
REGIONAL LOGISTICS AND INTERMODAL TRANSPORT SCENARIOS

Slobodan Zečević^a, Snežana Tadić^a, Mladen Krstić^{a*}

^a University of Belgrade, Faculty of Transport and Traffic Engineering, Serbia

Abstract: *With the continuous growth of the international trade, transportation to the hinterland is gaining ever growing importance with the aim of raising the competitiveness of ports, regions and economic systems. Stable growth in the international container flows creates the pressure on ports and terminal network in the hinterland. Seaports are facing problems of insufficient storage space, long retention time of containers and poor transport and logistics system in the hinterland. These situations generate demands for new distribution and logistics solutions in the ports hinterlands, which are based on a combination of different modes of transport and the development of multi-modal logistics systems. This paper presents the scenarios of logistics and intermodal transportation in Montenegro, with the aims of expanding the hinterland of the Port of Bar, achieving the logistics sustainability, improving the economy and efficiency of supply chain services, integrating the logistics activities and stimulating the regional economic growth.*

Keywords: *regional logistics, intermodal transport, concentration, integration, network*

1. INTRODUCTION

Logistics and intermodal transport are the key words in the development strategies of modern and developed social and economic systems of the leading countries in the world. The successful concept of logistics and intermodal transport involves the formation of logistics, i.e. intermodal transport networks with logistics centers that represent capable and modern places of connection of the various modes and technologies of transport. Logistics, i.e. multimodal transport network is largely developed in the area of Europe. There are significant terminals with the developed infrastructure of maritime, rail, inland waterway and road transportation in the region. However, in Montenegro, Serbia and the closer region, there are certain disadvantages in terms of logistics and transportation networks, which represent a real limitation for the application of the intermodal transport technologies.

The paper deals with the regional logistics and intermodal transport scenarios which would, within the economic system of Montenegro and the region, create the preconditions for the inclusion into the most important international trade and economic trends. The scenario needs to offer solutions which would support the "extended gateway" concept (Iannone, 2012), logistics sustainability, economy and efficiency of the supply chains, integration of the logistics activities and the economic growth of the region. In order to identify the win-win solutions, the scenarios of regional logistics and intermodal transport should be based on the fundamental

* m.krstic@sf.bg.ac.rs

principles of the modern logistics: concentration, consolidation, cooperation, integration, inter-modality, outsourcing, synergy, sustainable development and the quality of logistics services.

2. DECENTRALIZED LOGISTICS SYSTEM

Traditional development of regional and national economic units of Montenegro and neighboring countries has a characteristic of decentralization and spatial dispersion, without the presence of integrative institutional links. The consequence of such situation is the large number of systems, institutions, i.e. transport and logistics enterprises (distribution systems, port terminals, transport companies, forwarding and agency companies, etc.). These systems often occupy large areas valuable for the development of profitable programs, use the outdated and inadequate technology and do not offer integrated services in the logistics chain (Tadic et al., 2013). Lack of cooperation and consolidation affects the increasing number of road transport vehicles, poor utilization of cargo space, large number of empty trips, low efficiency of transport and high costs of logistics. This has a negative impact on the environment, possibility of the roads, traffic safety, consumption of the non-renewable natural resources, and it impedes the economic and social development at the sectoral, national and regional level in every way.

Existing plans and development tendencies of logistics systems, traffic infrastructure and economic entities are characterized by the decentralization from the spatial, organizational and institutional aspects. A decentralized logistics system is based on the existing system of the Port of Bar and planned road-rail intermodal terminals in Podgorica and Bijelo Polje, with the aim of developing an intermodal transport on the corridor Bar-Podgorica-Bijelo Polje-Belgrade. However, logistics centers, i.e. warehousing and distribution systems, retain the concept of decentralization or spatial dispersion in all economic regions of Montenegro (northern, central and maritime region) (Figure 1).

The concept involves the development of regional transport infrastructure and connection to the Corridor X and the so-called Corridor XI – Motorway of the Seas. Apart from the promotion of intermodal transport on the route Bar-Podgorica-Bijelo Polje-Belgrade, the construction and linkage of the road infrastructure of the regional and international significance is also planned. However, systems configuration, in the spatial and institutional terms, as well as the degree of cooperation and consolidation of flows, are not appropriate for the development of strong integrative functions between the public transport companies and the other operators in the transport and logistics market of Montenegro.

Existing and planned storage and distribution systems are in the function of the individual public and private companies, while in the spatial and organizational terms they relate to their parent companies and situate next to the production facilities, sales outlets, shopping centers, industrial areas and major traffic routes. Decentralization and the individual development programs represent a limiting factor for the overall optimization and upgrading of the warehouse and distribution systems (van den Heuvel et al., 2013; Wagner, 2010).

Logistics of the transportation, warehousing, inventory, packaging and manipulation processes is characterized by the insourcing strategy or the in-house logistics, 1PL (First Party Logistics). In the individual cases, the relationship between users and providers of logistics services is based on the traditional 2PL principles (Second Party Logistics). Due to the lack of equipment and infrastructure and the reduction of costs or investments, companies mainly leave the execution of the traditional logistics services (transport and storage) to the logistics service provider. In the strategy of the decentralized system, the logistics partnership is expected to develop at the level of the 3PL (Third Party Logistics).

3. LOGISTICS INTERMODAL NETWORK SCENARIOS

Based on trends and possible real and visionary solutions, two regional transport and logistics system scenarios are proposed (Institute of Faculty of traffic and transport engineering, 2009; Tadić et al., 2013):

- The scenario of regional concentration
- The scenario of complete concentration and integration

Plans of regional logistics encourage the economic growth (Zing et al., 2008). Concentration, collaboration, cooperation and vertical integration in the transport chain of the port hinterland, expand its catchment area and enable "door to door" services. Inland intermodal terminals take a more active role in the supply chain, leading to extended gates and extended distribution centers (Notteboom & Rodrigue, 2009; Rodrigue & Notteboom, 2009).

3.1 The scenario of regional concentration

The scenario of the regional concentration involves the integration and concentration of logistics and transportation systems in the three spatial economic regions. It is based on the development of the integrated logistic intermodal centers in all three regions, with smaller centers or terminals for the reception and delivery of goods, i.e. the development of a network of logistics centers in Montenegro (Figure 2).

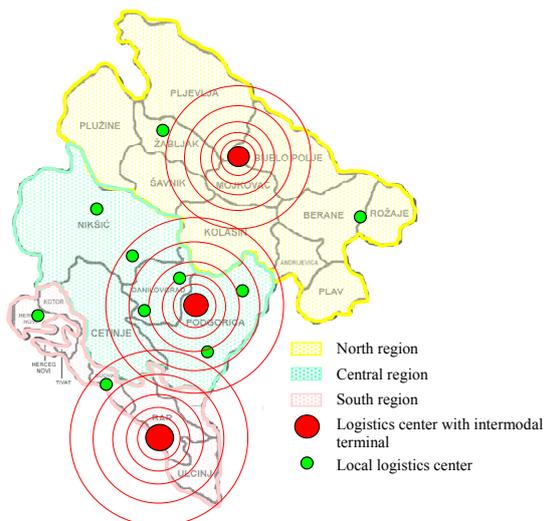


Figure 1. Decentralized logistics system

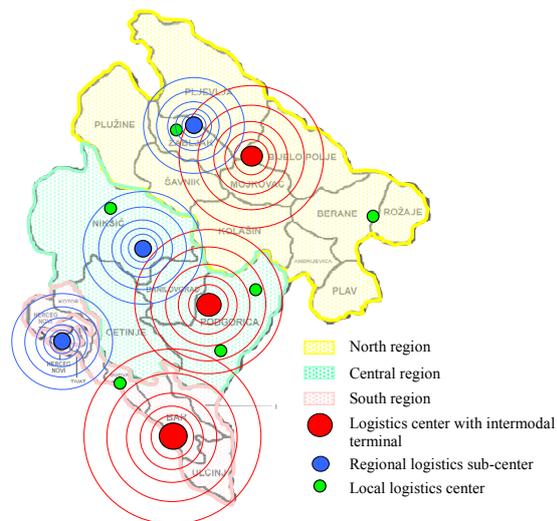


Figure 2. Scenario of the regional concentration of transport and logistics system

Podgorica, Bar and Bijelo Polje are in a function of the important intermodal terminals with a distinct aspect of the spatial centralization of logistics systems. The warehouse and distribution systems of the major companies remain at the current locations, while the logistics subsystems of small and medium sized enterprises are directed towards the concentration and location within the regional logistics centers near the developed economic centers of Montenegro. Systems with advanced technologies which will offer the high-quality logistics services will be built and developed in the area of the logistics center.

The scenario is focused on the transport corridors, intermodal transport, greater participation of the railways in the realization of the cargo flows and the development of cooperation between the transport and logistics companies and the companies from the industry, trade and other service-providing sectors in the field of logistics. In addition, scenario supports the development

port. Port of Bar and the dry port would be the unified functional and technological system. The integration of the port and the dry port enables the "extended gateway" concept and larger share of the railways in the transport operations, thus improving the overall cost effectiveness of the entire system (Iannone, 2012).

Logistics platform may have a broader regional importance with settlement of the systems that would expand the logistics service offer with the value added service (VAL, value added logistics), such as: labeling/marketing of the goods, packing and repacking, sterilization, filling, mixing, painting, final assembly, installation, Merge in Transit (MIT), etc. In the logistics center, as the point of connection, reconsolidation of the components without holding inventories is being done. This could become very profitable service concept for all freight flows which gravitate towards the countries of the region through the Port of Bar. Within the logistics platform and the Port of Bar, the cross-docking and the city logistics terminals are being developed with the primary function of centralized and integrated supply of the urban areas.

All warehouse systems of Montenegro gravitate towards the logistics centers, i.e. logistics platform in the central part of Montenegro. In spatial terms, Luka Bar relieves of the large warehousing systems and orients towards the transit-transshipment systems, i.e. cross-docking terminals, and performs the function of the city logistics. Intermodal transport terminals remain at three locations (Bar, Podgorica, Bijelo Polje), and the micro location of the logistics platform in the central part of Montenegro should be carefully defined.

Concept of the port and dry port is based on a strong transport connection, primarily by the railway, which requires the highest degree of integration between the ports and the railways. Transport by the heavy freight vehicles is limited to the connections between the terminals, and transport within the urban areas to the small and eco-friendly vehicles. The warehousing systems are fully transferred onto the outsourcing strategy. In order to reduce the required area, modern warehousing technologies and transshipment systems are being applied for certain types of goods. In relation to the existing situation, the concept of concentration provides significant savings, reduction of logistics systems and the required surfaces.

Given that scenario represents the highest level of cooperation and integration between the public and private sectors, the development of the logistics outsourcing, i.e. 3PL and 4PL (Fourth party logistics) strategies are being stimulated. In institutional and organizational terms, the port and the dry port may constitute a single unit, open to the highest level of integration with the railway of Montenegro and other public and private transport and logistics companies. The partnership concept between the 3PL and 4PL logistics service providers and the companies from the other economic fields provides multiple effects, such as the efficiency improvement, reduction of the operational, transportation and inventories costs, improvement of the technologies and the quality of services, reduction of the investment in the non-profit systems, the development of core activities of the client company, division and reduction of the risks, etc.

4. CONCLUSION

Transport and logistics system of Montenegro and the region lags behind the modern trends. The gap is not only in technical and technological, but often in the planning, organization, marketing and qualitative terms. The logistics of the region is without the necessary degree of concentration and consolidation of flows and providers of the logistics services, while the transport and traffic systems are characterized by an extremely low level of intermodal transport development. The causes are different, and they are manifested through: insufficient flows volumes, a lack of investment, poor organization, poor marketing and lack of the awareness of the importance of logistics and the application of modern transport technologies.

The described scenarios of transport and logistics system development belong to the group of solutions with which Montenegro can be placed among well-organized and planned European

countries. Application of the dry port system or the regional intermodal terminals, with the aim of connecting the port with the shippers and receivers within the region, enables the growth of competitiveness and sustainability of the multi-modal distribution in the hinterland of the Port of Bar, i.e. the development of Montenegro and the region. The proposed solutions have the elements of openness, multi-functionality, multimodality, with special emphasis on the possibility of cooperation between all forms of organization, ownership and size of the corporations that participate in the realization of logistics services. In some of the proposed solutions, the partnerships between the small and medium sized enterprises and the public and private companies may represent the most efficient form of economic, organizational, functional and technological cooperation. In addition, the development of a network of logistics centers and a higher degree of the system integration allows the expansion of the hinterland of Port of Bar.

The successful development of logistics and intermodal transportation in the territory of Montenegro and the region can be expected after adopting one of the scenarios of centralization of logistics systems. However, it is necessary to adopt and implement an integrated package of recommendations and measures related to the (Tadić & Zečević, 2012; Iannone, 2012): infrastructure policy, development of a network of logistics centers, improvement of the rail transport services, legislation, alteration of the customs processes and procedures, removal of the technical and legal barriers with the aim of fair competition in the transport market, new business models for the logistics systems integration, establishment of national associations and bodies, provision of the financial measures and support.

REFERENCES

- [1] Iannone, F. (2012). The private and social cost efficiency of port hinterland container distribution through a regional logistics system. *Transportation Research Part A*, 46, 1424–1448.
- [2] Institute of Faculty of traffic and transport engineering, Department of logistics (2009). *Studija logističke integracije subjekata transportnog sistema regiona – Učešće intermodalnog transporta Crne Gore*, Belgrade, Serbia
- [3] Notteboom, T., Rodrigue, J.P. (2009). The future of containerization: perspectives from maritime and inland freight distribution. *GeoJournal*, 74 (1), 7-22.
- [4] Rodrigue, J.P., Notteboom, T. (2009). The terminalization of supply chains: reassessing port-hinterland logistical relationships. *Maritime Policy & Management*, 36(2), 165-183.
- [5] Roso, V. (2008). Factors influencing implementation of a dry port. *International Journal of Physical Distribution & Logistics Management*, 38 (10), 782-798.
- [6] Tadić, S., Zečević, S., 2012. Development of intermodal transport and logistics in Serbia. *International journal for traffic and transport engineering*, 2(4), 380-390.
- [7] Tadić, S., Zečević, S., Krstić, M. (2013) Vrednovanje koncepcija regionalne logistike. *SYM-OP-IS 2013, Zlatibor*, 515-521.
- [8] van den Heuvel, F.P., de Langen, P.W., van Donselaar, K.H., Fransoo, J.C. (2013). Regional logistics land allocation policies: Stimulating spatial concentration of logistics firms. *Transport Policy*, 30, 275–282.
- [9] Wagner, T. (2010). Regional traffic impacts of logistics-related land use. *Transport Policy*, 17(4), 224–229.
- [10] Zing, Q., Huapu, L., Haiwei, W. (2008). Prediction Method for Regional Logistics. *Tsinghua Science & Technology*, 13(5), 660–668.