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IMPACT OF INTERMODAL TECHNOLOGIES ON DEVELOPMENT OF PORT SYSTEM

ABSTRACT

The development of functional and efficient port system requires the realization of a common transport system which would allow taking advantages of larger areas, lower costs of railway traffic and inland waterway traffic on longer relations in cooperation with the road transport on shorter relations.

The result of the development of intermodal technologies in the port system is the maintenance of the current and attracting of additional traffic to a certain port, and the reduction of port congestion by providing additional container capacities. Since the competition among ports is becoming more emphasised by using intermodal technologies, their advantage is obvious. Congestion is one of the main economic points of transport development. The usage of different fleets in case of different operators represents the main source of congestions at terminals and ports resulting in inefficiency of the transport system.

The aim of this work is to analyze the problems related to congestions resulting from insufficient usage of intermodal technologies in the port system.

KEY WORDS

intermodal transport, port system, intermodal technologies, congestion

1. INTRODUCTION

There are different definitions of intermodal transport and the related concepts of combined transport. The ECMT (European Conference of Ministers of Transport) and the European Committee for Standardisation (CEN) use the following definition for intermodal transport: *the movement of goods in one and the same loading unit or vehicle which uses successively several modes of transport without handling of the goods themselves in changing modes.* [CEN, 1997] The

EC definition goes beyond the ECMT/CEN definition, and corresponds with the ECMT/CEN definition of multimodal transport: *the movement of goods whereby at least two different modes are used in a door-to-door transport chain.* [EC, 1997]

Discussions about intermodal transport have for long been focused on transshipment technologies.

Today, there is a wide range of terminal technologies to choose from and the operators should define the principles for the train operations before deciding which type of transshipment technology is suitable. The four outlined development lines all require different transshipment technologies. The technology development and implementation is primarily a concern for the industrial partners, but governments and the European Commission can stimulate the development by issuing standards and spreading the knowledge about the experiences from technical and commercial tests¹. Then operators can choose from a palette of proven technologies at reasonable prices (if produced in certain numbers) and also benefit from the experiences gained by the operators of other services.

Maritime transport has become a faster and more reliable transportation mode. In order to reduce pollution and congestion on the roads, EU transport policy aims to stimulate shift of traffic to short sea shipping. To meet this demand, seaports must increase their terminal capacity (demand for space) and to increase their productivity with new generations of cranes, that will be capable of handling goods (containers) in both directions automatically. The first shift to new technologies occurred in the 1950s with the introduction of container ships. The need for efficient handling of containers stimulated the development of new equipment, such as straddle carriers, gantry cranes, special tractors.

2. MAIN FUNCTIONS OF THE PORT TERMINAL EQUIPMENT

The primary function of a maritime container terminal is to ensure the transfer of a container between the maritime mode (ship) and the terrestrial mode (train, truck, barge) and vice versa.

A breakdown of the routing of a typical container calls upon 6 functions within the terminal; these are given below and correspond to the main classifications headings used here²:

- *The site function* (covering aspects of security, safety, plant health, maintenance and premises).
- *The drawing alongside function* (reception of ships).
- *The quay function*: this covers the transfer of containers between ship and quayside and vice versa.
- *The "park" function*: this covers the taking in charge of the container from quayside to its storage zone, including all the storage operations (it is the crucial node of a port complex due to the multiple interfaces with other functions).
- *The intermodal function*: this covers the various means of container handling associated with rail, road and river networks.
- *The information management function*: this includes all those systems that facilitate the acquisition, transmission and processing of information relating to administrative and operational activities (checking entrance and exit of containers at the gate, drawing up of the ship's loading manifest, allocation of specific handling equipment, management of storage operations) within the terminal.

As well as the six functions listed here, an additional classification heading is added: *integrated systems* – due to their architecture they *simultaneously* combine at least two of the previously stated operational functions.

2.1. Intermodal functions of port system

Intermodal function of ports must have some conditions and subjects that represent the basic function of ports³. The services in port depend on the type of the goods, the market area, consignee's requests and the ability and qualification of the staff adding new value to the goods. Additional elements important for intermodal functioning are; palletization, packing, storage, automatic invoicing, inspection and etc. The notion of intermodal function in ports contains new strategies of cooperation.

The nature and dynamics of business demand from a number of suppliers and buyers, freight forwarders, agent, shipowners, carriers, banks, insurance companies to participate in a cooperating way in the strategy

of advancement of intermodal function. This is displayed in operational management, execution of transportation and defining the pricing policy. The main activity is the control and tracing the flow of goods by the system of information and communication.

3. CONGESTION IN PORTS

The EU countries are facing the challenge of accommodating a substantial growth of freight moving along their roads, railways, waterways and terminals. Delays from congestion incur considerable economic costs.

In the framework of its White Paper on European Transport Policy for 2010, the European Union has adopted a strategy of shifting the balance between different modes of transport. The Marco Polo program offers financial support to projects to promote an objective of relieving congestion on European roadways by transferring 12 billion ton-kilometres of freight to other modes of transport annually. The United States has a much more limited program, the Congestion Mitigation Air Quality Improvement Program, which can support modal transfer projects strictly for the goal of reducing transportation pollution. Part of the EU strategy of diversifying freight transport is its short sea program. The Trans-European Network (TEN-T) scheme includes four high-speed ocean routes. The Commission has supported Shortsea Shipping Promotion Centers in member countries and a European Shortsea Network linking each of the national centres to facilitate the exchange of information and experiences. In the United States, the Maritime Administration (MARAD) launched a Short Sea Initiative in November 2002 in an effort to alleviate US freight capacity, highway congestion and environmental impact concerns, while using the underutilized assets of America's waterways and revitalizing the US maritime industry.

Government policy on freight transport needs to move away from the traditional focus on individual modes towards a system-wide perspective.

Every economy relies on seamless connections between all modes of transportation. Port facilities and the domestic transportation networks serving them are critical elements in the transportation system. Unfortunately, more often than ever, they are stretched to their very limits as the infrastructure deals with steadily mounting cargo volumes, ever-larger ships, and increased land side congestion.

There are three reasons for the rapid growth of container traffic: the increasingly widespread use of containers, which means that the problem for ports is no longer how to attract vessels but how to attract containers; the formation of shipping consortiums, which has helped to concentrate container traffic flows; and

lastly, the much larger size of container vessels which made it necessary to upgrade the port infrastructure to cater for high-volume flows. The advent of containerisation, however, has led to greater diversity in routing criteria.

Against this background, it is worth bearing in mind that Europe is a maritime continent and that ports are areas where highly sophisticated logistic activities are concentrated. Indeed, in this respect it is possible to talk in terms of logistic polarisation. This is by no means a recent development. Historically, ports have always been trading areas that have subsequently developed into industrial zones.

Nowadays, technical advances have made it possible to substantially increase the size of vessels, with the result that, in terms of transport costs, distant countries are now extremely accessible. The most costly component of the transport chain is the inland leg, and it is over this leg that prices are most competitive in the transport sector. This explains why forwarders fight so hard to gain control over inland transport operations.

As the volume and concentration of transport flows has increased, so too has the number of distribution centres located in the port areas. Over 50 percent of the European distribution centres are located in the northern range between Le Havre and Hamburg. There is fierce competition between ports to attract trade flows and also to attract activities. The interplay between actors is a determining factor in this competition, although the institutional framework for such competition has not yet been fully defined. There is competition between not only "ranges" but also ports, depending upon the extent to which ports have been integrated into operators' networks. It is a fact that competition between ports has increased, even between ports that are not located in the same geographical area in Europe.

In general, road infrastructure inside ports is saturated, resulting in long delays in loading containers. In view of this congestion, rail and the inland waterways are perfectly credible alternatives. In the case of the inland waterways, the aim is to restore the confidence of forwarders in this mode of transport and to allow them to negotiate transport contracts freely.

In the case of rail, it needs to be said that, in terms of the overall costs, i. e. the cost including transport time, on-time deliveries, tracing capability, etc., services are not always competitive. The railways will only be successful if they can substantially lower their tariffs.

4. CONCLUSION

This paper deals with the importance of intermodal transport and its technologies on the port system.

Improving land access to sea ports and lowering the congestion in ports require action by all the actors involved in:

- The creation of inland terminals and the transformation of their role to ensure that all port-terminals are integrated into a logistical chain with the use of intermodality. Such terminals would allow part of the distribution system to be moved outside the port area, thus releasing the capacity in ports. These terminals will, in due course, become sites where logistics activities will be concentrated. They will be used to group freight shipments, an activity no longer carried out in ports. Nonetheless, care must be taken not to create new bottlenecks at the level of terminals.
- While port authorities have little room for manoeuvre, as managers, they must adopt a proactive approach to the improvement of seaport accessibility. Rather than issuing new regulations, they must start thinking *collectively* with all the actors involved. It must be stressed yet again that knowledge, which at present is often dispersed in ports, and the application of that knowledge has an essential role to play in this process. A change in this respect can influence the intangible but basic elements of accessibility and reduce the general costs of access.
- Maritime shippers, because they want to increase their share of *carrier haulage* in order to control the chain and the associated costs, also have a role to play in this respect. While their aim is to cut costs by streamlining inland transport operations, the approach they have adopted lies purely at the microeconomic level and consequently they cannot develop a rational and closely-knit network.
- The railway companies are still the main actors in this area by virtue of the dominant position they enjoy, but until now they have acted extremely cautiously.
- The public authorities regulating the markets must above all stabilize the institutional environment and clarify, with regard to the ports, the respective roles of the public and private sectors. Administrative and customs procedures must be simplified. Access to networks must be liberalised and the rules of competition harmonized. Rules must be drawn up with regard to the internalisation of costs.
- The European authorities must integrate ports into genuine networks and must not limit themselves to creating corridors. They must give priority to an intermodal approach which places all modes on the same footing.

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SAŽETAK

UTJECAJ INTERMODALNIH TEHNOLOGIJA NA RAZVOJ LUČKOG SUSTAVA

Za razvoj funkcionalnog i efikasnog lučkog sustava neophodna je realizacija zajedničkog transportnog sustava kojim bi se omogućilo korištenje prednosti većih površina, nižih troškova željezničkog prometa i prometa na unutarnjim plovitim putovima na većim relacijama u kooperaciji s cestovnim prijevozom na kraćim relacijama.

Rezultat razvijenosti intermodalnih tehnologija u lučkom sustavu je održavanje postojećeg i privlačenje dodatnog prometa u određenu luku te smanjenje lučkog zagušenja stvaranjem dodatnih kontejnerskih kapaciteta. Budući da je natjecanje između luka sve izraženije korištenjem intermodalnih tehnologija uvida se njihova prednost. Zagušenje spada u glavnu ekonomsku točku transportnog razvoja. Korištenje različitog voznog parka pri različitim operatorima predstavlja glavni izvor zagušenja na terminalima i lukama uzrokujući neefikasnost transportnog sustava.

Cilj ovog rada je analiza problema vezanih uz zagušenja do kojih se dolazi nedostatnim korištenjem intermodalnih tehnologija u lučkom sustavu.

KLJUČNE RIJEČI

intermodalni transport, lučki sustav, intermodalne tehnologije, zagušenje

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