



RESEARCH ON DRY PORT CONCEPT AS INTERMODAL NODE

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Abstract. The shortage of the free space in the port areas is the reason to search for alternatives. This paper focuses on the dry port concept which is a new approach to solving the mentioned problem. The dry port concept is based on moving of intermodal terminals further to hinterland from the port areas. It helps to avoid traffic bottlenecks, to connect cargo handling from the port with other types of cargo at one common transport centre and it can help develop the hinterland areas. The BSR Interreg III B NP project Inloc (Integrating logistics centre networks in the Baltic Sea Region) showed an initiative to elaborate the concept and to study the feasibility to attract transport operators. The research was done partly by the authors of the article – partners of the Inloc project. Common results of the dry port research and conclusions of the approach elaborated by the article authors are presented.

Keywords: dry port, terminal, container, intermodality, networking, logistics.

1. Introduction

Ocean freight transport industry has changed its structure as a result of the new trends and preconditions that came with the introduction of the container and the rise of intermodality. Short sea shipping has had the same impact as ocean shipping, especially in the Baltic Sea Region.

The following factors are acknowledged as the most important driving forces behind the new trends:

- the rise of containerization;
- door-to-door transport with a single bill of lading;
- deregulation of the transport market;
- horizontal and vertical integration of the transport market;
- globalization of the world economy;
- rising demands from manufacturing industries.

The development of the transport service market is moving towards higher concentration and demands to the transport operators. Over the years maritime containerized transport has increased its performance significantly. According to the European Commission, the volume of European hinterland transport related to trans-ocean maritime transport will double in the period from 2000 to 2010 [1].

Intermodal and sea related transports are acknowl-

edged as priority measures to solve common EU transport system problems [2–4].

To meet market demands seaports have tried to increase their capacity within the seaport area.

However seaports are among the most space extensive consumers of land in metropolitan areas and their expansion often generates environmental and land use conflicts.

The main problems seaports face today, as a result of growing containerised transport, are lack of space at seaport terminals and growing congestion on the access routes serving their terminals [5]. The real estate and approaching problems are among those that most ports face during their life time as well. The factors are supporting the dry port concept, to outsource the functions which will need a lot of territory with the cheaper hinterland locations.

For some seaports the weakest link in their transportations chain is their back door, where congested roads or inadequate rail connections cause delays and raise transportation costs. According to the authors, the strategic decision would be the implementation of rail or improved inland intermodal terminals serving seaports.

As elaborated by van Klink and van den Berg and McCalla, seaports can generate scale economies to operate cost effective intermodal transport with high fre-

quency to different destinations beyond their traditional hinterland; i.e., to use rail to enlarge their hinterland and at the same time to stimulate intermodal transport [6, 7].

Transport policies at different levels advocate rail as being a more sustainable traffic mode and therefore propose a shift of volumes from road to more energy efficient traffic modes.

Parola and Sciomachen [8] imply that the only strategic decision would be the implementation of rail for connecting seaports with hinterland through inland terminals. Those inland terminals are of major importance for the efficiency of the intermodal transport as well as for efficient access from/to seaports.

Therefore, satellite terminals (inland intermodal terminals in remote areas) are seen as an alternative to seaport expansions.

The concept of the dry port is based on a seaport directly connected by rail with inland intermodal terminals, where shippers can leave and/or collect their goods in intermodal loading units as if directly at the seaport. The seaport and the inland terminals are connected with high capacity traffic modes, such as rail, rather than only with road. In addition to the transshipment that a conventional inland intermodal terminal provides, services such as storage, consolidation, depot, maintenance of containers, and customs clearance are usually available at dry ports.

The idea of dry ports, i.e., advanced intermodal terminals with rail links to seaports, is certainly not new, and the seaport's role in hinterland transportation is dealt with, e.g., Slack [9], Notteboom [10], and van Klink and van den Berg [6].

Inland intermodal terminals, as important nodes in the transport network, have gained substantial attention in transportation literature. Considerable research has been conducted on how to find the optimal location for inland intermodal terminals [11], how to improve the efficiency of terminals [12, 13].

The dry port concept is closely related to container routing and scheduling problems [14–17], approaches of which could be adopted to terminal, the so-called dry port as well as to ports.

The aim of this article is to present the concept of the dry port based on conclusions of survey analysis, conducted within BSR Interreg III B NP project Inloc (Integrating logistics centre networks in the Baltic Sea Region) [18–22].

2. Dry port concept

There are many different terms used for an inland terminal facility; sometimes the same term is used for different facilities or different terms are used for the same facility:

- An Inland Clearance Depot is a common-user inland facility, other than a seaport or an airport, with public authority status, equipped with fixed installation, and offering services for handling and temporary storage of any kind of goods (including container) carried under

customs transit by any applicable mode of inland surface transport, placed under customs control to clear goods for home use, warehousing, temporary admission, re-export, temporary storage for onward transit, and outright export.

- An Inland Container Depot is a common user facility with public authority status, equipped with fixed installations and offering services for handling and temporary storage of import/export stuffed and empty containers.
- An Intermodal Freight Centre is a concentration of economic independent companies working in freight transport and supplementing services on a designated area where a change of transport units between traffic modes can take place.
- An Inland Freight Terminal is, “any facility, other than a seaport or an airport, operated on a common-user basis, at which cargo in international trade is received or dispatched”.
- An Inland Port is located inland, generally far from seaport terminals. It supplies regions with an intermodal terminal or a merging point for traffic modes – rail, air, and truck routes – involved in distributing merchandise that comes from water ports. An inland port usually provides international logistics and distribution services, including freight forwarding, customs brokerages, integrated logistics, and information systems [23].

When containerisation is booming, ports often meet with shortage of capacities for container storage areas. A Dry Port is a port situated in the hinterland servicing an industrial/commercial region connected with one or several ports by rail and/or road transport and is offering specialised services between the dry port and the transmarine destinations. Normally the dry port is container and multimodal oriented and has all logistics facilities, which is needed for shipping and forwarding agents in a port.

For historical reasons, most ports in Europe are located in city centres, which demands the effective and safe goods transport with a minimum of environmental strain. Simultaneously the ports of Europe demand space and facilities for loading, unloading, storage, terminals, etc. in order to ensure the keeping of high quality and growth with the growing traffic and amount of cargo in question.

Traditionally extending the port areas by filling docks and dam, new sea areas solve the space problem. To fill the sea area is very problematic in view of environmental protection of coastal sea land. The increasing problem of transporting goods to and from the port through the city, together with the expensive costs of establishing new docks have created preconditions to establish hinterland terminals or dry ports, which almost can handle all of the port related activities (Fig 1). The development of dry ports is therefore an essential tool to promote sustainability and effectiveness of freight

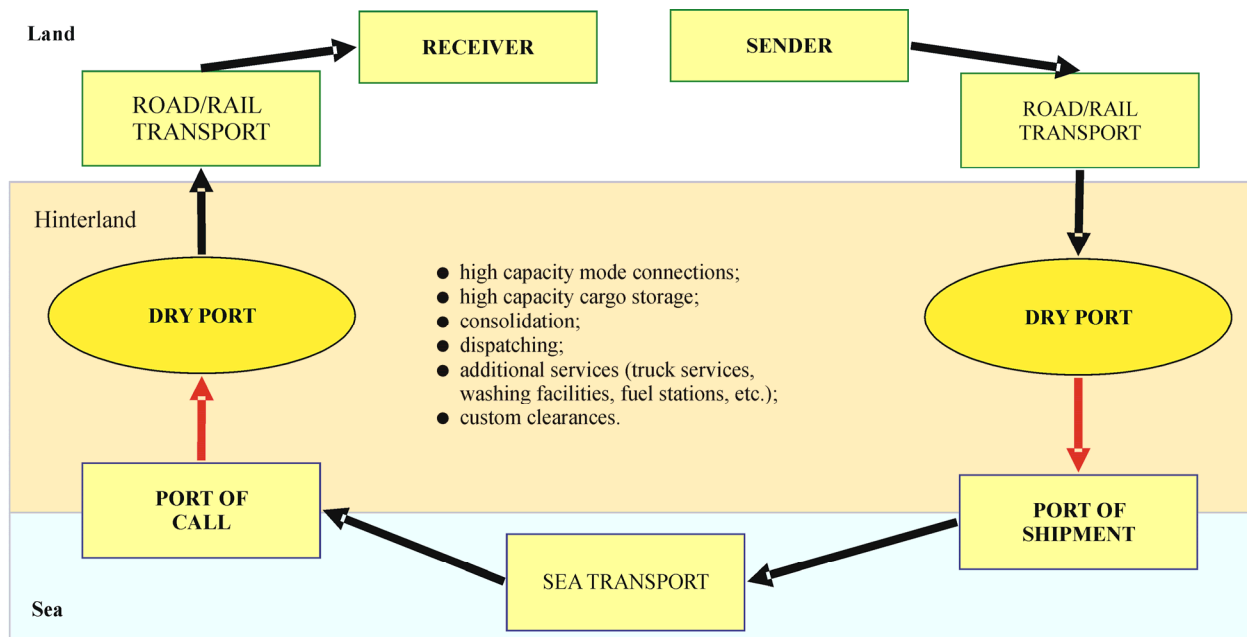


Fig 1. Dry port in the transport chain [18]

transport in sea related transport chains [20].

To ensure an effective Dry Port there are two general objectives: (1) Consolidation of maritime goods in intermodal short- and long distance transport flows and (2) Collecting and distribution of local, regional and international transports. To achieve these two objectives, it is necessary for the terminal to carry out the following functions: Hinterland warehousing; Management of container flows to different ports based on Consolidation of individual container flows; Reduction of pre- and end haulage with road transport and expansion of rail transport; Offering special- and extra services; Reduction of transport costs; Increase in the firms of ship owners and the port influence to ensure the intensification of the transport chains effectiveness.

In order to carry out these functions it is required to consider the following measures: to offer centrally placed areas; offer the choice: reloading or shunting; offer co-ordination between different operators; organisation of pre- and end haulage; using advanced or existing technology; offer an integrated flow of information on railway, Dry Port, road and maritime related data.

3. Methodology of research

The BSR Interreg III B NP Inloc project was carried out from 1st August 2004 to 31st January 2007 by the 35 partner organisations from nine Baltic Sea countries – Finland, Germany, Denmark, Sweden, Estonia, Latvia, Lithuania, Poland and Russia. The title Inloc is an acronym of Integrating Logistics Centre Networks in the Baltic Sea Region project, the objectives of which were (1) to improve the networking and operation of ports, logistics centres and other logistics operators and to create innovative solutions and strategies for all actors in the logistics chains, (2) to create conditions

for the spatial integration of logistics operations, to analyse spatial and environmental consequences of logistics centres development and to remove bottlenecks in port-hinterland-logistics centre connections, (3) to improve the compatibility of different information technology based transport and logistics networks, and (4) to organise educative events related to logistics centres and disseminate knowledge and potential of logistics centres and logistics in general.

The first task of the project was done by examining the practical networking possibilities in case studies including study on dry port concept for improving port-hinterland-connections in the Baltic Sea Region.

The kind of transport operators networking and attitudes to dry port concept were surveyed by questionnaire analysis. The questionnaire was sent to transport operator companies from the BSR countries – Lithuania, Latvia, Finland, and Denmark. The questionnaire was again supplemented by interviews in order to add to the quantitative results. The target group for the questionnaire is international, export-oriented transport operators that work in business strategic networks. The persons who have answered the questionnaires are from the managerial level. Managerial level respondents are required since they are in a position to be able to have an opinion about the strategic business networks.

The main lines of business of the respondents were the following: warehousing and cargo handling – 28 %, road transport – 34 %, sea transport – 10 %, rail transport – 10 % and forwarding – 18 % of the total amount. Referring to the definition of the European Union Commission – 23 % of questionnaires came from micro-sized companies, 39 % from small-sized companies, 23 % from medium-sized companies and 15 % from large companies.

The questionnaire was sent to 84 transport operator companies and 27 questionnaires were received from the companies, i.e. 31 % of the recipients answered the questions. All respondents collaborate with other transport operator companies, which also fulfils our requirement about belonging to a network. This can also explain why the percentage of the questionnaires answered was not higher. The companies that do not co-operate in networks are probably not as motivated to send their answers. 45 % of surveyed companies collaborate with 1–10 companies, 17 % – collaborate with 11–20 companies and 38 % – co-operate with more than 20 companies.

4. Results of the research

First of all motives for cooperation were analysed. Internationalisation, learning and economies of scope were the three most important reasons for that (Fig 2).

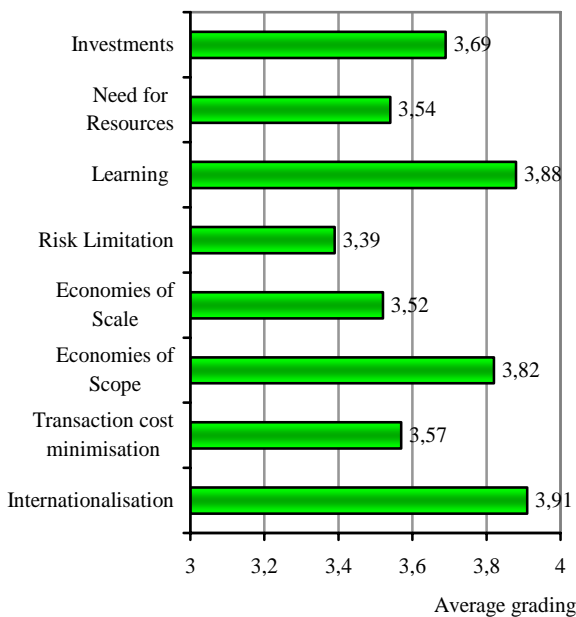


Fig 2. Motives for cooperation

The cooperation is mostly based on one of the following kinds – framework contracts, letters of intent, joint marketing agreements, fixed business models and simple agreements.

The survey shows (Fig 3) that the Framework contract is one of the acceptable forms of cooperation for transport operators in BSR.

Half of the respondents were without opinion when they were asked to express interest to use value-added hinterland terminal, so-called dry port for maritime container transport (Fig 4). The reason for shortage of opinions was the lack of understanding of dry port concept and lack of good practice cases for ensuring the advantages.

Anyway, the respondents agreed that offering of special and extra services could be one of the main driving forces for dry ports (Fig 5).

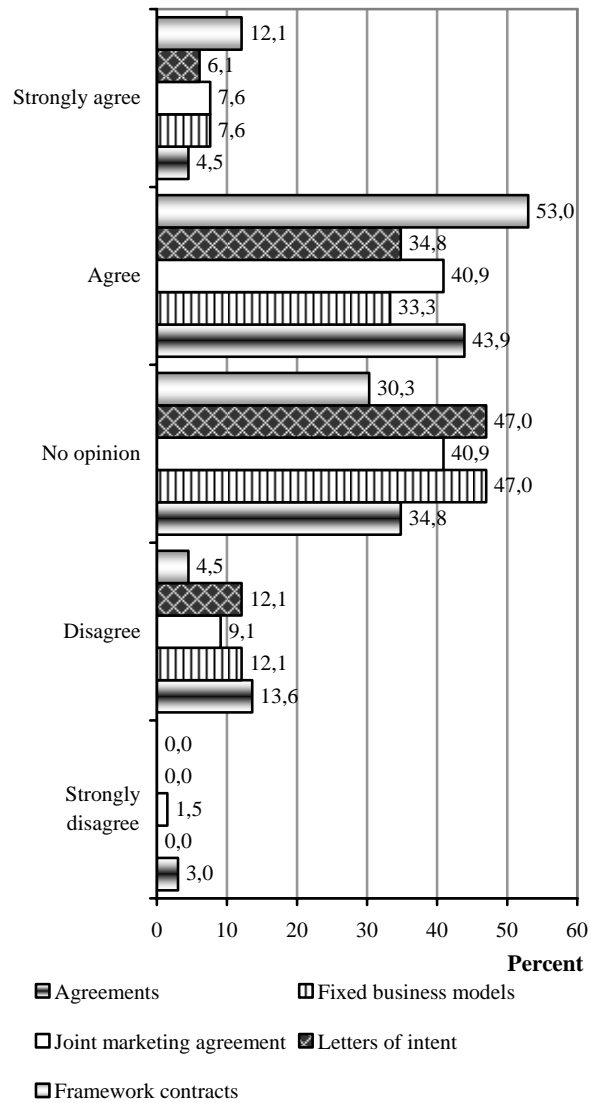


Fig 3. Framework of logistics networking in BSR

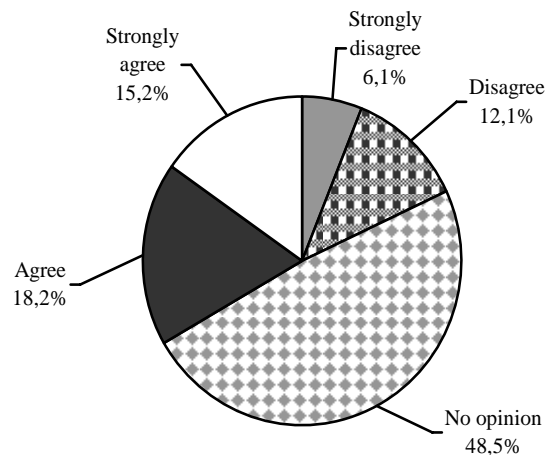


Fig 4. Necessity for hinterland terminal as dry port concept for maritime container handling

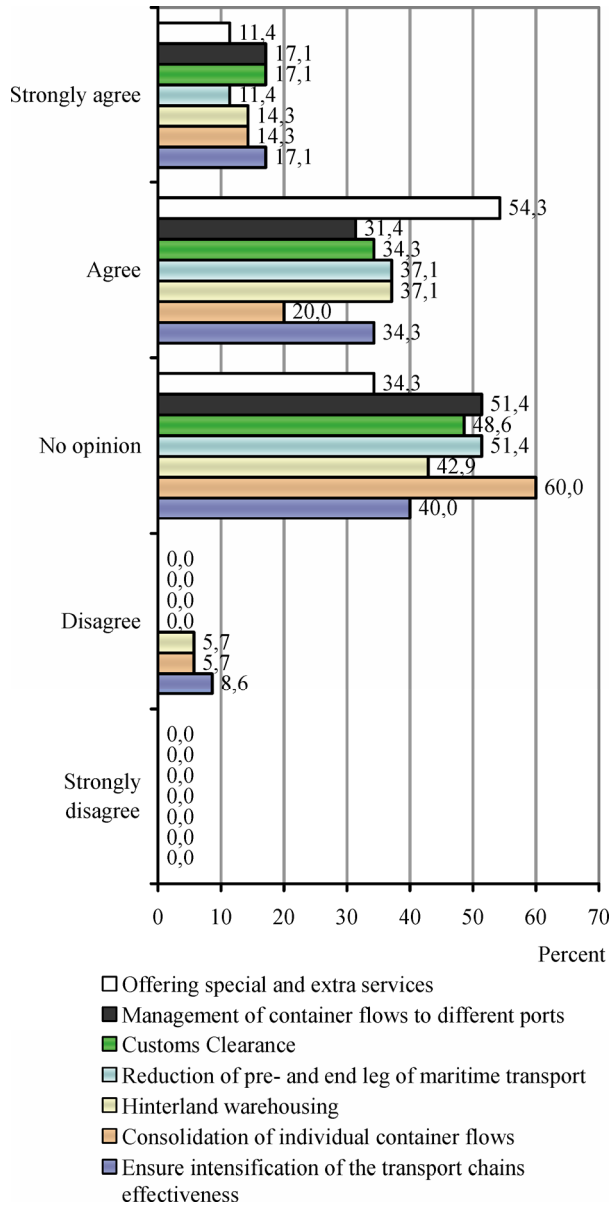


Fig 5. The functions available in the dry ports

Opinion on the dry port advantages (Fig 6) was positive as expressed by the respondents. The dry port is feasible due to its following features:

- it helps to avoid traffic bottlenecks;
- strengthens multi-modal solutions;
- helps to connect cargo handling from the port with other types of cargo at one common transport centre.

The dry port should concentrate on the following functions:

- offer more specialised and extra services;
- ensure intensification of the transport chain effectiveness;
- offer customs clearance services.

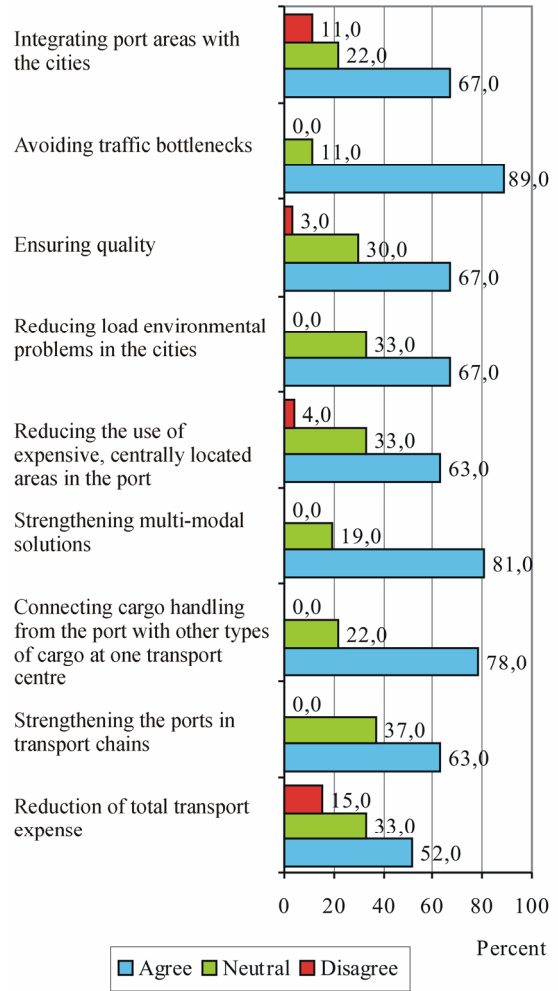


Fig 6. Average opinion on Dry port advantages

5. Conclusions

1. In order to develop themselves as logistics platforms, ports have to simultaneously work in several directions, also by taking into account the requirements of the senders and receivers of goods as they become their business partners in addition to the traditional ones such as the shipping companies, terminal operators, forwarding companies, etc.
2. In a wide sense, ports are complex entities supporting the procurement of raw materials, the manufacturing and the distribution of finished goods. Their contribution to the satisfaction of specific customer's requirements (and therefore their potential role in the given supply chain) will depend on:
 - the availability of efficient inland connections, as part of a global transport system.
 - the ability of logistics and transport operators to contribute to the value creation and to accomplish also the qualitative attributes of demand (reliability, punctuality, frequency, availability of information, and security).

3. Based on the investigations it can be stated that:
- The main reason for the respondents to co-operate is internationalisation. But internationalisation is closely followed by the willingness to learn and acquire new knowledge as well as economies of scope. Only few companies have answered that the reason why they co-operate is risk limitation. This shows that the companies are interested not only to increase their internal knowledge, but also to increase the knowledge of the company externally, thus getting more internationalised and hereby increasing their reputation abroad. Concerning the sharing of technical and logistic aspects the respondents have proclaimed that they can see the advantages of sharing container terminal's warehouses, logistics track and trace systems, innovative transshipment equipment and vehicles.
 - The main framework condition for logistics networking should be a framework agreement. It could create some standard of cooperation attitudes and it is more primary than simple agreements or other kinds of partnership;
 - There is a positive attitude towards the dry port concept in the BSR. A segment of approximately 33 % of the respondents is positive of the idea of the dry port and 48 % are neutral. This shows that there could be the basis for developing the concept of dry ports in the Baltic Sea Region.
 - An offering of extra services should be the main driving force for the dry port according to operators' point of view. The reason for such investigation results is that some services are not offered by typical ports. Improvement of already existing services is not substantial for decision making.
 - Avoiding of traffic bottlenecks in port areas is mentioned as the most important environmental advantages of the dry port by transport operators.
4. Aspects for the future development of networks of ports, logistics centres and other operators:
- further facilitation of legal aspects of the co-operation,
 - further facilitation of administrative and financial aspects of operating in strategic business networks;
 - it would be worthwhile for small and medium-sized enterprises to co-operate well together in order to improve their conditions for competition.

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