

PERFORMANCE ASSESSMENT IN OPERATING DRY PORTS

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In this paper, an approach for recognizing and defining correct and operable performance will be presented with the purpose of evaluating the effectiveness and efficiency of processes in dry ports (inland intermodal hubs). The challenge in evaluating the possible improvements of the underlying processes lies in the special nature and the complex structure of dry ports. It is important to consider that all the processes are highly interconnected and that changes in parameters in one process also have an impact on parameters in other processes. Furthermore, the performance of dry ports, seen as the backbone of the system, has a significant impact on the overall performance of the whole transportation network.

Key words: dry ports, logistic performance indicator, container, freight, transportation, TRANS-TOOLS, ASYCUDA

JEL codes: A12, C53, C83, D78, D85, F14, L92, M13, O21, O47, Q55, R11, R4

Introduction

The first shipping container was invented and patented in 1956 by an American named Malcolm Mc Lean. From that moment on, the container shipping industry has improved its performance at an impressive pace, with containers production reaching high numbers, megacarrier container ships reaching 14000 TEU⁶⁵⁶ (World Cargo News, 2006), and the seaports container terminals expanding the capacity already increased by the existing ones (McCalla, 1999). As container transport volume continues to grow, seaport inland access becomes a critical factor for the seaports' competitive advantage. Therefore, progress only in the maritime part of the transport chain and in seaport terminals, without improvements in seaport inland access, is not sufficient for the entire transportation chain to function successfully.

One of the issues, which has been neglected for many years or sporadically implemented on different continents, is the dry port concept, which represents the focus of this paper. The concept was recently reborn due to increased interest in environmental issues related to growing containerized maritime transport. Many studies and researches have been made for the concept to be integrated into world freight trade.

Methodology used in this paper is based on extended literature review, interviews and case studies, with external validation regarding dry ports implementation, and is primarily meant to highlight the main impediments which influence implementation of dry ports and the actors involved in containerized freight trade, after a proper definition or at least after defining the concept.

Definition and classification the concept of dry ports

The definition of the concept required investigation of previous names for inland intermodal terminals, as there are different names all over the world: Gueterverkehrszentren in Germany, Plateformes Multimodales Logistiques in France, Freight villages in UK or Interporti in Italy, Inland Port in US, Inland Container Depots in India and Asia, Estacao Aduaneira do Interior in South America, particularly in Brazil, meaning Interior Customs Station. They all provide transshipment from one mode to

⁶⁵⁶ One freight container standard size = twenty equivalent unit, TEU

another as well as auxiliary services such as warehouses, customs, maintenance workshops, insurance offices and other (Roso, 2009). India introduced Inland Container Depots – ICDs, in 1983 and Indian Customs (2004) bases its definition of an ICD on the UN ECE definition below, but restricts it to containers. India also uses the term Container Freight Station - CFS, which differs from an ICD since containers are stuffed and stripped there. Hence, an ICD is a consolidation node for containers whereas a CFS aggregates individual consignments into containers. A CFS function might be added to an ICD. ICDs are normally located outside the port towns but there are no site restrictions regarding CFSs. In Europe there has been a focus on business areas offering a wide range of logistics services. In a survey (Cardebring and Warnecke, 1995), a definition was provided for an Intermodal Freight Centre as a concentration of economically independent companies working in freight transport and supplementing services on a designated area where a change of transport containers between traffic modes can take place. An Inland Freight Terminal is “any facility, other than a port or an airport, operated on a common-user basis, at which cargo in international trade is received or dispatched” (UN ECE, 1998). An Inland Port is located inland, generally far from seaport terminals; they supply regions with an intermodal terminal offering value added services or a merging point for different traffic modes involved in distributing merchandise coming from ports (Harrison et al, 2002). The term dry port is used synonymously. Finally, according to the Economic Commission for Europe (ECE, 2001), a dry port is simply “an inland terminal which is directly linked to a maritime port”. However, a dry port definition that corresponds to the definition of an Inland Clearance Depot - cited above - was used (Beresford and Dubey, 1990). Since the former definition on dry port is rather broad in its meaning, all above mentioned terminal facilities might use the notion of dry port due to their links to seaports. Another definition describes a dry port as “an inland intermodal terminal directly connected to seaport(s) by rail where customers can leave/pick up their units as if directly to a seaport” (Roso, 2009). Despite the fact that the frame of reference is ambiguous, we nevertheless get a general perspective from the above quoted definitions. Research done in 2007 (Roso, 2009) classifies dry ports as it follows: close dry ports, mid range dry ports and distant dry ports. This classification is based on the distance between the seaports that dry ports are servicing and the dry ports themselves. However, one such classification could not be sufficient in order to get a clear definition of the dry port concept. There is still a wide area for research regarding the concept and we will mention other criteria of classification as it follows:

- According to size (meaning how many TEU it can handle per year): small, medium, large and mega dry ports, which can be implemented in land-locked countries.
- According to means of access: depending on how many rail tracks and roads are in and out of facility.
- According to value added services: as stuffing / stripping of containers, maintenance of container, handling and storage of refrigerated / frozen and dangerous goods.

A summative definition, as observed from above, is that dry ports, having the word “dry” as a structural part of their name, are supposed to be viewed as different from inland intermodal terminals which have, in addition to standard dry port facilities, at least one inland waterway, by means of which goods can also be transferred also by water means: either by barges, tugs, or other navigational equipment; moreover, its handling equipment is at higher scale than that of dry ports.

There are still a lot of academic debates over dry ports definition and classification, as research field in container trade and inland logistics has been developing over recent years.

Assessing performance of dry ports

The underlying concept for assessing performance indicators to measure the process quality of inland terminals is a first approach towards a standardized process for collecting and evaluating data on the performance of dry ports. It is intended to show that inland terminals have to be considered complex systems that will need much more attention in the future. This will allow bearing in mind the big picture while not losing sight of operating details. There is one particular study (Gronalt, Posset and Benna, 2008) which focuses on a discrete event simulation which was developed in an earlier stage of our research. The simulation model is based on three standard processes (Gronalt, Benna, and Posset 2006). It takes consequently into account the delivery and pick-up process of train and truck, the storage of containers in the yard and the handling of empty containers. In this context the aim of the simulation model was to conduct experiments regarding causes and effects within the underlying process. The simulation model is used to quantify and evaluate performance indicators which are used as input for the evaluation of the dynamic cause and effects model by setting the following parameters:

- Throughput (ITU/Year)
- Rate of fast movers and non stackable ITU (%)
- Average storage time of fast movers (days)
- Average storage time of slow movers (days)

The better the operating efficiency of the dry port equipment and staff, the more customers the terminal can attract and the more customers will place handling orders. More handling orders result in an increase of the storage usage rate which also induces a greater order fulfill-rate. The higher the order fulfill rate, the higher the available capital of the terminal and the greater the resources budget. A greater resources budget allows the management for more staff training to increase equipment exploitation which again results in an increase of operating efficiency. An increase in the operating efficiency induces extra handling orders which generates more gains and further allow for more staff training and better equipment exploitation. As a result, an increase in the operating efficiency has a reinforcing impact on the customer's handling orders.

Performance indicators are assigned as a loop to emphasize the impact of an improvement or deterioration within the context of the system. Furthermore, it is possible to point out the corresponding causes to deduce necessary actions. In a study conducted in 2008, (Gronalt, Posset and Benna, 2008) expert interviews and field studies practitioners always pointed out that there is a need for a theoretical model to support the understanding of the underlying simulation model, but the results of simulation were still viewed as a black box for dry port operations. When thinking of actions and the expressiveness of performance it is important to formulate corresponding objectives to measure the impact or contribution of performance indicators. Still in the world economic crisis, the above scenario is expressed too optimistically. Despite this, we have at hand another two of the main tools for assessing a dry port performance: TRANS-TOOLS and ASYCUDA.

TRANS-TOOLS "TOOLS for Transport Forecasting and Scenario Testing" is a European transport network model that has been developed in collaborative projects funded by the European Commission Joint Research Centre's Institute for Prospective Technological Studies - IPTS and Directorate-General for Transport and Energy - DG TREN. It covers passengers and freight transportation, as well as intermodal transport. It combines advanced modeling techniques in transport generation and assignment, economic activity, trade, logistics, regional development and environmental impacts. It can be used both by public and private bodies, for prediction and forecast for traffic and evaluation on environmental impact. The main issue for the development of TRANS-TOOLS was the need to construct an IPR-free instrument, with open architecture in order to facilitate access by potential users and developers (EC JRC IPTS, 2008).

The implementation of the ASYCUDA - Automated System for Customs Data) software,

developed by UNCTAD, will be a future standard for the operation of dry ports. ASYCUDA is a computerized customs management system which covers most foreign trade procedures. The system handles manifests and customs declarations, accounting procedures, and warehousing manifests, as well as suspense procedures. It generates detailed information about foreign trade transactions which can be used for economic analysis and planning. The system project is directed at reforming the customs clearance process. It aims at speeding up customs clearance through the introduction of computerization and simplification of procedures and thus at minimizing administrative costs to the business community and the economies of countries. It also aims at increasing customs revenue, which is often the major contributor to national budgets in most countries, by ensuring that all goods are declared, that duty/tax calculations are correct and that duty/exemptions, preference regimes, etc. are correctly applied and managed. Furthermore, it aims at producing reliable and timely trade and fiscal statistics to assist in the economic planning process as a by-product of the customs clearance process. An important objective of the ASYCUDA projects is to implement the systems as efficiently as possible with a full transfer of know-how to national customs administrations at the lowest possible cost for countries and donors (UNCTAD, 2009).

The other macroeconomic indicator which will include dry ports performance will be the LPI – Logistic Performance Index. It is a joint venture of the World Bank, logistics providers, and academic partners. The LPI is a comprehensive index created to help countries identify the challenges and opportunities they face in trade logistics performance. The World Bank conducts the LPI survey every two years. The LPI uses standard statistical techniques to aggregate the data into a single indicator. This approach makes it possible to conduct meaningful comparisons across countries, regions, and income groups, as well as to undertake country-specific diagnostic work. Because these vital aspects of logistics performance can best be assessed by operators on the ground, the LPI relies on a structured online survey of logistics professionals from the companies responsible for moving goods around the world: multinational freight forwarders and the main express carriers. Freight forwarders and express carriers are in the privileged position to assess how countries perform. It helps by directly affecting the choice of shipping routes and gateways and influencing firms' decisions about production location, choice of suppliers, and selection of target markets (Arvis et al., 2010). Implementing dry ports and increasing their performance will increase LPI of the country, which will bring a higher rating in the world freight trade.

Integrating and combining the above mentioned indicators will provide a better picture regarding the performance of a dry port, and to what extent this will constitute part of the solution for the future of transportation, climate change, regional sustainability, security and safety.

Conclusion

Dry port implementation is not a straightforward solution for the seaport terminal decongestion or for providing easier seaport inland access; it can, nevertheless be part of the solution. The implementation and operation of freight containers through dry ports would bring a series of advantages: environmentally, CO₂ emissions would decrease, by splitting and shifting a part of freight market share of road to electrified railway networks and application of the “last mile” principle; from the traffic and infrastructure point of view, decongestion of trucks queued at seaport terminals gates would become possible; regarding security and safety of trade, customs and government control would improve and the risk of road accidents would be reduced. On the other hand, durable regional sustainability would evolve, new jobs would be created and costs would be reduced by value-added services. On a different level, competitiveness of importers and exporters would be increased, with or without economic growth, chaotic movements of cargo in

hinterland would be eliminated, and finally, the issue of empty containers would be solved by reallocation. Although it is obvious that the relocation of containers from road to electrified rail would result in lower CO2 emissions, a dry port is not merely the equivalent of rail implementation – it is a set of efficient services such as transshipment, storage, depot and containers' maintenance, customs clearance, tracing and tracking. Anyhow, the dry port performance depends on the quality and quantity of ways of land access such as railway and road.

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