

THE ROLE OF INLAND TERMINAL DEVELOPMENT IN THE HINTERLAND ACCESS STRATEGIES OF SPANISH PORTS

Jason MONIOS
Transport Research Institute, Edinburgh Napier University
Merchiston Campus
Edinburgh EH10 5DT
United Kingdom
Email address: j.monios@napier.ac.uk

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ABSTRACT

The aim of this paper is to understand how inland terminals are developed in relation both to ports and to other inland terminals within a national system.

The paper builds on previous work developing inland terminal taxonomies and applies them to the Spanish case, with supplementary focus on the relations between the “dry port” and “extended gate” concepts. Theoretical contributions include both the importance of development direction (land-driven vs sea-driven) and the identification of an emerging spatial disparity in port development strategies between coastal and inland nodes.

In Spain, ports retain an interest in inland terminals through minority shareholdings but they are not the primary investors. The principal ports using Spanish inland terminals are Barcelona and Valencia, both of which are also developing logistics zones within their ports. Furthermore, while the ports are developing closer IT links with these inland locations, this does not necessarily indicate greater than normal levels of cooperation. A study of the Spanish system thus raises questions about whether the increasing academic focus on “dry ports” actually signals any change in strategies of port development or intermodal terminal operation. Therefore the final aim of this paper is to question the use of the “dry port” terminology.

Key words: inland terminal, intermodal, dry port, extended gate, rail, Spain

1. Introduction

Cullinane and Wilmsmeier (2011) wrote that “while the expansion of reach on the maritime side of a port’s operational environment is clearly recognised and relatively widely analysed, the process of a port’s spatial development of its hinterland (other than simply the fact of its expansion) has received considerably less attention.” (pp9-10) This paper will contribute towards addressing this research gap, in particular by considering an entire national system. The aim is to understand how inland terminals are developed in relation both to ports and to other inland terminals.

This paper builds on the work of Wilmsmeier et al. (2011), which outlined a research agenda regarding the development of inland terminals. It is not simply the fact of their development that is under study but the process whereby they are planned, funded and built, as this process is where the public and private sectors meet to pursue their own aims. Similarly, the authors ask whether the cooperation strategy followed during development affects the potential integration of service levels once the site is operational. This question will be considered through the comparison of three inland terminal developments within one national system.

The paper begins with a literature review and a discussion of Spanish maritime policy, before a brief overview of the port system. The three case studies are presented, based on site visits, interviews and questionnaires undertaken by the author. Finally, these data are used to compare the three site development strategies and how they relate to port competition, hinterland access and modal shift. A particular contribution to the literature is the discussion of to what extent the concepts of “dry port” or “extended gate” are really being employed: has industry practice actually moved beyond the definition of the standard intermodal terminal? In order to develop this last point, the Spanish system will be compared to other

inland terminal management strategies, based on additional site visits and interviews undertaken in Belgium and the Netherlands.

2. Literature review

2.1 Hinterland access and corridor development

A vast literature exists relating to intermodal transport and hinterland access, which is beyond the scope of the present paper.¹ Key issues include the increasing vertical integration in the supply chain (Heaver et al., 2000; Heaver et al., 2001; Frémont & Soppé, 2007; Hayuth, 2007; Olivier & Slack, 2006; Notteboom, 2008), the increasing focus on the terminal rather than the port (Konings, 1996; Slack, 2007; Rijsenbrij, 2008), and the subsequent focus on the land-side activities of the sea port (Bichou & Gray, 2004; Parola & Sciomachen, 2009), leading to the inevitable focus on inland terminals.

In this literature a trend may be observed towards using inland terminals to enlarge the hinterland of the sea port (going back to van Klink & van den Berg, 1998). The port's role has changed from a monopoly to a node in the logistics chain (Robinson, 2002), and hierarchies in the transport chain are changing. Ports therefore need to be active in extending or even maintaining their hinterlands (Van Klink & van den Berg, 1998; McCalla, 1999; Notteboom & Rodrigue, 2005).

Notteboom (2010) noted that immediate hinterlands remain the primary focus of ports, notwithstanding the increasing attention given to hinterland access. The pros and cons of public vs private sector development have been elaborated by Wilmsmeier et al. (2011), Notteboom and Rodrigue (2005) and Bergqvist (2007). The over-optimism of sites developed by local or regional bodies has been noted, with the result that some terminals are under-

¹ See Wilmsmeier et al. (2011) or Rodrigue et al. (2010) for a good overview.

utilised. Ng and Gujar (2009) addressed centrality and intermediacy (Fleming & Hayuth, 1994) and how they can be affected by government policy.

Moglia and Sanguineri (2003) analysed the role of a public port authority in the activities of private companies such as terminal operators, particularly in terms of stimulating private investment, for example acquiring land within the port for logistics operations. The authors also highlighted the importance of port authorities having a member on the board of private organisations carrying out commercial activities within the ports.

A particularly relevant concept for this paper is the extended gate, discussed by Van Klink (2000) and more recently by Rodrigue and Notteboom (2009) and Veenstra et al. (2010). The concept of “terminal haulage” (as opposed to carrier or merchant haulage), represents a new stage of integration that could hold significant potential if technical and operational obstacles can be overcome. The extended gate terminal haulage concept can also be related to a move from push logistics towards pull logistics or even “hold logistics”, as outlined by Rodrigue and Notteboom (2009) in their concept of supply chain terminalisation, whereby inland terminals are actively used to manage inventory flows.

The “hinterland access regime” proposed by De Langen and Chouly (2004) views the collaborative activities undertaken by a number of actors as a governance issue. The governance issue comes to the fore because port authorities have limited influence on infrastructure development beyond the port perimeter. A key question to be asked in this paper is how inland terminals fit into the hinterland access strategies of ports. Are Spanish inland terminals active nodes in shaping the chain?

2.2 Inland terminals, ICDs, inland ports and dry ports

Intermodal terminals in the hinterland have acquired various names over the years, such as Inland Clearance (or Container) Depot (ICD), a term that evinces a particular focus on the

ability to provide customs clearance at an inland location. Similarly, the term “dry port” has been in use for decades now. It has often been used interchangeably with ICD, as well as to distinguish an ICD in a landlocked country from a country that has its own sea ports (for more on the early use of the term, see Beresford & Dubey, 1991; Garnwa et al., 2009). More recently, it has been used in industry as a marketing tool, perhaps to imply that a facility has reached a particular level of sophistication in terms of services offered, such as customs or the presence of Third Party Logistics (3PL) firms within the site and/or an adjoining freight village or similar (see also GVZ in Germany, ZAL in Spain, interporti in Italy). Thus one question to be asked in this paper is whether recent uses of the term “dry port” designate anything new, and whether it should be used in ways other than the original definition as an access point for landlocked countries.

A new definition was proposed by Roso et al. (2009): “A dry port is an inland intermodal terminal directly connected to seaport(s) with high capacity transport mean(s), where customers can leave/pick up their standardised units as if directly to a seaport.” (p.341) The key aspect of this definition is the authors’ contention that “for a fully developed dry port concept the seaport or shipping companies control the rail operations” (p.341). One aim of this paper is to consider to what degree this situation actually obtains in the industry. Are rail operations to sites labelling themselves “dry ports” run by the sea port or shipping companies?

In contrast, Rodrigue et al. (2010) prefer the term “inland port” as an overall term representing inland nodes of various types and sizes, before going on to differentiate them according to their functions. While the use of generic “inland port” terminology represents an elegant solution for encompassing all kinds of inland nodes,² two notes need to be made. Firstly, in Europe “inland port” generally designates an inland waterway port. Secondly,

² The authors argue that, just as a sea port can be anything from a simple interchange point to a complex arrangement of terminals, warehousing, customs, logistics, etc., so an inland port can also be anything from a small intermodal interchange to a large facility encompassing a freight village, etc.

inland ports in the US are generally far larger than most inland terminals in Europe, some handling several hundred thousand containers annually, therefore supporting large scale warehousing or production districts in the wider area. Thus there are obstacles to using the term “inland port” to describe an intermodal terminal in Europe that has no water access and may handle fewer than 100,000 containers (in many cases, fewer than 50,000).

Rodrigue et al. (2010) draw useful distinctions between the functions of different sites, classifying them as satellite terminals, transmodal centres and load centres. This functional approach is similar to the close, mid-range and distant dry port model presented by Roso et al. (2009) and the later sea port-based, city-based and border-based model proposed by Beresford et al. (2011). This kind of functional approach, based on the usage of each node, has more utility than overall terms such as “dry port” or “inland port”. It allows a research agenda to be developed along the lines of the purpose and usage of these nodes in the transport chains that they shape. It also focuses more clearly on the transport operations of the node as represented in the actual terminal or interchange point. This focus is more closely aligned with the infrastructure requirements and investment in the site, particularly in terms of planning and public involvement. The “co-location” of warehousing, logistics, etc. at or near the site tends to result from a number of decisions from individual private firms, therefore attempting to include a potential multiplicity of freight villages or logistics clusters within the umbrella of the terminal concept makes classification and taxonomy development increasingly difficult. It is therefore argued in this paper that the common denominator for classification of inland intermodal terminals is the transportation interchange activity (which can be differentiated according to the taxonomies above); the variety of services that may or may not grow up alongside each node are better addressed separately.

2.3 Previous case studies of Spanish inland terminals

The three significant intermodal terminals currently operating in the Spanish hinterland have been the subject of brief case studies (FDT, 2007 & 2009; Roso, 2010; Rodrigue et al., 2010; Van den Berg and de Langen, 2010).³ Besides these three, there are currently no other sites in Spain that are considered by industry or in the academic literature as significant nodes with direct container shuttles to ports, although there are of course other small rail terminals (more on this below). While some of these inland terminals in Spain are promoted as “dry ports” in marketing material (for example the port of Barcelona), further questions about their planning and operation should be asked. What function do they serve? Where is their market? How integrated are they with their sea ports? How active are they in shaping the transport chain?

3. Ports policy in Spain

Spanish ports are owned by the state and run by port authorities on a landlord model. Port services are provided by private operators, under contract to the port authority. Each of the 28 port authorities (representing 46 commercial ports) must have its development plans approved by the national body Puertos del Estado (created in 1992 to separate port management from the ministry) each year. The aim of this approval is to make sure that the ports do not over-extend themselves and take on too much debt or begin unwise projects.

However, while Puertos del Estado allows the ports to follow their own strategies, it does influence port policy directly in some areas. For instance, it is a national policy to develop intermodality and to promote short sea shipping. One way this has been attempted is by requiring ports to give a 20% discount on port dues if a container goes by rail. This has been compulsory since 2004, but there has been little impact so far. Similarly, some issues such as

³ In addition Santander-Ebro has been mentioned by Roso (2010). However at the time of writing, this site was not receiving any rail traffic from the port of Santander and, as it is primarily an automobile platform, it was not considered relevant to the current study which focuses on containers.

changing labour laws and negotiation with unions over cargo handling are best done at a national level, and the national body pursues these actions on behalf of the ports.

The only inland terminal in which Puertos del Estado is involved is the Dry Port of Madrid at Coslada, in which the national body collaborated with the four major container ports (see case studies below). While there is no national inland terminal strategy as such, the national body can assist in coordinating initiatives, providing inter-regional coherence to the traditionally regional administration of logistics platform development. As an example, Puertos del Estado is collaborating with the port authorities and regional administrative bodies to consider the potential for inland terminals in Andalucía.

4. The Spanish port system

Figure 1 shows the location of the four major ports in Spain by container throughput. Madrid (location of Azuqueca and Coslada) and Zaragoza can also be seen.



Figure 1. Map of Spain showing location of the four major ports (Valencia, Algeciras, Barcelona and Bilbao). Note: size of circles has no direct relation to throughput. (Source: Google Maps)

Container throughput in the west Mediterranean has increased enormously over the last decade (for a discussion of the reasons behind this development see Gouvernal et al., 2005).

Table 1 shows the container throughput at the top four Spanish ports in 2009. It is interesting to note that Valencia and Algeciras have maintained their traffic while the other two ports have suffered a noticeable fall in throughput.

Spain	World	Port Name	TEU 2009	TEU 2009 (hinterland)	TEU 2008	TEU 2008 (hinterland)
1	27	Valencia	3,653,890	1,829,254	3,602,112	2,023,630
2	34	Algeciras	3,042,759	151,908	3,324,310	159,614
3	58	Barcelona	1,800,213	1,193,917	2,569,550	1,571,962
4	138	Bilbao	443,464	438,818	557,355	543,502

Table 1. Throughput at top four Spanish ports in 2009. (Source: Containerisation International database; Puertos del Estado, 2009)

Bilbao traffic is mostly short sea or feeder from northern range ports in Europe due to its location and Algeciras volumes are mostly transshipment. Valencia and Barcelona are the two major ports for Spanish deep sea cargo, although Valencia does more transshipment than Barcelona. Table 1 also shows the hinterland throughput (i.e. transshipment figures have been subtracted to reveal genuine trade flows).

The geography of Spain means that the hinterland of each port is generally not too far inland so intermodal terminals are not relevant to these flows. The only inland markets of significance are the greater Madrid area (pop. 5-6m) and north-eastern Spain, which is the primary industrial region in the country.

In general, Spain is a net importer, and this is particularly acute in Madrid, so balancing empty container flows is a problem. Catalonia is more balanced because, as the main industrial area, it exports as well as imports. At the Dry Port of Coslada 99% of import containers are loaded, but for exports this figure is only 40%.

5. Case studies

5.1 Dry Port of Azuqueca de Henares

The Dry Port of Azuqueca de Henares was the first such site to be developed in Spain, opening in 1995. The initiative was driven by the port of Barcelona, but it has rail connections to the ports of Barcelona, Valencia, Bilbao and Santander. It is located to the northeast of Madrid, in Guadelejara. While Coslada only handles containers, Azuqueca also handles bulk traffic such as steel, cereal and cement. 70% of their traffic is containers, 30% bulk. The site was granted a 45 year lease on the land from the local authority, starting in 1994.

Total TEU has risen from about 2,000 in 2001 up to approximately 25,000 TEU in 2008, before falling to approximately 15,000 TEU in 2009. Of this, roughly 50% is from Barcelona, 40% Bilbao, and 10% Valencia.⁴ The train services from Valencia and Bilbao to Azuqueca are run by Continental Rail, while TCB runs the rail operations from Barcelona.

The interesting aspect of this development is that it is similar to a model frequently observed in the USA, being developed by a real estate company. Gran Europa created the whole logistics area in Guadelajara and then built the intermodal terminal to service it. The logistics area was not in existence 20 years ago therefore it was not a matter of shifting the flows from road to rail; rather the entire logistics chain was developed here. The primary shareholder in the operation is Gran Europa (75%), with the remainder being owned by companies related to the ports of Barcelona, Bilbao and Santander.

5.2 The Dry Port of Madrid (Coslada)

The Dry Port of Madrid opened in 2000. It is the only site in which Puertos del Estado is involved. 51% of the company is owned equally by Puertos del Estado and the ports of Barcelona, Valencia, Bilbao and Algeciras: 10.2% each. The remaining shareholders are Madrid Regional Government (25%), Entidad Publica Empresarial de Suelo (13.08%) and

⁴ These percentages have changed over the years, so these are not exact figures.

Coslada Local Council (10.92%). After a tender process, the site operation was awarded on a ten-year concession to Conte-Rail which is a private company owned by Dragados (50%), RENFE (46%) and Puertos del Estado (2%). However, Continental Rail has been competing for the rail services since 2007.

The facility has a 50 year agreement with the local council to use the land and a logistics centre is based next door. In 2009 the terminal handled 45,000 TEU, down from a high of 60,000 TEU in 2008.

5.3 Terminal Marítima de Zaragoza

While the logistics centre ZAL Mercazaragoza is not new, the Terminal Marítima de Zaragoza was only opened in 2009. All traffic is with the port of Barcelona and the site is currently running about 6-8 weekly services. At first the Zaragoza logistics platform was only linked to Barcelona by road, but once the rail corridor to Azuqueca was operational, Zaragoza was a stop on the corridor so it made sense to use it. Originally the distance to Zaragoza was too short to compete against road, but it works now as part of the corridor service.

The terminal site is owned by the company TM Zaragoza, with a shareholding of 56% ZAL Mercazaragoza (the logistics park), 21% port of Barcelona and 20% from the region of Aragon. Throughput in 2009 was 23,864 TEU.

6. Discussion

6.1 Location

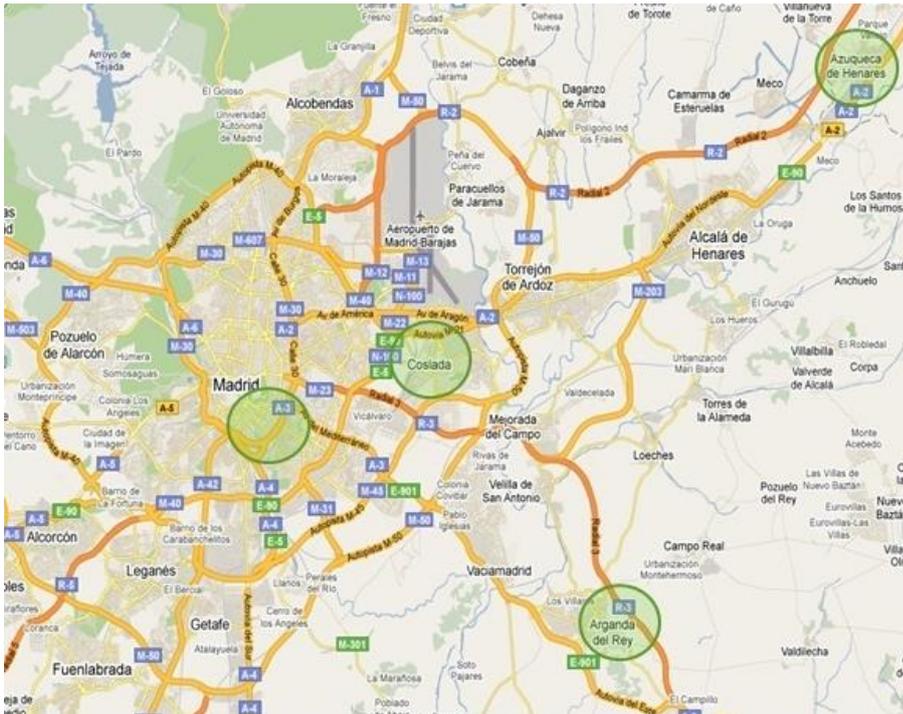


Figure 2. Map showing location of current (Coslada, Abroñigal, Azuqueca de Henares) and proposed (Arganda del Rey) rail terminals in the greater Madrid area. (Source: Google Maps)

Besides the three inland intermodal terminals noted above, there is another rail terminal in central Madrid at Abroñigal that acts as a consolidation point for landbridge services between Bilbao and Sevilla. Coslada does not compete for that traffic as it focuses only on rail shuttles directly to the major ports.

The greater Madrid area contains about 5-6m inhabitants and that is the hinterland for the Coslada terminal, but it does overlap with the hinterland of Azuqueca and Abroñigal. The hinterland for Azuqueca includes Madrid, but it is mostly the wider Guadalajara area where there are many distribution centres. In fact, it is the consolidation of cargo to fill a train that can go to both sites that can help to make rail viable.

Because land planning decisions are made at a regional level, getting permission for Coslada with respect to the location of other sites was not a problem because Azuqueca is in another region (Guadalajara, as opposed to Madrid). However both sites required some additional funding to support the rail connection, therefore limiting the danger of over-saturation of terminal sites. A similar case was found in Sweden (see Bergqvist, 2008;

Wilmsmeier et al., 2011) where two neighbouring regions wanted an intermodal terminal. As funding from the rail operator to build the main line connection would only be forthcoming for one site in a given area, the result is a kind of self-regulation.

New developments being proposed show that, like other countries, Spain has regional/municipal bodies who want to develop new logistics sites. A new logistics site is proposed at Arganda del Rey, southeast of Madrid (see map) with 1350 hectares of land available. The plan also includes installing a new semi-circular rail line running from an interchange site north of Madrid (Alcala de Henares), through the new site SE of Madrid, and round to a site south of Madrid (Aranjuez). Valencia is the main port involved but the port of Barcelona also has a small stake in the development process for the new site. Even if the latter does not pursue further involvement, having a seat on the board means that for the moment they are able to keep abreast of the project (see earlier discussion of Moglia and Sanguineri, 2003).

If this project goes ahead, the likely result is that Valencia will use it rather than Coslada, which would perhaps be used for other purposes such as air freight, as it is near Barajas airport. Barcelona would no doubt continue to use Azuqueca, thus the multi-user terminals would in reality become primarily single user, with some small additional traffic from Bilbao and Algeciras. The proposed site is interesting because on the one hand it represents a policy failure, in that if Valencia is the only user of Coslada and its traffic moves to Arganda, then Coslada may be abandoned (with regard to port traffic), even though it was driven by the national port authority. On the other hand, if all the Coslada traffic is coming from the Dragados terminal, and Dragados holds the controlling share in the concessionaire of Coslada, it may keep the traffic coming there rather than Arganda (unless Dragados wins the concession for that too), due to the benefits of vertical integration and lower transaction costs.

6.2 Relation with ports

Dragados Marvalsa is the largest container terminal at the port of Valencia, and 90% of the traffic from Valencia to Coslada is from this terminal. Therefore since 80% of the total traffic at Coslada has been from Valencia (100% at present in 2010), it could be concluded that the “multi-user” terminal is, in reality, a private terminal for Dragados. As was seen above, Dragados owns the controlling share in Conte-Rail, the company operating the terminal. Therefore while officially a publicly operated facility, there is a degree of vertical integration of a private company here.

Similarly, Valencia only provides about 10% of the traffic to Azuqueca. So it is very much a case of Valencia using Coslada and Barcelona using Azuqueca for access to Madrid traffic. Barcelona’s involvement in both Coslada and Azuqueca provides security and flexibility, and considering that future capacity at Coslada is limited, Azuqueca gives them longer term security.

Therefore, although much is made of the multi-user nature of Spanish terminals, in fact the majority of usage comes from Spain’s two large ports, Barcelona and Valencia. Valencia uses Coslada to access Madrid (as a small part of their Madrid traffic, the rest of which goes by road), while Barcelona is able to compete with Valencia by using Azuqueca for Madrid access. Zaragoza is used by Barcelona to access the industrial area in that region, which is in any case within the natural hinterland of Barcelona port. If the future site at Arganda del Rey is developed, this may replace Coslada as Valencia’s primary inland node. The effect on competition between the two ports will depend on what inland rates can be offered. It also depends on which shipping lines are calling at which of the two ports. The choice of which inland terminal (Azuqueca or Arganda) is used for Madrid containers will be primarily a result of the port choice (Barcelona or Valencia, respectively).

6.3 Rail

Since the liberalisation of Spanish rail operations due to an EU directive, a number of private operators have entered the market to compete with the incumbent RENFE. The benefits are now beginning to be seen. In 2007 Continental Rail handled about 10% of the traffic between Valencia and Coslada, but by 2009 it was up to 25% and in 2010 it was closer to 40%. In fact, after two weeks of working with the terminal Continental Rail had captured all of the Maersk traffic from Valencia to Coslada. Rail operations from Coslada to other ports is all through RENFE, but this is only 10-20% of the total Coslada throughput.

Ports still have problems with the actual rail connections into the port so infrastructure improvements are required to reduce shunting. At the moment, rail accounts for only a tiny proportion of inland traffic from Spanish ports. In 2008 Valencia handled 69,048 TEU by rail (Fundación Valenciaport, 2010), while Barcelona's rail throughput was 52,562 TEU (in total, including to France) (Port of Barcelona, 2010). This represents just over 3% of hinterland throughput (see table 1) for each port.

Reasons for optimism include the upgrading of the rail line from Barcelona to France to European gauge, which is due for completion in 2012. This will allow direct transport without the need to change from Iberian gauge to European gauge. This will help Barcelona in attempts to compete for French cargo, building on its existing rail service to the inland terminal at Lyon. In addition, the new high speed passenger line running from France through Barcelona to Madrid means that the old line is now available for freight traffic, albeit on Iberian gauge. Meanwhile, Valencia has been investing in upgrading rail connections right into the port, as well as developing an IT system that will increase service integration and make rail more efficient hence attractive to users.

6.4 Function

The three Spanish sites serve similar functions. All three provide customs clearance, all are road/rail and all are load centres serving their local markets. All three sites have freight villages or warehousing facilities in the immediate area. Yet it is of particular interest that the ports of Barcelona and Valencia are pursuing developments of logistics zones within their port areas, rather than inland origins/destinations.

In most cases the greater the distance from a port, the more flows are diluted, therefore the gateway port (or nearby) remains the preferred location for flow (de-) consolidation and logistics activities if space permits. Ports with spatial development issues are required to pursue a strategy of spatial discontinuation to remain competitive, thus moving non-essential activities such as logistics to inland sites. Those ports that do not have this requirement may have the competitive edge in terms of retaining these supplementary revenue streams.

Two major reasons for moving non-core activities such as storage or logistics to inland facilities are to avoid congestion at the port and to save valuable port land for core activities. If these two ports are developing logistics zones onsite, these two conditions would not seem to apply. Congested ports will move some activities to their inland nodes, and will also attempt to optimise the process as far as they can (Monios & Wilmsmeier, 2011). Yet real integration (along the lines of the extended gate or dry port definitions quoted earlier) is noticeable by its absence, and in the majority of cases ports and inland terminals are functioning much as they always have.

The kind of hinterland development pursued by a port depends on the local situation. The isolated location of Madrid means that it is a good candidate for high-capacity rail shuttles to a load centre terminal, but the management and operation of the connecting services are not integrated with the port.

6.5 Drivers of development

Wilmsmeier et al. (2011) introduced a conceptual approach to inland terminal development, contrasting Inside-Out development (land-driven e.g. rail operators or public bodies) with Outside-In development (sea-driven e.g. port authorities, terminal operators). Taking this approach, the Spanish system would be considered an example of Outside-In development, as each case has been driven to a large degree by the ports. But Wilmsmeier et al. (2011) also ask whether the cooperation strategy followed during development affects the potential integration of service levels once the site is operational. Findings from the current research indicate that the sites act as independent rail terminals once they are developed, rather than being controlled by the ports. Share ownership of these inland terminals represents a way for ports to remain informed and to protect their interests. This relates back to the point of Moglia and Sanguineri (2003) about port authorities having a seat on the board of private companies carrying out commercial activities within their ports.

The three inland terminals in Spain are all open-user facilities run by independent organisations, in none of which does a port own the majority shareholding. However, as has been noted, the controlling share in the operator (not owner) of Coslada is a sea port terminal operator. While greater IT integration between the ports and the inland terminals is being pursued in order to achieve efficiency gains, this is standard port practice of information management rather than actual service integration.

New developments in the Spanish intermodal system reveal that Inside-Out development is also taking place. It was noted in the literature review that other research has revealed problems with developments driven by local or regional bodies because they are not always the most efficient from a transport point of view. What is interesting from a theoretical standpoint is the change over time. Inland terminal development begins as a market-driven process from the outside in, but once regional authorities realise the potential benefits for

their regions of such developments, they begin to pursue development from the inside out, seeking actively to capture maritime flows.

It was agreed by all interviewees that the role of the public sector is to bring in private sector investment. That is what has been done in all three cases, where port authorities have formed partnerships with terminal developers and operators. In this kind of operation benefits for the private investor are sometimes small so it can be difficult to attract interest. But developing such infrastructure allows container flows to be bundled on high capacity links such that private operators can then bid on this consolidated traffic. It may be observed that the marketing of Outside-In development can often mask the reality of which organisations are involved. For example, the port authority or terminal operator may be considered to “drive” the process and thus the direction, whereas in reality they will be forming partnerships with inland operators or terminals, rail services, 3PLs, etc. More research on the creation of such partnerships is needed to understand the complexity of intermodal service development (see De Langen and Chouly, 2004; Van der Horst & de Langen, 2008).

7. Concluding remarks: towards a dry port definition

Some key findings regarding the role of inland terminal development in the hinterland access strategies of Spanish ports can now be drawn together. While the ports drive the development to some degree, they are in partnership with terminal operating companies, the ports holding only minority shareholdings. The level of service integration is likewise fairly low, as it is the rail companies rather than the terminals that deal with the shippers and plan container flows. The terminal itself is merely an interchange location rather than the director of container movements.

In order to conclude this functional analysis, a brief comparison with other European terminals that use the title “dry port” will be made. Dry Port Muizen (operated by Inter Ferry

Boats) and Dry Port Mouscron/Lille (operated by Delcatrans)⁵ both use the term “dry port” but they function differently. IFB runs terminals but it just handles the trains of other companies (including trains of a separate part of their parent company IFB Intermodal). At the Delcatrans terminals a rail operator is sub-contracted to provide the traction but Delcatrans does all the bookings and container management. So these two terminal types are a contrast, but what they have in common is that no port actor is involved in any of their operations.

Therefore neither the three Spanish sites, nor Muizen or Mouscron/Lille would be considered “dry ports” using either the landlocked or the Roso et al. (2009) definition. Yet all but Zaragoza use the term in their site names and three of these sites (Coslada, Azuqueca, Muizen) were included in a recent review of “dry ports” (Roso, 2010). So what differentiates a dry port from an intermodal terminal? As well as the actual intermodal interchange, any sites under consideration may have operational differences in terms of the provision of services within the site boundary, in the immediate neighbourhood or further away. However the distinctive aspect of the Roso et al. (2009) definition seems to be the close link between the port and the inland site.

Both Spain and TCT Venlo give examples where the port is involved. The difference is that in Spain it is the port authority, whereas with Venlo it is the terminal operator ECT (Rotterdam). Furthermore, in the case of ECT, the port terminal is directly involved in the operations, unlike in Spain where it is just a minority shareholder. Consequently if one says that the dry port concept involves an integrated service offering, it is exemplified more by

⁵ What is even more curious is that Delcatrans runs two sites in conjunction: LAR Rekkem (on the Belgian side of the border) and Dryport Mouscron/Lille, just on the French side. The two sites are only a few miles apart and are run jointly. Dryport Mouscron/Lille was set up by the regional government and went out of business before being taken over by Delcatrans. One is called a dry port because of its initial naming, but both sites are the same – simply small intermodal terminals with a couple of rail tracks and some warehousing nearby. Indeed, the interviewee expressed curiosity that I had any interest in DPML as it is the smaller of the two sites and the main Delcatrans office is at LAR Rekkem.

ECT’s extended gate concept than by those sites using the dry port terminology.⁶ ECT is developing the concept of “terminal haulage” as opposed to the already understood notions of merchant or carrier haulage. Similarly, the port of Valencia has been working on increasing integration with Coslada by developing an IT system to share information in a single unified system, thus moving closer to a potential extended gate concept, although at this stage it is more of an information management system. The matrix in table 2 presents one way of categorising such developments, but requires further research on other terminal integration strategies.

Does the port actor manage the inland haulage, i.e. container slots, sales, etc.	Port involvement in the terminal	
	Yes	No
No	Dry Port Madrid Dry Port Azuqueca TM Zaragoza	Dry Port Muizen Dry Port Mouscron/Lille
Yes	TCT Venlo	-----

Table 2. Matrix showing different concepts of integration in port – dry port systems.

It was noted in the literature review that the earliest dry port definition referred to landlocked countries using the terminal as a maritime access point. Since then, the term has been used in various ways, but without clear definition. A new definition was proposed by Roso et al. (2009), suggesting that the port actor controls the rail operations, resulting in a combination of an inland clearance depot with adjoining freight village and extended gate functionality. In the case of Spain, this definition does not apply, although the integration between Valencia and Coslada may have the potential to approach such a concept in the future. A better example of this level of integration would be TCT Venlo, which does not currently use the “dry port” term.

We are therefore left with a number of different definitions:

1. Dry port: as per the original landlocked definition.

⁶ The extended gate concept is also being developed in Flanders. See Van Breedam & Vannieuwenhuysse (2007).

2. Inland port: generally meaning a large gateway site such as is prevalent in the US (see Rodrigue et al., 2010). See section 2.2 for reservations on the application of this term in Europe.
3. Extended gate: an integrated service offering such as in Venlo. This is perhaps closest to the Roso et al. (2009) definition of the dry port concept, particularly if the inland node is a large site with adjoining services.
4. Intermodal terminal: traditional intermodal interchange point. May or may not have warehousing/logistics, customs or other services onsite or nearby.

It is therefore suggested that the “extended gate” terminology be retained to refer to a specific concept of integrated container flow management between the port and the inland site. By contrast, most interchange sites (especially in Europe) fall under the final category. Therefore “intermodal terminal” or “inland terminal” may be better terms to describe the common denominator linking the majority of sites; functional analyses can then focus on the activities of each node, for example whether they involve customs clearance, value-added services or overspill functions for a port. Therefore functional distinctions, as discussed in section 2.2, prove themselves to be of greater utility than overall terms.

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9. References

- Beresford, A.K.C. and Dubey, R.C., 1991. Handbook on the management and operation of dry ports. RDP/LDC/7, UNCTAD, Geneva.
- Beresford, A., Pettit, S., Xu, Q., Williams, S. 2011. A study of dry port development in China. *Maritime Economics & Logistics*, forthcoming.

- Bergqvist, R., 2007. *Studies in Regional Logistics – The Context of Public-Private Collaboration and Road-Rail Intermodality*, BAS Publishing, Göteborg.
- Bergqvist, R., 2008. Realizing Logistics Opportunities in a Public–Private Collaborative Setting: The Story of Skaraborg. *Transport Reviews* 28 (2), 219-237.
- Bichou, K. and Gray, R., 2004. A logistics and supply chain management approach to port performance measurement. *Maritime Policy & Management* 31(1), 47-67.
- Cullinane, K., Wilmsmeier, G., 2011. The Contribution of the Dry Port Concept to the Extension of Port Life Cycles. In: J. W. Böse (Ed), *Handbook of Terminal Planning*, Springer, New York.
- De Langen, P. W., Chouly, A., 2004. Hinterland access regimes in seaports. *European Journal of Transport and Infrastructure Research* 4 (4), 361-80.
- Garnwa, P., Beresford, A. and Pettit, S., 2009. Dry ports: a comparative study of the United Kingdom and Nigeria. In: *Transport and Communications Bulletin for Asia and the Pacific No. 78: Development of Dry Ports*, UNESCAP, New York, pp. 40-56.
- Gouveral, E., Debrie, J., Slack, B., 2005. Dynamics of change in the port system of the western Mediterranean. *Maritime Policy & Management* 32 (2), 107-121.
- FDT, 2007. Feasibility study on the network operation of hinterland hubs (dry port concept) to improve and modernise ports' connections to the hinterland and to improve networking
- FDT, 2009. *The dry port: concepts and perspectives*, FDT, Aalborg.
- Fleming, D. K., Hayuth, Y., 1994. Spatial characteristics of transportation hubs: centrality and intermediacy. *Maritime Policy and Management* 21 (3), 187–193.
- Frémont, A., Soppé, M., 2007. Northern European range: shipping line concentration and port hierarchy. In: Wang, J., Olivier, D., Notteboom, T., Slack, B. (Eds.), *Ports, Cities and Global Supply Chains*, Ashgate, Aldershot, pp. 105-120.

- Fundación Valenciaport, 2010. Personal communication, 13th October, 2010.
- Hayuth, Y., 2007. Globalisation and the port-urban interface: conflicts and opportunities. In: Wang, J., Olivier, D., Notteboom, T., Slack, B. (Eds.), *Ports, Cities and Global Supply Chains*, Ashgate, Aldershot, pp. 141-156.
- Heaver, T., Meersman, H., Moglia, F., Van de Voorde, E., 2000. Do mergers and alliances influence European shipping and port competition? *Maritime Policy & Management*. 27 (4), 363-373.
- Heaver, T., Meersman, H., Van de Voorde, E., 2001. Co-operation and competition in international container transport: strategies for ports. *Maritime Policy & Management*. 28 (3), 293-305.
- Konings, J. W., 1996. Integrated centres for the transshipment, storage, collection and distribution of goods. *Transport Policy* 3 (1), 3-11.
- McCalla, R. J., 1999. Global change, local pain: intermodal seaport terminals and their service areas. *Journal of Transport Geography* 7 (4), 247-254.
- Moglia, F., Sanguineri, M., 2003. Port planning: the need for a new approach? *Maritime Economics & Logistics* 5 (4), 413-425.
- Monios, J., Wilmsmeier, G., 2011. Dry ports, port centric logistics and offshore logistics hubs: strategies to overcome double peripherality? *Maritime Policy and Management*, forthcoming.
- Ng, K. Y. A., Gujar, G. C., 2009. The spatial characteristics of inland transport hubs: evidences from Southern India. *Journal of Transport Geography* 17 (5), 346-356.
- Notteboom, T., 2008. Bundling of freight flows and hinterland network developments. In: Konings, R., Priemus, H. and Nijkamp, P. (Eds.), *The Future of Intermodal Freight Transport*, Cheltenham, Edward Elgar, pp. 66-88.

- Notteboom, T. E., 2010. Concentration and the formation of multi-port gateway regions in the European container port system: an update. *Journal of Transport Geography* 18 (4), 567-583.
- Notteboom, T. E., Rodrigue, J., 2005. Port regionalization: towards a new phase in port development. *Maritime Policy & Management* 32(3), 297-313.
- Olivier, D., Slack, B., 2006. Rethinking the port. *Environment & Planning A* 38 (8), 1409-1427.
- Parola, F. and Sciomachen, A., 2009. Modal split evaluation of a maritime container terminal. *Maritime Economics & Logistics* 11 (1), 77-97.
- Port of Barcelona, 2010. Annual Report 2009, Autoridad Portuaria de Barcelona, Barcelona.
- Puertos del Estado, 2009. Anuario Estadístico 2008, Puertos del Estado, Madrid.
- Rijsenbrij, J., 2008. Container handling in mainports: a dilemma about future scales. In: Konings, R., Priemus, H., Nijkamp, P. (Eds.), *The Future of Intermodal Freight Transport*, Edward Elgar, Cheltenham, pp. 109-134.
- Rodrigue, J-P., Debie, J., Fremont, A., Gouvernal, E., 2010. Functions and actors of inland ports: European and North American dynamics. *Journal of Transport Geography* 18 (4), 519-529.
- Rodrigue, J-P., Notteboom, T., 2009. The terminalisation of supply chains: reassessing the role of terminals in port/hinterland logistical relationships. *Maritime Policy & Management* 36 (2), 165-183.
- Roso, V., 2010. A review of dry ports. *Maritime Economics & Logistics* 12 (2), 196-213.
- Roso, V., Woxenius, J., Lumsden, K., 2009. The dry port concept: connecting container seaports with the hinterland. *Journal of Transport Geography* 17 (5), 338-345.
- Slack, B., 2007. The terminalisation of seaports. In: Wang, J., Olivier, D., Notteboom, T. and Slack, B. (Eds.), *Ports, Cities and Global Supply Chains*, Aldershot, Ashgate, pp. 41-50.

- Van Breedam, A., Vannieuwenhuysse, B., 2007. The extended gateway: a new project for Logistics Flanders. In: Notteboom, T. (Ed.), *Ports Are More Than Piers*, De Lloyd, Antwerp, pp. 289-306.
- Van den Berg, R., de Langen, P., 2010. Port authorities enlarging their scope: the case of Barcelona. Paper presented at the conference on *Intermodal Strategies for Integrating Ports and Hinterlands*. Edinburgh, October 2010.
- Van der Horst, M. R., De Langen, P. W., 2008. Coordination in hinterland transport-chains: a major challenge for the seaport community. *Maritime Economics & Logistics* 10 (1-2), 108-129.
- van Klink, H.A., 2000. Optimisation of land access to sea ports. In: *Land Access to Sea Ports*, European Conference of Ministers of Transport, Paris, 10–11 December 1998, pp. 121–141.
- van Klink, H. A. and van den Berg, G. C., 1998. Gateways & Intermodalism. *Journal of Transport Geography* 6 (1), 1-9.
- Veenstra, A., Zuidwijk, R., van Asperen, E., 2010. The extended gate concept for container terminals: expanding the notion of dry ports. Paper presented at the conference on *Intermodal Strategies for Integrating Ports and Hinterlands*, Edinburgh, October 2010.
- Wilmsmeier, G., Monios, J., Lambert, B., 2011. The directional development of intermodal freight corridors in relation to inland terminals. *Journal of Transport Geography*. 19 (6): 1379-1386.