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Ensuring Hinterland Access The Role of Port Authorities

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The views expressed in this paper are those of the author and do not necessarily represent positions of the Erasmus University Rotterdam, Port of Rotterdam Authority, the OECD or the International Transport Forum.

ENSURING HINTERLAND ACCESS; THE ROLE OF PORT AUTHORITIES

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Abstract

In this paper, it is argued that port authorities can actively contribute to better hinterland access. Different types of involvement of the port authority are discussed, as well as reasons for such involvement.

The analysis is explorative and aims to provide a basis for further discussion. The analysis applies to landlord port authorities (PAs) with public goals. Landlord port authorities have become more autonomous and take the initiative for expansion and redevelopment of port infrastructure. The activities of PAs can be classified in four broad categories: traffic management, customer management, area management and stakeholder management. PAs traditionally act as landlords but increasingly operate 'beyond the landlord' model.

The main argument for a more active involvement of the PA is the fact that coordination in clusters as well as transport chains does not always emerge spontaneously, for various reasons. More coordination can lead to more efficient supply chains and more competitive ports. Consequently, PAs have incentives to invest to improve coordination in port clusters and supply chains.

A more active involvement is especially relevant in hinterland transport, as this is rapidly becoming the main bottleneck in international door-to-door transport chains. PAs may contribute to efficient hinterland access by investing in infrastructure and terminals inside the port area, but perhaps also outside this port area. PAs may also improve hinterland access by setting infrastructure access rules, investing in a port

¹ This paper is written on a personal title and does not represent the views of Port of Rotterdam Authority or Erasmus University Rotterdam. The paper draws heavily from various previous papers with different co-authors.

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community system, by setting conditions in terminal concessions and finally by ensuring sufficient competition between firms in all parts of the supply chain. These roles of PAs are certainly not relevant in all ports but may provide a challenging perspective for PAs that wish to explore a more active role to improve hinterland access.

1. Introduction

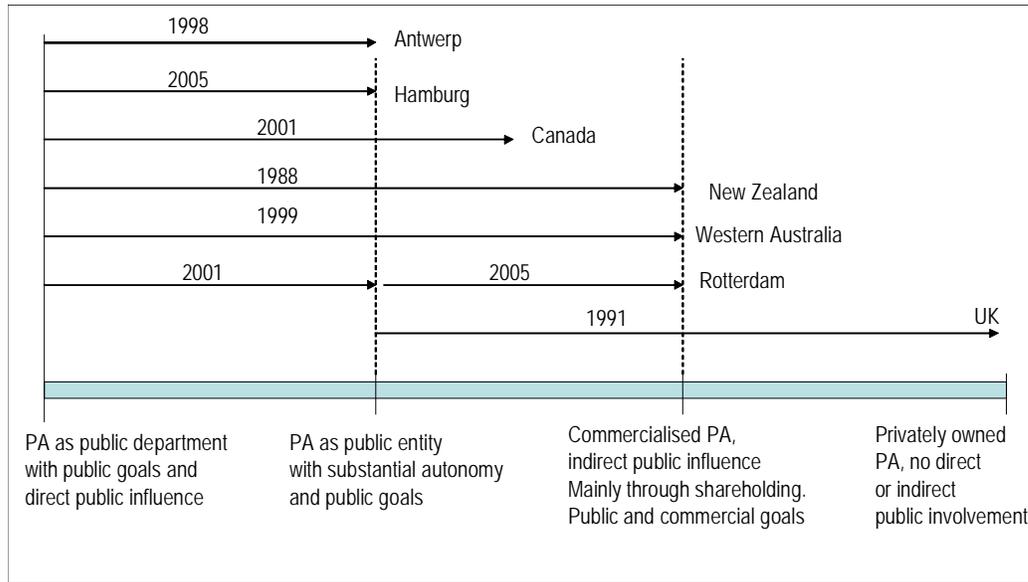
In this paper, a number of theoretical insights is used to explore the role of port authorities (PAs) in hinterland access. The paper is explorative, rather general and contains some initial ideas that need further discussion and scrutiny. Discussion and further analysis seem very relevant as the pressure on hinterland transport systems is increasing. Furthermore, in many ports it has become clear that solutions to improve hinterland access do not emerge spontaneously (either by market forces or public investments), but may require an active involvement of the PA.

Following this introduction, first, the traditional role of the landlord port authority is briefly reviewed. Second, a new perspective on the role of PAs, with a focus on their contribution to improve coordination in port clusters and supply chains is provided. This is relevant for the subsequent discussion of their role in improving hinterland access. Third, a brief overview of the existing literature on port hinterlands is provided. This discussion suggests a number of challenges for improving hinterland access. Fourth, the involvement of the PA in hinterland transport is discussed in detail. A short concluding section finalises the paper.

2. The role of landlord port authorities

In most ports around the world, a port authority plays a central role. Most of the largest container ports worldwide are organized according to the landlord model, where a publicly owned port authority plays a central role (Baird, 2002). Landlord PAs increasingly operate as autonomous organisations with a commercial focus (see the overview provided in Brooks and Cullinane, 2007). Figure 1 shows in a stylised way the increasing autonomy of PAs in a number of countries.

Figure 1. The increasing autonomy of PAs in a number of countries



PAs generally invest in facilities such as (dredging of) maritime access channels, breakwaters, berths & quays, sites for terminals, sites for manufacturing & logistics activities and road and rail infrastructure. PAs provide sites to tenants and port access to ships. Consequently, the main revenue streams are land rents and port dues.

In general, landlord PAs do not aim for profit maximisation, but have other objectives, such as maximising throughput, contributing to economic development and enabling trade (Brooks and Cullinane, 2007). However, many PAs are self-sustaining. This implies PAs need to generate sufficient return on investment to finance new investments.

Landlord PAs generally have the *planning initiative* for expanding or re-developing the port area and (maritime) infrastructure. Table 1 shows the involvement of the PA in port planning in four countries.

Table 1. Involvement of the PA in port planning

Country/ port	Arrangements
Belgium	The port authority develops port plans that have to be approved by the Flemish ministry and comply with relevant regional, national and international regulations. The special law for ports gives PAs the right to expropriate land, to enable effective port planning.
The Netherlands	The PA develops port plans and seeks approval for those plans of the municipal and national government. Expansion plans have to comply with the relevant regulation.
New Zealand	Public agencies are in charge of port planning, the port company is responsible for running an efficient port business. They are clearly stakeholders in the planning process and provide information on the requirements of additional capacity.
Canada	The PA develops a land use plan for the port land it manages. The Ministry of Transport (of the state) is responsible for major port development initiatives.

These countries have different institutional structures and consequently the PA plays a somewhat different role. However, in all cases the PAs either have the planning initiative (Belgium, the Netherlands) or are the main partners in planning initiatives formally taken by public authorities² (New Zealand and Canada).

Figure 2 illustrates four core activities of Landlord PAs³. *Traffic management* is a core activity of many PAs. The focus of most PAs is on the management of vessel movements in the port. PAs often are the harbour master in the port area. This activity may also encompass monitoring and prevention of pollution from ships in the port, as well as the monitoring of the security of ships and cargo.

Area management refers to all activities to develop the port area, such as construction of road and rail infrastructure in the port area, maintenance of public areas in the port and planning land use in the port area.

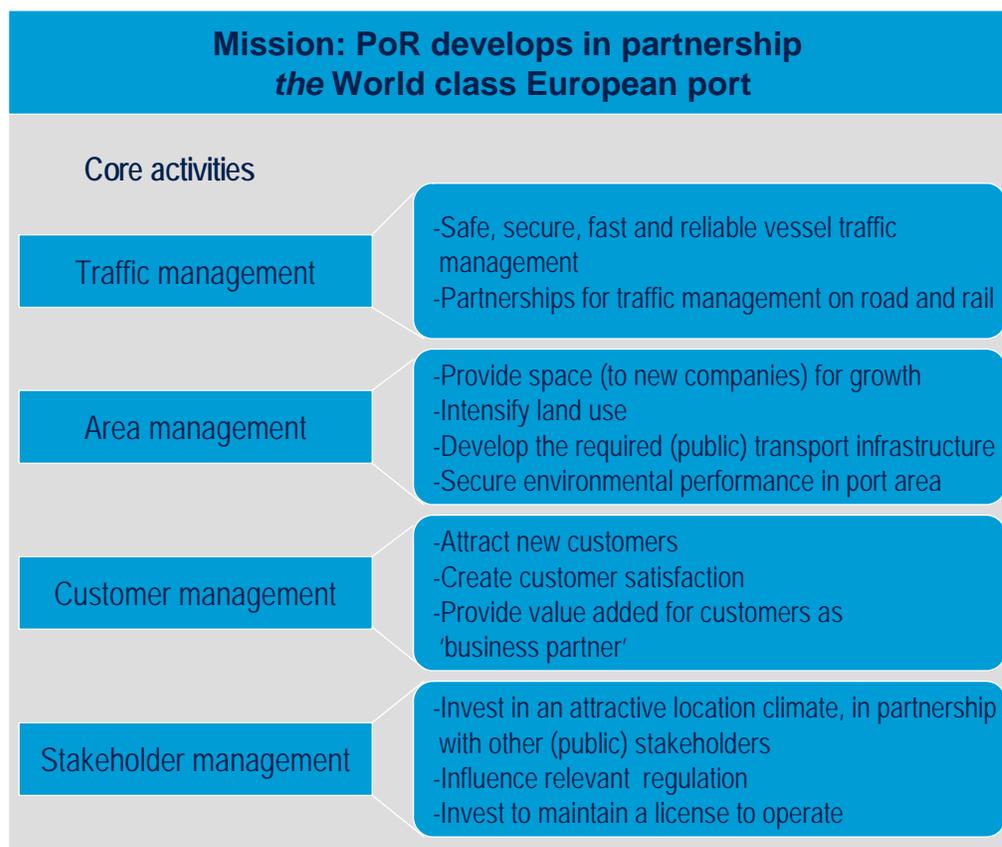
Customer management refers to all contacts with customers, including signing contracts with new customers, granting concessions to private operators, and (joint) port marketing.

² An advantage of a system where public, autonomous PAs have the planning initiative is that they can be given instruments to enable effective port planning that cannot be given to private firms. In the case private initiative is leading, regulations are required to ensure the public interests are served. In the UK, such regulations make port development difficult to realize (Gilman, 1999). Private planning initiatives are only effective when there is a 'level playing field'.

³ Not all PAs engage in all these activities, but overall these activities do provide a good overall picture of the involvement of PAs.

Stakeholder management finally, refers to all activities to ensure the port maintains its licence to operate. Central are the contacts with stakeholders that directly influence the attractiveness of the port, e.g. through customs, security & inspection procedures as well as infrastructure policies.

Figure 2. **Four core activities of Landlord PAs⁴.**



2. The role of PAs in enhancing coordination

The involvement of PAs goes increasingly beyond the traditional landlord model. PAs do not only lease land and provide safe access to the port, but also actively invest to improve the efficiency of the transport chain and the competitiveness of the port. Such investments lead to growth of the two key *revenue drivers* of port authorities: land value and port throughput.

The value added of an active role of the PA can be explained by their contribution to more effective *coordination*. More coordination is required both in the *port cluster* and in *international transport chains*⁵.

⁴ Not all PAs engage in all these activities, but overall these activities do provide a good overall picture of the involvement of PAs.

⁵ In a previous study, we have used the concept of a 'hinterland access regime' to analyse cooperation to improve hinterland access (see De Langen and Chouly, 2006).

Coordination in port clusters

A 'port cluster' consists of all economic activities related to the arrival of ships and cargoes and located in the port region (De Langen, 2004). Although the relevant port region differs from case to case, it generally includes the primary port area and some adjacent municipalities with relatively much transport and logistics firms. Physical proximity is a defining characteristic of a cluster. Thus, the port cluster is a more 'localised' concept than the port hinterland, that may stretch several hundreds (in some cases even thousands) of kilometres inland. Coordination between firms in the cluster (e.g. cargo handling firms, forwarding firms, logistics service providers, transport firms and so on) contributes to the competitiveness of the cluster as a whole. This is explained by the presence of external economies (such as a high quality labour market and knowledge spill-overs) in clusters (Marshall, 1890). These external economies arise to some extent spontaneously⁶. Firms and other organizations in a cluster also *invest* to create or enlarge cluster externalities, for instance by joint investments in the quality of education. Such investments are problematic because the benefits of such investments cannot be 'internalized' by a particular (group of) firm(s), but spread to all firms in the cluster, regardless of their contribution to the investments (Schmitz, 1999). Thus, the collective action problem (Olson, 1971) is relevant in clusters (De Langen and Visser, 2004). Even when collective benefits of co-operation exceed (collective) costs, co-operation does not (always) develop spontaneously.

This tendency for insufficient shared investments is relevant for various types of investments, including education, innovation and marketing (see De Langen and Visser, 2004). Because firms in clusters benefit from collective investments and cannot –or at least not perfectly– be excluded from these benefits, these investments can be considered as 'collective goods' (Antonelli, 2000).

Landlord PAs can invest in collective goods for the port cluster and recover costs from the port users (tenants and shipping lines). Such an arrangement can be beneficial for the port users, because the collective goods contribute to the quality of the port. The PA has incentives to invest in collective goods, since these contribute to higher land value and more throughput.

Coordination in international transport chains

Five general arguments explain why coordination problems arise in transport chains:

1. The unequal distribution of the costs and benefits of coordination. If one actor in the chain has to invest (e.g. in ICT systems) while other actors obtain the benefits, coordination may not arise spontaneously. Gain-sharing mechanisms that redistribute benefits may fail owing to high transaction costs and the risk of free-rider behaviour.

In such a regime the cooperation between all relevant organisations in the port cluster is center stage. In this paper, we focus specifically on the role of the PA.

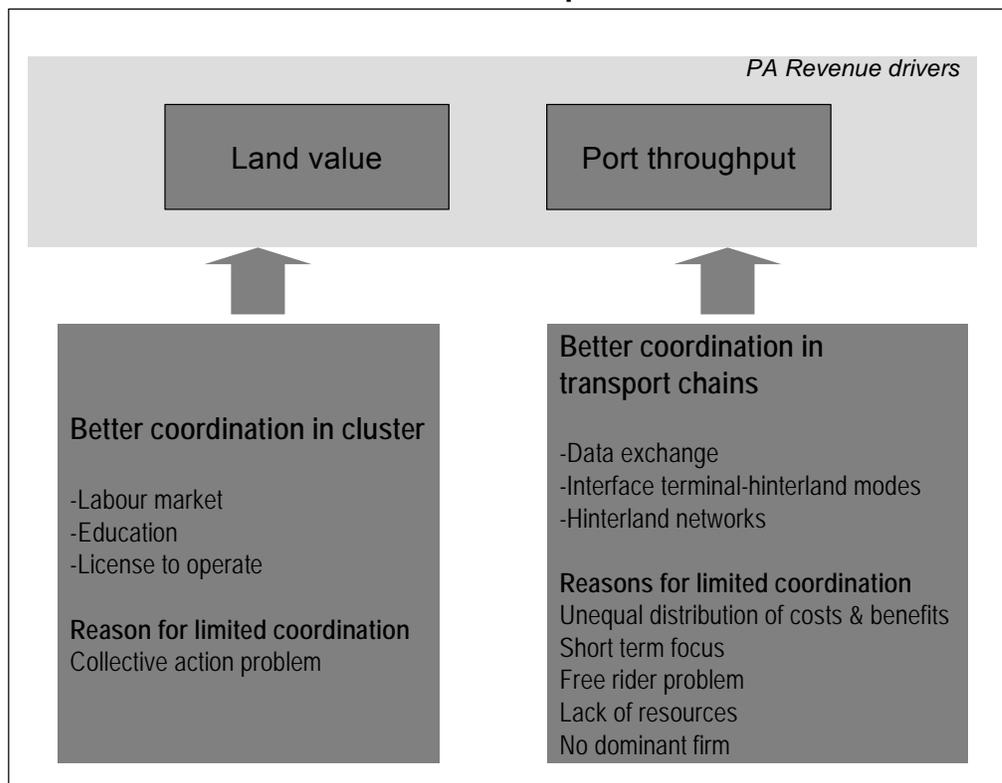
⁶ For instance, the availability and quality of labor is relatively high in clusters, because workers migrate to a cluster to reduce search costs and risks of unemployment. Furthermore, the large demand for skilled labor provides a basis for a relatively advanced education infrastructure.

2. The lack of resources or willingness to invest on the part of at least one firm in the transport chain. This issue is especially relevant for coordination problems involving relatively small firms.
3. Strategic considerations. These can also impede coordination. Firms may be reluctant to improve coordination if competitors would also benefit. This situation is likely to arise in a market characterized by fierce competition.
4. The lack of a dominant firm. A firm with supply chain power will have a major impact on the structure of a transport chain (see e.g. Groothedde, 2005). A lack of supply chain power reduces coordination.
5. Risk-averse behaviour and a short-term focus of firms in hinterland chains. Firms that expect the process of establishing better coordination through cooperation to be time-consuming may be reluctant to put any effort into this process.

These reasons explain why the efforts and investments of firms to improve coordination are in some cases limited. Firms often concentrate on their own processes and put less effort into resolving the coordination problems of the chain as a whole. This attitude is more marked if actors expect cooperation to be difficult to achieve. Thus, previous experience in coordination also determines a firm's attitude.

The PA can contribute to more coordination in transport chains, because more efficient transport chains lead to more throughput. Figure 3 summarises the reasons for a role of the PA in enhancing coordination in port clusters and transport chains.

Figure 3. **Tthe role of the PA in coordination in port clusters and transport chains**



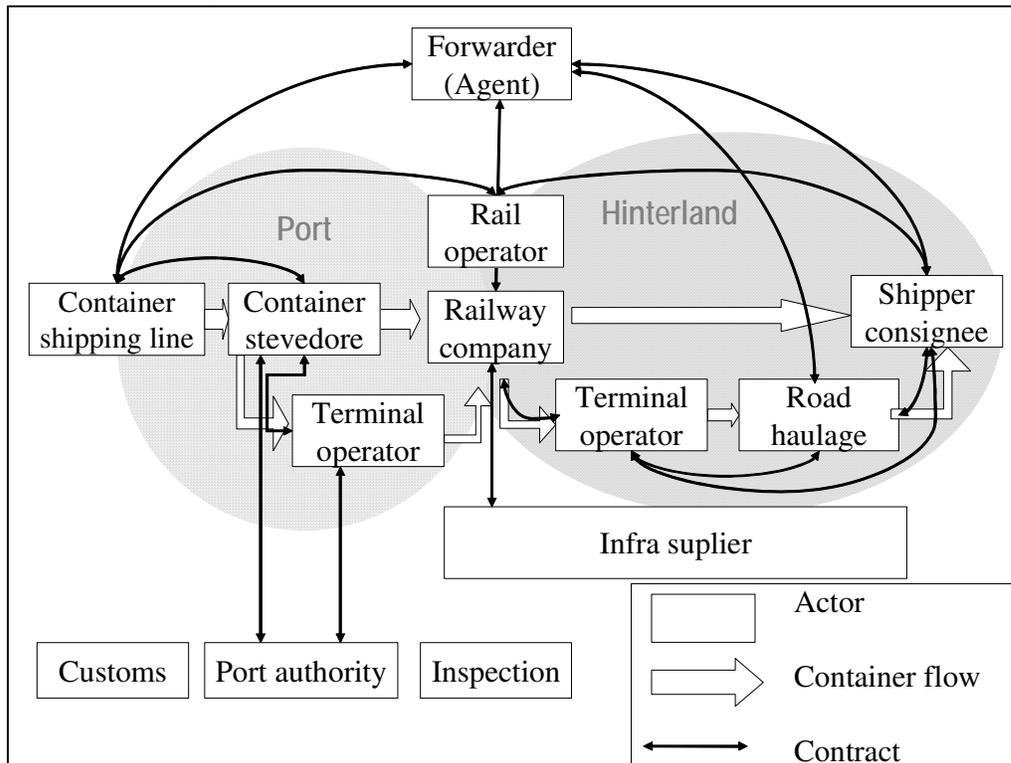
This role of PA is relevant with regard to hinterland access. Before the involvement of the PA is discussed in more detail (in section 5), first a short overview of relevant insights with regard to port hinterlands is provided.

3. Port hinterlands

As ports have become links in a global logistics chain (Robinson, 2002), port competition has moved from competition between ports to competition between transport chains (Notteboom & Winkelmanns, 2001). In fact, in most door-to-door transport chains, the costs of hinterland transport are higher than maritime transport costs and port costs combined. Most ports mainly serve contestable hinterlands and thus crucially depend on the quality of hinterland transport services. Regions where one port has a substantial competitive advantage form the *captive hinterland* of this port and in general this port handles the vast majority of cargoes to/from these regions. Contestable hinterlands consist of all regions where there is no single port with a clear cost advantage. As a consequence, various ports have a share of the market. For most ports, captive hinterlands have diminished and most ports cannot rely on cargo from their captive hinterlands. Instead, ports need to compete in contested hinterlands and consequently firms in ports need to develop strategies to best serve this hinterland.

The quality of a port's hinterland access depends on the behaviour of many actors, including terminal operators, freight forwarders, container operators, and the port authority. As an illustration of the variety of firms involved in hinterland transport, figure 4 shows the relevant actors in the rail hinterland chain.

Figure 4. The relevant actors in the rail hinterland chain



Source: Van der Horst and De Langen, 2008

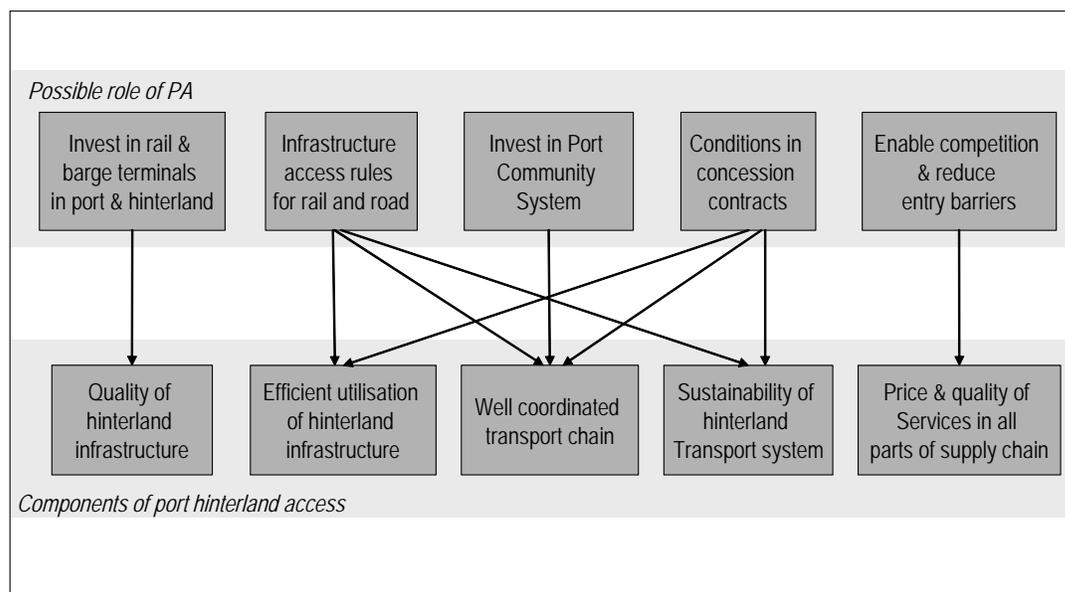
Five conditions for efficient hinterland access

Based on the previous overview and relevant literature (such as Robinson, 2002, Notteboom and Rodrigue, 2005 and De Langen and Chouly, 2004), five conditions for efficient hinterland access of seaports can be identified. First, the transport infrastructure to the hinterland needs to be sufficiently well developed. Second, the transport infrastructure needs to be well used efficiently. Third, the transport chains needs to be well coordinated, fourth there is an increasing need for a sustainable hinterland transport system and finally, the services provided by private firms (such as terminal services, barge services and so on) need to be attractive.

4. The role of PAs in improving hinterland access

Figure 5 shows the five conditions for efficient hinterland access discussed above, and five options for the PA to influence the conditions. Each of these options is discussed in further detail in the next sections. These options may not be relevant in all cases and are to be regarded as preliminary suggestions, not as policies with proven success.

Figure 5. **Conditions for efficient hinterland access & options for involvement of the PA**



5.1 Investments in rail & barge terminals

In many seaports, the PA has to take the initiative for infrastructure expansion projects in the port area, because other firms or public organisations do not have the incentives and/or legitimacy to do so. There may be arguments for an active involvement of PAs in such expansion projects outside the port area as well. The key argument here is that such investments outside the port area can contribute significantly to the utilisation of the infrastructure *in* the port area. Thus, such investments improve port competitiveness. An active involvement of the PA is only required when such investments do not emerge spontaneously. Private firms may not have the administrative power to develop planning initiatives (e.g. for dry ports or rail tracks to the port), while regional authorities in the hinterland may not have incentives to take the planning initiative for such facilities, because not local residents but importers, exporters and logistics service providers located outside the region benefit from such facilities.

Examples of PAs that have taken the planning initiative outside the port area include:

- The PAs of LA and Long Beach that have been involved from the start in the Alameda Corridor project, a project to substantially improve the rail connections from both ports.
- Port of Barcelona, that has invested in rail tracks to improve the connection of the port to the European hinterland.
- Port of Rotterdam Authority, that has taken the initiative to develop a *container transferium*, located outside the port area, where trucks can deliver containers for the port. These containers move the final 30 to 50 kilometre by barge, thus reducing highway traffic.

These examples suggest that PAs may need to monitor the structure of hinterland transport chains and look beyond their boundaries for investments to relieve bottlenecks and improve efficiency of existing hinterland transport infrastructure.

5.2 Infrastructure access rules

PAs are in most cases involved in and responsible for the development of infrastructure in the port. In the previous section, we suggested that PAs may need to become involved in providing capacity outside the port area.

In this section, we suggest that PAs may also have to contribute to the efficient utilisation of hinterland infrastructure. Infrastructure is not by definition used efficiently. Infrastructure users may not coordinate their activities sufficiently. In many cases such users do not coordinate at all⁷. Setting rules for infrastructure access may improve the utilisation of this infrastructure –and thus enhance port competitiveness.

Table 2 shows a number of cases where insufficient coordination leads to a sub-optimal utilisation of infrastructure and tentative infrastructure access rules that may enhance efficiency⁸. These infrastructure access rules would only allow trucks, trains and barges to use the infrastructure if they meet certain criteria⁹. Alternatively, tariff structures can be devised that provide discounts when these criteria are met, or penalties when these criteria are not met. All these are forms of infrastructure access rules.

⁷ This can be explained because an unequal distribution of the costs and benefits, the lack of resources or willingness to invest of at least one relevant firm, strategic considerations of infrastructure users, a lack of supply chain power (see e.g. Groothedde, 2005) and risk-averse behaviour and a short-term focus of firms in hinterland chains, (see Van der Horst and De Langen, 2008 for a more detailed analysis.

⁸ This table is based on Van der Horst and De Langen, 2008). These coordination problems are not in all ports relevant. In the US, for instance, the large rail operators own most rail tracks and the issue of access to this infrastructure may be less relevant.

⁹ Governments obviously have general infrastructure access rules, e.g. a driving license and a sufficiently safe vehicle. The argument here is for additional rules aimed to improve efficiency of the utilisation of infrastructure, sustainability and more coordination in hinterland chains.

Table 2. **Cases of insufficient coordination that reduce utilisation of infrastructure**

Coordination problem	Potential solution through infrastructure access rules
Too many calls of barges with small call sizes per terminal	Only allow barges in the port when they call at a limited number of terminals.
Peak load on rail terminals in ports	Only allow trains on rail tracks when rail terminal operator confirms to have capacity to handle these trains in their allocated slots (real time).
Unused rail tracks because of insufficient planning	Penalise train operators (substantially) for not using a track.
Peak loads in arrival and departure of trucks at deep-sea terminal	Only allow trucks on port access routes when they have reserved a 'slot' at the terminal.
Peak loads in road transport causes congestion on the road infrastructure in port region area	Only allow (empty) trucks on the port access roads outside rush hours.
Insufficient information exchange of container data causes inadequate planning	Only allow trucks, trains, barges, seagoing ships in port area when they have provided all necessary information.

These examples show that infrastructure access rules may have benefits with regard to sustainability, efficient utilisation of infrastructure and a well coordinated transport chains.

While most PAs set access rules for seagoing vessels (e.g. safety, rules regarding waste disposal), most PAs are not involved in access rules for trucks, trains and barges. Such involvement may become desirable when access rules explicitly relate access to infrastructure with activities in the port. Given the central role of the PA in the port (e.g. contracts with terminal operators, investments in a port community system, communication with all relevant stakeholders), partnerships between the PA and the owners of the infrastructure to design and implement infrastructure access rules may be appropriate.

5.3 A port community system

An effective port community system may contribute to coordination in transport chain. In ports, data exchange between a variety of firms is required (Fabbe-Costes et al, 2006). For instance, terminal operators can plan better when shipping lines provide container data. Similar benefits are relevant for forwarding companies and hinterland transport companies. In most cases, the same data is useful for a variety of firms, as well as government organisations such as the customs. A port community system can provide standards as well as systems for data exchange. As the data of customs

clearance are an integral part of a logistics EDI system, the inclusion of customs in the system design is essential (Lee et al, 2000).

The benefits of data exchange are especially relevant in hinterland transport chains. Whereas maritime transport as well as the port sector is (increasingly) concentrated and the average firm size is large, many small firms, such as forwarders and trucking companies are involved in hinterland transport. These firms do often not have the resources and incentives to invest in dedicated data exchange systems. Consequently, trucks often arrive at terminals without pre-notification, they may arrive with the wrong information and so on. Similarly, hinterland transport companies may come to collect containers that are not yet cleared by customs. All these problems arise due to insufficient data exchange.

Many ports have in one form or another, a port community system. Examples include Rotterdam, Antwerp, Barcelona and Singapore. In all these cases, the companies in the port as well as the port authorities are involved. Such investments of PAs may be expected to increase given the increasing pressure on hinterland infrastructure and the resulting focus on well coordinated transport chains.

5.4 Conditions in concession contracts

The World Bank infrastructure database (2008) shows that the majority of port projects from 1990 to 2007 use concessions. In most cases, concessions are granted for specific terminals. Public port authorities (or occasionally other public agencies) invest in general port infrastructure and select terminal operating companies for a concession to operate a terminal and pay a concession fee to the PA. The responsibility for investments differs between concessions: in some cases the public PA invests in quays and terminal area, while in other cases the private terminal operator has to make these investments. Notteboom (2007) rightly argues that granting concessions and setting the conditions in the concession are key instruments of port authorities to influence port development.

Such concessions can also contain conditions aimed at improving the hinterland transport system. For instance, Port of Rotterdam has included conditions with regard to the share of barge and rail in the concessions. On top of this, PAs may consider to use concessions to oblige the use of information exchange systems and to secure service levels for the services to hinterland modes, e.g. on dock loading of trains and loading of barges. Thus, conditions in concessions for terminal operators may be instruments to improve the sustainability of hinterland, coordination in transport chains and the utilisation of infrastructure.

5.5 Ensuring competition in transport chains

Finally, the door-to-door transport chain is only competitive if there is sufficient competition in all parts of the transport chain. For instance, if a train operator does not face competition, the overall transport chain becomes more competitive. This is primarily because firms in chain have market power and will use it to increase prices. However, competition in the port will also lead to more specialisation and innovation, with benefits for the port as a whole (De Langen and Pallis, 2006).

The issue of entry barriers is relevant in this respect. Entry barriers in most seaports are substantial and include economic, regulatory and geographical barriers (De Langen and Pallis, 2007). In some cases port reform has introduced a limited number of private port operators but has not lowered entry (and exit) barriers for additional firms. Thus, while the scope for private involvement in the provision of port services has increased substantially, the issue of entry barriers is still relevant.

Lowering entry barriers is desirable because this enhances the contestability of markets, it increases the level of intra-port competition and it enables faster implementation of new technologies and business models (Geroski et al 1990).

Thus, PAs may need to encourage competition in the port. A policy to reduce entry barriers may be required. This issue is relevant for hinterland access, especially with regard to rail transport, as the number of competing rail operators is limited in many seaports. The same may apply for rail and barge terminals in the port.

6. Conclusions

In this paper, the role of port authorities in hinterland access is explored. Landlord port authorities have become more autonomous and take the initiative for expansion and redevelopment of port infrastructure. The activities of PAs can be classified in four broad categories: traffic management, customer management, area management and stakeholder management. PAs traditionally act as landlords but increasingly operate 'beyond the landlord' model. The main argument for a more active involvement of the PA is the fact that coordination in clusters as well as transport chain does not always emerge spontaneously, for various reasons. More coordination can lead to more efficient supply chains and more competitive clusters. Consequently, PAs have incentives to invest to improve coordination in port clusters and supply chains.

Such a more active involvement is especially relevant in hinterland transport, as this is rapidly becoming the main bottleneck in door-to-door chains. PAs may contribute to efficient hinterland access by investing in infrastructure and terminals, inside the port area, but perhaps also outside this port area. PAs may also improve hinterland access by setting infrastructure access rules, investing in a port community system, by setting conditions in terminal concessions and finally by ensuring sufficient competition in all parts of the supply chain. These roles of PAs are certainly not relevant in all ports but may provide a challenging perspective for PAs that wish to explore a more active role to improve hinterland access.

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