operating conditions in terms of the condition of transport infrastructure and the rules of access to it. Another important criterion is the full interoperability of transport systems both in the Union itself as well as in neighboring countries. The pursuit of wider interoperability of two railway systems with different track clearances is also an important element of a smooth exchange of cargo flows between Europe and Asia. The European Union aims to rebuild the railways dominated by road transport or inland waterway transport. Changes in social preferences in the use of various types of transport means have created settlements and service points as well as industrial zones along the main routes of road transport. Road transport generates much higher external costs than rail transport, but nevertheless bears several times lower fees for access to transport infrastructure. Assessing the freight transport market in a large simplification, we can determine that rail transport is gaining in importance since the quantitative and spatial nature of the demand for transport enables a regular combination of trains carrying large amounts of cargo over relatively long distances. However, the ratio of the size of the cargo pipe to the length of the route has a significant impact on the profitability of building transport chains using railways.

Within the single European market, a number of companies from various economic sectors are looking for opportunities to improve their competitive position. Modern

production and distribution companies are looking for better and more effective solutions that enable them to offer products that are accepted by customers and, from their point of view, optimal, in particular in terms of technological innovation, quality and price. That is why it is so important for success in business to strive for introducing processes based on new technical and organizational solutions and to achieve a high level of customer service at every stage of cooperation. These trends can also be noticed in the transport and forwarding and logistics sector (TSL). Among the links of logistic chains, external factors such as weather conditions, political situations in individual regions, as well as elements with a broader and more long-lasting meaning, such as changes in the economic and technical and technological environment, affect the greatest extent.

Trends in the contemporary transport market clearly indicate the need for partner ties in the provision of customer services, based on close cooperation between carriers and other entities involved in the process of trade in goods. In a properly functioning supply chain, the principle should apply that all participants who provide services contribute to the success of the entire undertaking and benefit from participating in it. This is the main reason for entering into strategic alliances and jointly organizing logistic enterprises. At the same time, you should be aware that it is also a common risk.

Increasingly, in the practice of railway transport, we observe phenomena of service integration, and at the same time creating a network that allows the use of partner resources in the form of jointly implemented projects, using the synergy effects. Thanks to such activities, the package of services provided by transport companies, which in cooperation, is significantly expanded with forwarding companies create comprehensive services. Such integration creates a chain of connections and mutual relations between enterprises and significantly increases the package of logistics possibilities. However, the creation of an appropriate organization functioning in the network system, without proper preparation of the line and point infrastructure and equipping it with IT tools, will not ensure its proper functioning, and thus the ability to compete with well-organized logistics companies.

The broadly understood complexity of services can be understood as the implementation of various - in terms of specificity - groups of services when participating in the supply chain, a number of companies very closely related to each other mostly in capital, which can be determined by the statement: "A network of related companies that work on the basis of mutual cooperation, together control, manage and improve material and information flows from suppliers to end users. "The ultimate common goal should be to provide services to the client with the right level of quality and the price he accepts and thus achieve the expected benefits. Participation in the process of creating transport chains is not a simple task, you need a very good knowledge of the transport market. Companies operating on it should, while performing their current tasks, observe a number of international legal regulations as well as internal industry regulations. The development of trade requires companies that want to enter the international market to adapt to the increasingly complex "functions" of the delivery of goods. These are not only ordinary processes, but whole chains of services, often involving many forwarding companies and transport. The division of tasks and the number of participants depending on the type of cargo to be transported and on the client's expectations as to the scope of the service. Trends in modern forwarding show that many of the activities involved in the forwarding process are often carried out by domestic, and in the case of

international forwarding, foreign subcontractors acting on behalf of the main forwarder, who accepted the order from the customer. Such a solution entails both positive aspects in the use of "know-how" subcontractors in a given country, or appropriate services tailored to a specific market, but also negative consequences, such as an increase in service costs or less control over the logistics process.

The functioning and development of networks and even transport systems, as well as related trends on the TFL field, currently affect the shape and quality of supply chains. They take the form of large logistic networks, directly affecting the possibilities of economic development of individual regions. New challenges and at the same time connections between economic systems are connected with the development of new technologies of logistic services, as well as with accompanying transport processes.

A good example of the need to create a logistical line infrastructure and intermodal transport is in the network system. The dynamically developing intermodal port terminals require adequate terminal infrastructure inside the country, ensuring fast and efficient flow of cargo between ports and terminals inside the country and final customers. It should be borne in mind that intermodal transport is a segment of transport in which efficiency is a resultant of the success of various links involved in the process, as well as external factors affecting the transport process, and at the same time independent of each other. Therefore, it requires appropriate organizational and technical preparation. In order to provide the customer with the appropriate quality of this type of transport, the organizers must have extensive knowledge related to its specificity (market and economic conditions, technology and technology, multi-branch transport, etc.), and also have appropriate skills and equipment.

Customer expectations of this segment of services in terms of quality and transport time are much higher compared to traditional, conventional rail services. Customers often decide to incur additional costs in exchange for quality and short transport time. For transporting goods with a high degree of processing, customers very often use this segment of transport, because they have in mind that capital frozen in cargo is not rotating, and therefore does not bring profits. Another advantage of intermodal transport is the relatively high level of cargo security during transport. Therefore, planning and implementation of transport chains in these transports require modern solutions in the field of transport and reloading processes technology and cooperation with a well-functioning IT platform, allowing customers to track the shipping process, which helps in optimizing the operational decisions of customers. The flow of information in a timely manner about possible disruptions and new conditions makes it possible to make operational and strategic decisions within the company and in its contacts with clients. In many cases, getting the right information at the right time allows you to reduce losses, or significantly reduces customer dissatisfaction with possible waiting for goods or companies for raw materials and semi-finished products for production. Creating a system of organization of goods delivery in accordance with the "5 W" definition popular in logistics.

Considering the development of logistics companies and the mentioned increase in frozen capital in commodity, customers of freight transport are not more interested in what means of transport is carried out, but at what speed and at what costs the goods will be delivered to their destination. Therefore, there is a need to implement systemic solutions also in the railway transport processes.

After the period of economic transformation and the opening of the rail market, railway transport companies focused on intra-industry competition, without noticing the changes taking place in the TSL sector in the development of logistics services. This is one of the reasons for reducing the competitiveness of this transport branch.

Rail transport to recover the transport market should develop logistic services and carry out transport of such segments as intermodal transport, hazardous materials or in individual wagons, i.e. dispersed transport. Due to the significant dominance of car transport and the liberalization of the railway transport market, and hence also high internal competition, railway transport enterprises, in order to be profitable, have been interested in transports that generate the lowest costs. Such transports are certainly mass transports, which do not require large maneuvering work at the place of sending and receiving parcels. With the liberalization of the rail freight market and increasing competition for customers, freight rates are lowered and the profitability of mass transport is reduced. The level of profitability is certainly influenced by lower costs of access to infrastructure due to the formation of train sets on the customer siding. Unfortunately, considering the maintenance costs, the number of railway sidings decreases each year. The situation that was created reflects what could be observed in the car transport, where as a result of high competition, many companies began to use rates below their own baskets, which in turn led to the collapse of a number of companies in this industry. Is the focus of rail transport companies only on mass transport in the right direction? For the proper development of railway transport, and therefore also in the area of striving to balance the development of particular modes of transport, the appropriate direction is to support distributed transport and hazardous materials by the state, eg in the reduction of access rates to railway infrastructure as a preference for intermodal transport. The word "preference" is not the best reflection of the situation, because one should talk about certain mitigation of disproportions in the scope of access rates between car and rail transport and differences in legal regulations in rail and road transport. State support in scattered transport and hazardous materials, similarly to intermodal ones, should last until the competition conditions of particular modes of transport are balanced. The policy of the European Union aims at transferring the transport of goods from road to rail, which has its justification in the external costs of transport, congestion and protection of the natural environment. The state, despite having declared the sustainable transport policy on many occasions, builds too weak instruments to transfer freight traffic from road to rail, which is why the share of rail transport in the freight market is decreasing every year. In 2017, the total increase in rail transport was recorded, which was caused by the increase in transport of building materials and coal imports. It is different in a number of Western European countries, where long-term strategies for transferring cargo from road to rail were adopted. However, the mechanisms of action are different. Countries such as Germany and Austria are very consistent in their implementation. It is understandable that the sender of goods in the choice of means of transport are guided primarily by economic aspects. If the cost of access to roads is significantly lower than the cost of access to tracks at comparable carriers' costs, then the transport of goods by lorry will continue to increase. In a situation of limited budget resources, the state must decide on the preferences for the development of solutions in the country's transport system, which will be in line with the European Union's recommendations for environmental protection. In the countries most involved in the implementation of Directive 2001/14 / EC, the increase in the

share of rail transport is clearly visible as it generates lower external and environmentally friendly costs. In our country, so far, only mechanisms supporting intermodal transport in the form of a reduction in access to railway infrastructure and the possibility of obtaining aid for the implementation of terminal investments or purchase of wagon and traction rolling stock have been implemented..

In Poland, intermodal transport has been developing very rapidly in the last few years. Increases in transport measured in transport performance and transported by weight, rising at around 20% y / y. In 2017, the share of intermodal transport in rail transport in total amounted to 6.12% in the transported mass, while in transport performance this figure amounted to 9.87%. Nevertheless, in this segment of transport, compared to the average in the European Union, amounting to around 15% share in the total mass of transport in rail transport, there is still a lot to do.

The European Union has been promoting the development of this type of transport for many years, and therefore appropriate financial support mechanisms have been adopted. The current financial perspective, which covers the years 2014-2020 with the possibility of extending to 2023 at the end of the investment, is the third financial perspective, the beneficiaries of which may obtain aid for investments related to the development of intermodal transport. In the previous financial perspective covering the years 2007 - 2013, with the support of EU assistance funds, 23 projects were implemented for a total co-financing amount of approx. PLN 470 million. However, the needs, considering the dynamically developing market, turned out to be much larger, which is why in the current financial perspective the amount of co-financing was set at PLN 1 billion.

The Center for EU Transport Projects under measure 3.2 Development of maritime transport, inland waterways and multimodal connections (group C intermodal transport) completed the call for applications on January 8 this year. The signals coming from the market indicated that the number of projects in the area of terminal infrastructure development and the purchase of traction and wagon rolling stock is high, and the support resources for support may turn out to be insufficient. Therefore, it is welcomed that the European Commission decided to increase the budget of the aid program for intermodal transport to PLN 2 billion.

The needs for the development of intermodal transport are wide in terminal infrastructure as well as rolling stock. PKP PLK S.A. currently, it is implementing a line infrastructure modernization program for a total of about PLN 66 billion, but in order for the rail transport to develop, in addition to the line infrastructure, a modern point infrastructure in the form of intermodal terminals and logistic centers is needed. In Poland, there are about 34 intermodal land terminals, but most of them were established at loading and unloading points, which do not meet the quality requirements of customer service. They have short loading and unloading tracks of length 200-300 m, and manipulation and storage yards are hardened with breakstone, which hinders manipulation processes.

The Polish network of intermodal terminals is characterized by the occurrence of clusters of terminals in several of the most industrialized points of the country. There are also areas where there is no terminal infrastructure built. According to the recommendations of the European Union, the distance between intermodal terminals should not exceed 150 km. In the east of Poland, the number of terminals is far too small. Unevenness in the development of

terminal infrastructure also occurs at our border crossings. At the border crossing point Terespol - Brest, in the reloading area Małaszewicze, four intermodal terminals are located, and private entrepreneurs plan to build more. Reloading capacities of terminals located in this area are currently used in about 40%. At other border crossings on the Polish side, in addition to the border crossing Siemianówka - Sławatycze, where a private terminal in Chryzanów was recently built, there is no such infrastructure. Bearing in mind the growing transport of intermodal units using the so-called The Silk Road between the European Union and Asian countries, especially China, should be expected to diversify these routes and the need to also use other border crossings. It would be advisable for intermodal terminals to be established in the near future at such border crossings as Kuźnica Białostocka - Bruzgi, Braniewo - Mamonowo and at the border crossing Dorohusk - Jagodzin. In addition to intermodal terminals, railway infrastructure at the border crossings is an important factor affecting the smoothness of transport at the interface between two railway systems with different track gauges. In the area of Małaszewicz at present, there are probably difficulties in accepting trains from the Belarusian side. The reason for this is not the lack of reloading capacity of the existing terminals, but the capacity of the Kobylany broad-gauge broadband station. Significant improvement of technical parameters and development of the number of tracks on this station may have a minor impact on the improvement of the current situation because it will cause a bottleneck to be moved to the border crossing itself, and thus to the Terespol - Brest stations. The presented example indicates the need for a comprehensive approach to solving the problems of the capacity of individual border crossings. Bearing in mind the even development of transport infrastructure dedicated to the needs of intermodal transport, it is advisable to have its shape and technical condition and consumables were considered in the network system. When creating such a network, it is necessary to determine the existing potential in terms of possessed transshipment capacity of the intermodal terminals located in individual regions of the country. Another important element is the determination of their technical condition and parameters as well as the possibility of expansion. The location of new facilities should ensure even coverage of the area of the terminal infrastructure of the entire country. In more industrialized areas, where there are large streams of cargo, their density should be higher.

An important issue when building a network of logistic infrastructure facilities, such as terminals and choosing a place for a potential investment, should be guided by a number of criteria. The basic conditions for choosing a terminal's location are the potential of a given market, organizational and legal conditions as well as technical and spatial conditions. However, the most important premise is the market criterion, and therefore the current one and predicted cargo flows in the environment of the planned investment. When assessing the weight of individual criteria, we can say that the share of market potential is about 60-70% in the total weight. However, the other criteria when choosing a location, such as spatial, environmental and technical conditions are of lesser importance. It is estimated their impact on the decision on the location selection not exceeding in total 30% -40% of the weight in the decision. Observing the deployment of existing terminals, we can conclude that it is consistent with the distribution of the number of special economic zones and storage areas in individual voivodships. The largest concentration of warehouse space is located in the area of Warsaw, Upper Silesia, and Poznań. About 60% of the total warehouse space in Poland is built in these

locations. The smallest warehouse space at the moment is located in such provinces as Podlasie, Świętokrzyskie and Opole. However, there is an observed increase in the activation of these areas in terms of industrial development, and in the long-term success is expected in the development of smaller warehouse markets, such as Białystok or Kielce. In the case of Białystok, Białystok Park is currently being developed by Panattoni, with an area of approx. 40.5 thousand m2. Important pipelines of cargo should be expected in this area.

According to the statistics of the Central Statistical Office for 2016, the intermodal transport market in our country is approximately 24.5 million tons, of which more than half is transported by rail, and the remaining part is transported by road. The share of intermodal units in road transport in terms of weight is just over 1.2%. Compared to Western countries, the containerisation of loads in our country is relatively low and one should consider the possibility of introducing mechanisms encouraging companies to increase the containerisation of loads. This course of action is certainly a good solution for the possibility of transferring general cargo from road to rail.

Source materials

[1] Antonowicz M., Zielaskiewicz H., Czy kolejowe przewozy towarowe odzyskają rynek transportowy, czasopismo Logistyka 6/2017

[2] Zielaskiewicz H., Transport intermodalny na rynku usług przewozowych, wydawnictwo ITE Radom