European Seaport Privatization: Describing Applicable Institutional Network Models

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Abstract

The current body of literature on port administration and management presents a host of challenging theories on public versus private ownership, privatization and port competitiveness. Classifications are often presented to test these theories and these classifications are furthermore used for offering policy decisions. It is claimed in this paper that although the current classifications present the basic building blocks of different port models, they basically lump together public-ness, private-ness and hybrid forms in ways that do no justice to institutional subtleties. The reason for this being that most studies are either looking at a limited number of ports in depth or a plethora of ports superficially.

Ports, being networks of facilities and infrastructures are complex entities in which for each of their components, different institutional arrangements of property rights may have been chosen. These institutional networks cannot be so easily described as either "public", "private" or "public-private." This paper aims to present a classification of port management, which covers the institutional characteristics of all infrastructure elements in a port. After doing this, the classification is applied to the largest ports in Europe, many of whom according to traditional models of port management are often said to have identical amounts of privatization. This more in-depth institutional study reveals a number of remarkable differences that tend to be downplayed in the literature up to now.

Keywords: Port classification; Privatization; Port Models; Port Ownership; Institutional Management

1. Introduction

Developing models of port institutions is useful in many aspects of port management. This includes the application on how to develop privatization policy around land use and infrastructures (UN; 1999, UN, 1998; World Bank, 1998; World Bank, 2001) and on redefining port institutions after privatization (Sletmo, 2001; Marges, 1997; Notteboom and Winkelmans, 2001a; Mangan and Furlong, 1998; Cañamero, 2000; Notteboom and Winkelmans, 2001b; Baaj, 2001). Models can be used as both a roadmap and as a reference for future development. It is with this line of reasoning and for this goal that in this paper an analytical classification technique is used to develop models of port privatization.

Port ownership can simply be defined in reference to who provides the port facilities and services (Song *et al.*, 2001). Furthermore, port classification via ownership has become a popular technique used in port comparisons in order to give structure to privatization theories (Song *et al.*, 2001; Estache and Rus, 2000; Notteboom *et al.*, 2000; Stevens, 1999; Saundry and Turnbull, 1997; Cass, 1996). These classifications usually divide the ports either between three or four types, e.g. World Bank (2001), Baird (1995, 1997), Baudelaire (1997), Juhel (1997) and Liu (1995) or only two types, e.g. De Monie (1996), Heaver (1995), Thomas (1994) and Goss (1986, 1990). However, classifications on national and regional levels confound these attempts of international comparisons by introducing their own schemes. An example includes the national four-tier UK ownership classification (National Ports Council, 1973; Thomas, 1994).

However, there is another body of literature that does not look at the classification of types by privatization, but rather the scale at which the ports are governed or the style in which they are managed (Stevens, 1999; van de Velde, 1999; ESPO, 1996; European Parliament, 1993; Savas, 1987). The governance of a port, for example can be overseen by a central government, a municipal government or a private enterprise. These management or privatization protocols advocate what and how a port should be managed relative to the port authority (Sherman, 1995; Agerschou *et al*., 1983; Douglas and Green, 1993; Juhel, 1998). Some apply these management styles directly to how management can implement privatization (Frankel, 1992; De Monie, 1996; Iheduru, 1993; Baird, 1995; UNCTAD, 1998; Cass, 1996). Again, however, there are also the regional classifications, such as the *Hanseatic*, *Latin*, *Anglo-Saxon* regional classification in northwestern Europe (Kreukels and Wever, 1998), which do not always fit the more generalized classifications.

Yet there is a dearth of information on how these latter classifications of management and governance styles fit into the former port ownership classifications. That is to say that maritime economists, whose goal it is to study the effects of privatization on production (either partial or integrated), ignore the gross effects caused by the subtleties of management differences. This may lead to misidentification of government or market failures. Meanwhile, policy and management experts have not found a way to integrate their management style philosophies to the accepted international port ownership classifications used by maritime economists. This may make the policy experts detailed and nuanced analysis inapplicable to comparisons or bring up questions of relevance beyond purely a regional level.

An example of the effects that this lack of integration causes will be shown in this paper by the following six ports: Rotterdam, Antwerp, Le Havre, Hamburg, Bremen and Felixstowe. Many of these ports, using the port ownership classification of Baird (1995, 1997) and applied by Cass (1996) are in the same port ownership model. Therefore, international studies that have used this classification have assumed that the institutional structures are the same. However, there is an overwhelming body of regionally centered literature that has detailed the dissimilarities of these ports and their nations (de Jong and de Vries, 2003; Loyen *et al.*, 2003; de Jong *et al.*, 2002; de Goey *et al.*, 2003; Devos and van Driel, 2000; Stevens, 1999; Kreukels and Wever, 1998; etc.).

In order to explore this research dichotomy, in the following section of this paper, the current port classifications used in the literature will be explored. This short synopsis of

the most often used port ownership classification models will be highlighted. Specifically, the merits of the classifications and to what studies they have been applied will be discussed.

In the third section of this paper, an analytical classification, named the *Common Port Property Rights* classification, will be presented. This classification will attempt to retain all of the advantages of previous classification. In order to do this, the infrastructure types, the actors, and the property rights of those actors will be taken into consideration. The end product of this paper being a classification in the form of a table that can be applied to any port by any researcher. This end table will explicitly show a methodology for further application.

Section four will apply the presented classification methodology to the six ports being discussed. These ports being namely Antwerp, Rotterdam, Felixstowe, Bremen, Hamburg and Le Havre. Institutional models of these ports are made using the classification methodology. Furthermore, in this section analysis of the implications that these differences have, illuminated by the framework, will be performed. Specifically, the differences in the ports that had previously been classified as being in the same classification will be illuminated.

In section five, conclusions will be drawn on how public-private issues in port management have to be addressed in a differentiated way and how this study contributes to this. Lastly, what this could mean for future application to policy and research will be presented.

2. Current Port Classifications

As mentioned previously, there are two groups of port classifications most pertinent to this research.. The first group classifies ports according to their ownership and the second group classifies ports according to their management styles. In this section several classification systems of both groups are presented.

Port Ownership Classifications

The two port ownership classifications that are most often cited in the international port comparison literature in regards to privatization of infrastructure and services are the Standard Port Typology (also known as the "Landlord Port/Service Port/Tool Port" classification) and the "Public/Public-private/Private port" classification. Both of these models being given fourth categories, depending on the author.

The Standard Port Typology

Seen below, in figure 1, is the Standard Port Typology. This typology appeared in the 1980s and since then has risen to popular usage (Stevens, 1999). This typology sought to classify ports into three categories. These three categories are the *Landlord Port*, the *Tool Port* and the *Service Port*. The important point to note from this model is that the ports are divided by the services that are provided in the port by the port authority in relation to the infrastructure and superstructure.

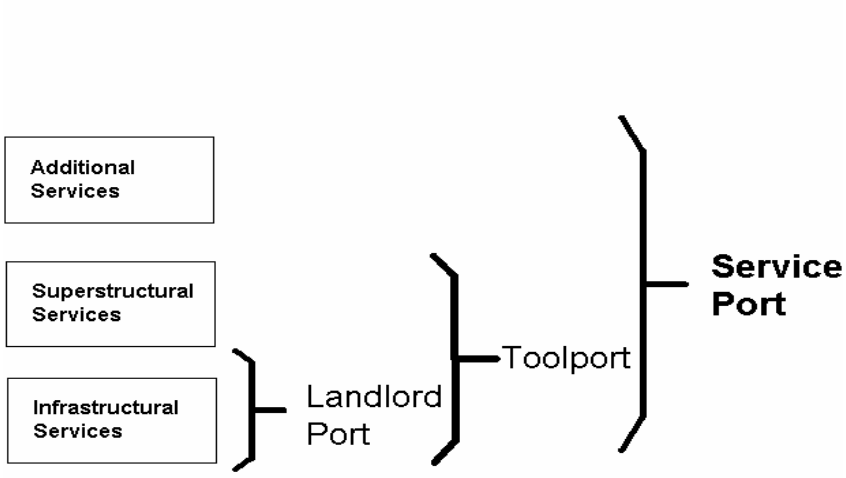


Figure 1: Standard Port Typology. Source: adapted from Stevens (1999)

In the *Landlord Port*, the port authority is the owner of the infrastructure and it acts as the management. However, private firms own all of the superstructures involved in the port activities in *Landlord Ports* and furthermore, pay for the operation of it as well. An example of this type of port organization are the port of Rotterdam, Bremen, Hamburg and Antwerp (World Bank, 2001).

In the *Tool Port*, as in the landlord port, the port authorities own all of the infrastructures. However, unlike the *Landlord Ports*, the *Tool Port* also owns the superstructure that is leased to the private companies. These private companies are then responsible for the operation of the equipment. An example of this type of port organization is the port of New York/New Jersey.

In the *Service Port*, as in the *Tool Port*, the port authority owns the infrastructures and the superstructures. However, in the case of the *Service Port*, the port authority therein handles the operations and maintenance as well. The classic example of the service port was the Port of Singapore Authority (PSA) and also includes Le Havre.

Recently, a fourth category was identified in the World Bank's *Port Reform Tool Kit* (2001). This category is the *Private Sector Port*. Furthermore, in this classification, the word "public" was added to the service port to be coined *Public Service Port*. The *Private Sector Port* encompasses the newly appearing port in which all aspects of the port are privatized, including the infrastructural services. Two examples of this type of port being Hong Kong and Felixstowe, U.K.

This classification was expanded later by the World Bank in their *Port Reform Toolkit* (2001). For that which is most noteworthy from the *Port Reform Tool Kit* is the application of the port types to more specific infrastructure designations. This is shown in table 1 below.

Model	Port Administration	Nautical Management	Nautical Infrastructure	Port Infrastructure	Superstructure (Equipment)	Superstructure (Buildings)	Cargo Handling Activities	Pilotage	Towage	Mooring Services	Dredging	Other Functions
Public Service Port	Pu	Pu	Pu	Pu	Pu	Pu	Pu	Pu	Pu	Pu	Pu	Pu
								Pr	Pr	Pr	Pr	Pr

Tool Port	Pu	Pu	Pu	Pu	Pu	Pu	Pr	Pu	Pu	Pu	Pu	Pu	
								Pr	Pr	Pr	Pr	Pr	
Landlord Port	Pu	Pu	Pu	Pu	Pr	Pr	Pr	Pu	Pu	Pu	Pu	Pu	
								Pr	Pr	Pr	Pr	Pr	
Private Sector Port	Pr	Pr	Pr	Pr	Pr	Pr	Pr	Pu	Pr		Pu	Pu	
								Pr			Pr	Pr	

Table 1: Toolkit Classification Source: World Bank, 2001. Pu = Public; Pr = Private

The Port Function Matrix

The second model of port administration that has come into common usage is one that is called the *port function matrix*. The difference to note in this model is that the ports are divided not by their infrastructure and superstructure, as in the previous model, but as to what actors control which functions in the port.

This *port function matrix* was developed by Baird (1995, 1997). This model is based on the idea that within a port there are three essential port functions. These are the *regulatory function*, *the landowner function* and the *utility function*. The port functions act as a barometer that measures the extent to which privatization has been implemented by a port institution.

These three functions are further broken down into what Baird powers and responsibilities, and what is referred to in this article as property rights. Examples of property rights given by Baird are maintenance, enforcement and management. This is to say, that this classification identifies models of different ports as to who performs these different functions. A breakdown of the four port types of Baird is shown in Table 2 below.

Port Models	**Port Functions**		
	Regulator	**Landowner**	**Utility**
PUBLIC	Public	Public	Public
PUBLIC/private	Public	Public	Private
PRIVATE/public	Public	Private	Private
PRIVATE	Private	Private	Private

Table 2: The port function matrix. Source: Baird (1995)

This model has been taken and has been applied to the worlds largest ports by Cass (1996). Please see table 3 below. What is important to note from table 3, is that four of the ports in the Hamburg-Le Havre range are classified as being the same type. In fact sixteen of the top twenty container ports listed are labeled as "PUBLIC/private" ports.

	Port	**PUBLIC**	**PUBLIC/ private**	**PRIVATE/ public**	**PRIVATE**
1	Hong Kong			?	
2	Singapore	?			

3	Kaohsiung		?		
4	**Rotterdam**		?		
5	Pusan		?		
6	**Hamburg**		?		
7	Long Beach		?		
8	Yokohama		?		
9	Los Angeles		?		
10	**Antwerp**		?		
11	New York/New Jersey		?		
12	Keelung		?		
13	Dubai		?		
14	Felixstowe				?
15	Tokyo		?		
16	San Juan		?		
17	**Bremen**		?		
18	Oakland		?		
19	Shanghai	?			
20	Seattle		?		

Table 3: Port Function Classification of top 20 Container Ports. Source: Cass 1996

Port Management Classifications

Three classifications of port management will be shown in this sub-section. The first model is a report by the European Parliament (1993). This report differentiates the municipal model of the northern European ports versus the state model of the southern European and South American ports versus the privatization model of some of the United Kingdom ports. The second model (Stevens, 1999) seeks to model ports in reference to what position the port authority takes in the activities of the port. This model is based on the work of Savas (1982, 1987) and shows the four models of the government monopoly, government conditioning, co-arrangements and market regulation ports. The last model to be discussed was developed by van de Velde (1999) for the purpose of public transport regulation, but can be applied here to ports. In this model, port institutions may arrange transportation in four ways. These ways are the public network, the private concessions, the regulated authorizations and the open entry models.

Port Classification by the European Parliament

In a report generated by the European Parliament (1993) and later used by the European Seaports Association (ESPO, 1996) the major ports in Europe and some non-European ports were listed in reference to the financing that took place in four basic port infrastructure types. These infrastructure types are *Maritime access infrastructure, Port area infrastructure, Port area superstructure* and *Land access infrastructure*. The results of this study are shown in table 4 below.

To be noted from this model, furthermore the reason that it is included in this article, is that it is an example of an attempt to blend the infrastructure approach of the *Landlord Port/Tool Port/Service Port* model and the actor approach of the *port function matrix*. These infrastructure types being divided, however, only into three categories.

Another advantage of this data is that a differentiation is made between the various categories of public actors. An exception being the identification of the *Port area infrastructure* of Belgium being labeled an undefined "Public". However, it is in this way that further classifications can be made and indeed has. For example, using this data, one could group Cyprus, Mexico, Portugal, Spain, Sweden and the United Kingdom into a "Port Authority Class" due to the fact that in all of these countries, the port authority finances the *Maritime access infrastructure* as well as the *Port area infrastructure* and only grants concessions to private actors in reference to *Port area superstructure*.

Country	Maritime access infrastructure	Port area infrastructure	Port area superstructure	Land access infrastructure
Argentina	P.A./Private	P.A./Private	Private	Most port authorities are responsible for road and other transport connections within port areas. Connection to the hinterland is usually the responsibility of governments. Regarding railways, responsibility can be national (Belgium), the port authority's (Germany), or the railway concessionaire's (Argentina). In the case of Hong Kong, the private sector is responsible for infrastructures within the port area.
Belgium	State	Public	Private	
Cyprus	P.A.	P.A.	Concession	
Denmark	P.A.	P.A.	Private	
Finland	P.A.	P.A.	Private	
France	State/P.A.	Public/P.A.	Concession	
Germany	State	Public	Private	
Greece	State	Public/P.A.	Concession	
Hong Kong	P.A.	Private	Private	
Ireland	P.A.	P.A.	Concession	
Italy	State/P.A.	Public/P.A.	Concession	
Malta	State	P.A.	Concession	
Mexico	P.A.	P.A.	Private	
Netherlands	State	P.A.	Private	
Portugal	P.A.	P.A.	Concession	
Spain	P.A.	P.A.	Concession	
Sweden	P.A.	P.A.	Concession	
United Kingdom	P.A.	P.A.	Concession	
Venezuela	P.A.	P.A.	Private	

P.A. = Port Authority

Public = Central, regional or municipal governments (undefined)

Concession = Publicly owned but privately operated

Private = Private Company

State = Central Government

Table 4: Port Financing in Europe
Source: European Parliament (1993); ESPO (1996); Trujillo and Nombela (2000)

Port Actor Network Classification

Another port classification that looked at the positions that actors took in a port is the classification of Stevens (1999). Stevens identified four arrangements using Savas (1982, 1987). Based on the positions that different actors have in the *arranger*, *producer* and *consumer* of the port facilities, Stevens identified four prevailing types of ports. These four types are the *government monopoly*, the *government regulation*, *co-arrangements* and *market regulations*.

According to Stevens, a *government monopoly* is when a public authority is exclusively responsible for the production and arranging of a good or service. A *government regulation* is when the government is an exclusive arranger and the market is put in charge of the production. A *co-arrangement* is when the government and the market perform the arranger and production roles. Lastly, *market regulation* is when the market exclusively takes on both the arranger and production functions. The application of Stevens models is shown in Table 5 below in reference to Port Planning and Nautical Management.

The outcome of the research by Stevens shows that in the *Nautical Management* sector, the four ports below exhibit the same model relationship. This relationship of the *Government Monopoly* transcends ports that are often contrasted against each other in the spectrum of private vs. public (Hong Kong vs. Singapore). However, when it comes to the land side of *Port Planning*, ports not only exhibit their management differences, but can, as in the case of Antwerp, vary their management techniques to fit the situation.

	Port Planning	**Nautical Management**
Rotterdam	Government Conditioning	Government Monopoly
Antwerp	Government Conditioning and Market Regulation	Government Monopoly
Hong Kong	Market Regulation	Government Monopoly
Singapore	Government Monopoly	Government Monopoly

Table 5: Port Actor Network Classification (Stevens, 1999)

Project-oriented Organisational Forms

In many ways this approach of Stevens mirror's the organization forms developed by van de Velde (1999). Van de Velde also saw actors relationships as the basis of his organizational models. The first step of his organization forms was to see if projects driven by institutions were initiated by the government or by the market. Next is asked who develops these projects, again the government or the market. In this way, van de Velde reaches four organization forms. These are shown in figure 2 below.

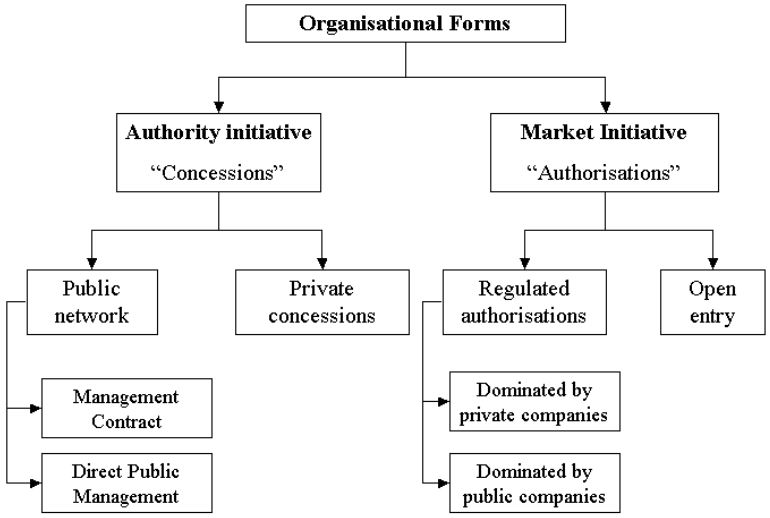


Figure 2: Institutional Models of van de Velde (1999)

That which is remarkable from these last two models is that they seek to explain ports through the relationships that different actors have towards each other. Rather than looking at the infrastructures themselves, these two actor oriented models set a background to how an institution works. From this, each case is intuitively and discursively studied.

3. The Common Port Property Rights Model: A Methodology

From the relevant classifications of ports and their institutions that have been discussed, a new classification will be developed. It is intended that this new model takes advantage of the positive aspects of these earlier models. Furthermore, this model must be useful and applicable without becoming complicated and overly detailed. The application to ports being in section four.

In order to come to this *Common Port Property Rights* model two factors are taken as cornerstones. These are the common physical infrastructures of the ports and the common property rights. Onto this matrix, the actors of the ports are modeled. This can thereafter be visually represented and textually supported. The applicability of this being an ease of comparison in discussions and conclusions of the model.

Identification of Port Infrastructure

In this research, a port is defined as an institutional network of structures that transports goods through the water land interface. However, from this overly general network definition of a port a list of infrastructure must be made. Rather than making a new one, in this research usage is made of the port infrastructure list produced by the World Bank (2001). This list is shown in table 6, below.

Economic Infrastructure	**Port Superstructure**
Tax System	Paving
Customs	Terminal lighting
Port Access Fees	Parking areas
Knowledge Infrastructure	Sheds, warehouses and stacking areas
Leases	Tank farms/silos
Contracts	Offices
Port Statistics	Repair shops
Environmental Infrastructure	Other terminal operation buildings
Air	**Local Port Infrastructure**
Water	Inner port channels
Land	Revements and slopes
Transregional Infrastructure	Roads, tunnels, bridges and locks
Maritime access channels	Quaywalls, jetties
Port entrance	Aids to navigation (buoys, beacons)
Protective Works (breakwaters, etc.)	Meteorological systems
Sea locks	Mooring buoys
Access inland transport	Vessel Traffic Management System
Rail connection to hinterland	Firefighting equipment
Inland port waterways	Docks
Company Assets	Port land
Tugs	Access roads to general road infrastructure
Line handling vessels	Rail connection
Dredging equipment	Dry-docks
Ship/shore handling equipment	
Cargo handling equipment	

Table 6: Common Port Infrastructures Source: World Bank (2001)

While it is certain that this list is not exhaustive of all the structures in a port, they do represent in general terms the common elements to all ports. Furthermore, while a finer detail of inspection is always possible, it does not necessarily bring any added value. On the level of the port, it is argued that this detail of infrastructure analysis is sufficient.

Property Rights

Barzel (1997) defines property rights as the rights that "an individual has over a commodity (or an asset) to be *the individuals ability*, in *expected terms, to consume the good* (or *the services of the asset*) directly or to consume it indirectly through exchange." Using this as a reference, the literature was scanned to find applicable rights in order to build a systematic classification.

Eight property rights were identified for this research. The source of these property rights were twofold. The first source was the classifications of port functions by Baird in his Port Function matrix (Baird, 1995) who used as sources De Monie (1994) and Goss (1990). The second source of property rights that was used for this paper were the legal property rights as identified by Pejovich (1990).

The eight factors that are were taken from this exercise and used in this research are defined as the following:

- **Usus (fructus):** Usus is the right that an actor has for using a form of infrastructure. Furthermore, usus fructus is the right that an actor has to use said infrastructure for economic gain. These two forms of usage are bundled together in this research into one institutional factor.

- **Operation Costs:** This is defined as the costs of keeping the infrastructure running, but not for the maintenance of this. This payment includes the operating budget of the activity.

- **Construction (abusus):** This is defined as the responsibility of paying for the creation of infrastructure. Construction also includes the costs for the creation of the land, but not the maintenance of the land. However, construction costs do include extensions, enlargement and enhancement (abusus) to the infrastructure and superstructure.

- **Maintenance:** This factor is defined as the responsibility of caring for and preserving the infrastructure. It is the actual carrying out of the maintenance and the discrepancies therefrom that is concerned in this research.

- **Inspection and Enforcement:** Inspection is the activity, whereby activities are checked to make sure that they are running within previously defined limits. Inspection and enforcement are not to be confused with regulation. Inspection and enforcement are separate powers in their own right.

- **Leasing and Contracting:** This factor is the ability to let others use the land. This involves the granting of part or the entire infrastructure to another actor.

- **Designing and Planning:** This form of management is defined as the process of planning, organizing, directing and controlling the activities of employees in combination with other organizational resources to accomplish stated organizational goals.

- **Zoning and Permits:** This is defined as the ability to set standards on activities. The actors who act in a regulatory fashion are those that set policy. These policies are on both the roles that the actors play, the impact that they have on the infrastructure and the rights that the actors have within the port. This factor is an emphasis on those actors that **grant** permits and **set** zoning policy.

Matching Property Rights to Port Infrastructure

Now that the infrastructures and the property rights have been defined, an attempt can be made to integrate these two defining characteristics into one common analytical port typology. In order to understand this better, table 7 (shown on the next page) was made.

			Scale						
			Economic Infrastructure	**Knowledge Infrastructure**	**Environment**	**Transregional Infrastructure**	**Local Infrastructure**	**Superstructure**	**Company Assets**
Port Functions	**User**	**Usus (fructus)**	Uses the economic infrastructure for economic/personal benefit.	Uses information gained on the port for economic/ personal benefit.	Uses the land, air, and water of the port for economic/ personal benefit.	Uses national port infrastructure for economic/personal benefit.	Uses the local port infrastructure for economic/ personal benefit.	Uses the superstructure for economic/ personal benefit.	Uses private firms assets for economic/ personal benefit.
		Operation	Funds the operation of the port economic infrastructure.	Is responsible for the application of port information.	Funds the operation of the environment.	Operates the national port infrastructure.	Operates the local infrastructure.	Operates the port superstructure.	Operates the assets of a private company.
	Landowner	**Construction (abusus)**	Sets tax plans, tariffs and payment structure in the port.	Carries out studies on the port that bring new information.	Constructs the port environment.	Constructs the national port infrastructure.	Constructs the local infrastructure.	Constructs superstructure.	Constructs the assets of a private firm.
		Maintenance	Maintains the economic port infrastructure.	Is the repository of the knowledge on the port.	Maintains the port environment.	Maintains the national port infrastructure.	Maintains the local infrastructure.	Maintains the port superstructure.	Maintains the assets of a private company.
	Regulator	**Inspection and Enforcement**	Inspects to make sure port economic rules are followed.	Makes sure that information on the port is accurate.	Inspects the usage of the port environment.	Inspects the national port infrastructure.	Inspects the local infrastructure.	Inspects the port superstructure.	Inspects the assets of private firms.
		Leasing and Contracting	Able to lend/hire out expertise on economic issues involving port trade.	Lends and hires out information on the port.	Leases or contracts the environment of the port.	Leases and contracts activity using the national infrastructure of the port.	Leases or contracts the local port infrastructure.	Leases or contracts the superstructure.	Leases or contracts the use of the assets of private companies.
		Design and Planning	Instigates changes to the port economic infrastructure.	Is involved in designing reports and examinations of port activities.	Makes future plans and designs on the use of the port environment.	Designs and makes plan for the national port infrastructure.	Designs and plans the local infrastructure.	Designs and plans superstructure.	Designs and plans the assets of a private firm.
		Zoning and Permits	Gives permits for port economic activities.	Decides who has access to port information.	Gives permits establishing the rights of using the port environment.	Sets the rules of whom may use the national port infrastructure.	Sets the rules of whom may use the local infrastructure.	Gives the permits so that actors may make superstructure.	Sets the rules of usage of company assets.

Table 7: Relationship Between Infrastructures and Institutional Factors

The reason why table 7 was constructed is that it is the intention in the following section to see what actors fulfill what duties in the port in reference to the identified infrastructure above. The logic behind this is that if one understands the relationships between the actors and the infrastructure, one can begin to draw conclusions as to how projects develop. Furthermore, one can thereafter offer interpretations as to why these institutional relationships are causing the stated outcomes.

This table is a methodology. For each of the boxes, one asks the question of who performs this property right on this structure. This procedure is done for each of the infrastructures shown in table 6 for each of the property rights as they have been identified and defined previously.

The advantages of this methodology is that it is transparent and consistent. It is transparent because of the structures and property rights have been defined. If there are any questions that arise or if one would like to perform this methodology for oneself, one merely needs to look at the factors as defined in this article.

This methodology is also meant to be consistent and thorough. It has been constructed this way so that there would not be any doubt that all of the permutations between property rights and structures have been discovered. In this way, while nothing is missed, one can still highlight only the most important aspects to draw conclusions from.

4. Applying the Property Rights Model to the Hamburg – Le Havre Range Ports

It is now the intention to demonstrate how this property rights model is able to differentiate between ports that have previously been grouped together. In order to do this, six ports are taken into consideration. These ports are the ports of Rotterdam, Antwerp, Hamburg, Bremen, Felixstowe and Le Havre.

These ports were chosen for three main reasons. Firstly, they are often referred to in the port literature as being in the same "range". This so-named Hamburg-Le Havre range serving much the same hinterland. In this way, one supposes that the ports are heavily competitive towards each other. Furthermore, since they are often compared to each other, this paper is not imposing any false groupings.

Secondly, all of these ports are of roughly the same size and have the same market orientation. Each, of course, having its specialties, but none dominated solely by one industrial activity. Each port sees more than one million containers per year cross the quay and has major facilities for tankers. Furthermore, all share common physical characteristics, each having deep harbors, excellent rail connections, road connections and waterways.

Thirdly, they are each governed by different national (in the case of Rotterdam, Le Havre and Felixstowe) or regional (in the case of Bremen, Hamburg and Antwerp) bodies that are arguably completely run independently of each other. The ports of Bremen and Hamburg, while both in Germany, are municipal ports run independently by their respective municipal governments. As for

the ports of Rotterdam and Antwerp, while both are Dutch speaking ports located in the "Lowlands", their cultural and political differences set them starkly apart.

The "Hanseatic" Ports

The *Hanseatic* ports that fulfill the analytical criteria of this study are the ports of Rotterdam, Antwerp, Bremen and Hamburg. The term *Hanseatic* is a historical one that refers to the development of several ports in northern Europe that belonged to a network of ports. These locally controlled ports (from the German word *Hanse*, meaning *local community*) were active in the thirteenth and fourteenth century ranging from Russia to Latvia to Sweden, Denmark, Germany and later to the Netherlands.

The ports which are in this study identified as *Hanseatic* are so identified because they have previously been identified so in the port classification literature (Kreukels and Wever, 1998; Trujillo and Nombela, 2000) as discussed in section two of this article. While these ports were not necessarily a part of the historical *Hanseatic League* of ports, they are nevertheless so labeled. This is due to the asserted similar institutional positions that these modern day ports have in relation to their local government authorities.

Also, much of the literature has lumped these ports together according to their label as *Landlord* ports (Kreukels and Weaver, 1998; Stevens, 1999), the definition of which was discussed in section 2. As landlord ports, then, one would expect these ports to have the same level of privatization of property rights, as shown in the Toolkit classification. However, it is the finding of this research that this is not the case.

Furthermore, according to the *port function matrix* (Baird, 1995) all of these ports are *PUBLIC/private* ports (Cass, 1996), as shown in section two. Accordingly, one would expect that the *Regulatory* and *Landowner* functions of these ports would be wholly public, while the port function *Operators* would be wholly private. Again, however, when one looks at the individual property rights that are part of these functions, the relationships are much more complicated.

The port of Rotterdam

Situated in the Netherlands, the port of Rotterdam wends for 40 kilometers northwestwards, starting from the southwestern-most point of the city of Rotterdam along the Maas River[1] to the North Sea. The total port area, including water, is 10,500 ha. This makes the port of Rotterdam, according to the facts present to the author, the second largest in the world in size[2]. Of this amount, 3500 ha are water.

Dividing the public sector into two levels is a necessary action in the case of Rotterdam. The reason for this is the heavy demarcation of activities that are carried by these two entities, the national

[1] It is somewhat debatable if one should refer to this section of the Maas as a river or a canal. This is due to the fact that the last part of the "river" where the port is situated has been engineered, dredged and worked so heavily.
[2] According to the author's data and the information given to him by the Dutch National Ports Council, the port of Antwerp tops out at 14,055 ha.

government and the port authority. (Stevens, 2000; de Goey, 1990; Ministerie van Verkeer en Waterstaat, 1999). In general, one can state that the national level is responsible for making policy decisions, but leaves the actual laying of these plans in the hands of the individual city government. However, in the case of Rotterdam, the port authority acts independently of the city, who as a rule, reverts to the expertise of the port authority (De Goey, 1990; Stevens, 2000).

The port of Rotterdam is shown in figure 3 on the following page. The areas of black show the involvement of private actors to activities of the port in reference to the various infrastructures. The striped section refers to port functions that are shared by the public and the private actors. Meanwhile, the blank areas are port functions still controlled solely by a public actor.

As illustrated in figure 3, the port of Rotterdam is the *Hanseatic* port with the most privatized property rights. Interviews have revealed that private companies have total control over their own assets. Besides this, private companies have partial ownership of much of the *Superstructure*, *Local Infrastructure* and *Transregional Infrastructure*. This is especially true of the rail and road networks. The *Transregional* rail networks being operated, owned and regulated by ProRail, a recently privatized division of the national government. Also, *Local Infrastructures* such as rail connections, access roads and the port land is regularly operated and owned by private companies.

However, what is possibly the most telling point from the classification in the port of Rotterdam is the involvement of private actors in the *Environment*. According to several interviews with both private and public actors, the private companies are heavily involved with the O*perating* and *Landowner* functions in the port of Rotterdam. One example is the plan to rely on private sector involvement in the construction of an extension to the Maasvlakte. Another example is the chemical cluster that tightened environmental standards to well below government restrictions without prodding from external government forces. It is possible that this is due to the culpability that is inherent in the leases which private actors sign in order to operate in the port of Rotterdam.

The port of Antwerp

The port of Antwerp is an inland port that is located 90 kilometers upstream from the North Sea on the Scheldt River. The port has an area an area of approximately 14,000 ha, around 7,500 ha of which lie on the Right Bank and a further 5,800 ha in use on the Left Bank. The overall quay wall length is around 130 kilometers. Furthermore there are about 280 kilometers of roads and 960 kilometers of railway (AMPA, 2001).

Like the port of Rotterdam, the port of Antwerp is under the auspices of a regional port authority, the Antwerp Municipal Port Authority (AMPA). However, unlike Rotterdam, the national Belgian government is only active in the financial infrastructure and leaves almost all public functions in the hands of the municipal government. Like Rotterdam, however, the port authority is almost exclusively in charge of these public port functions. Exceptions to this rule include the Flemish government (a sub-national public actor) that is in charge of the *Local Infrastructure* as well as the channels and roads in the *Transregional Infrastructure*.

However, what stands out from the port of Antwerp is the port functions that are denied to private actors, who otherwise have invested heavily in *Superstructure*. This is due to the unique policy of

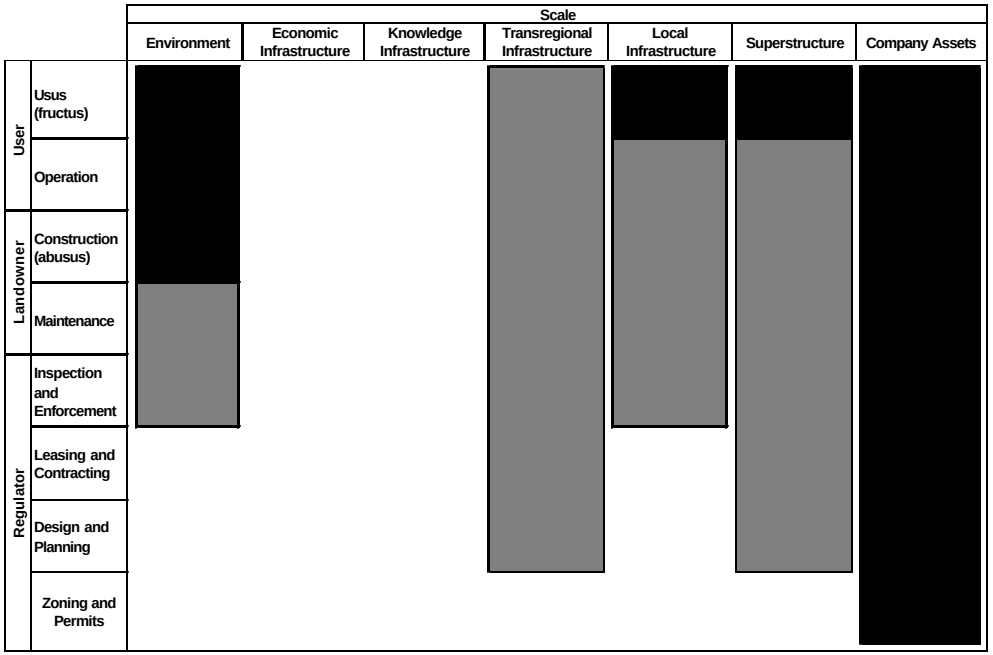
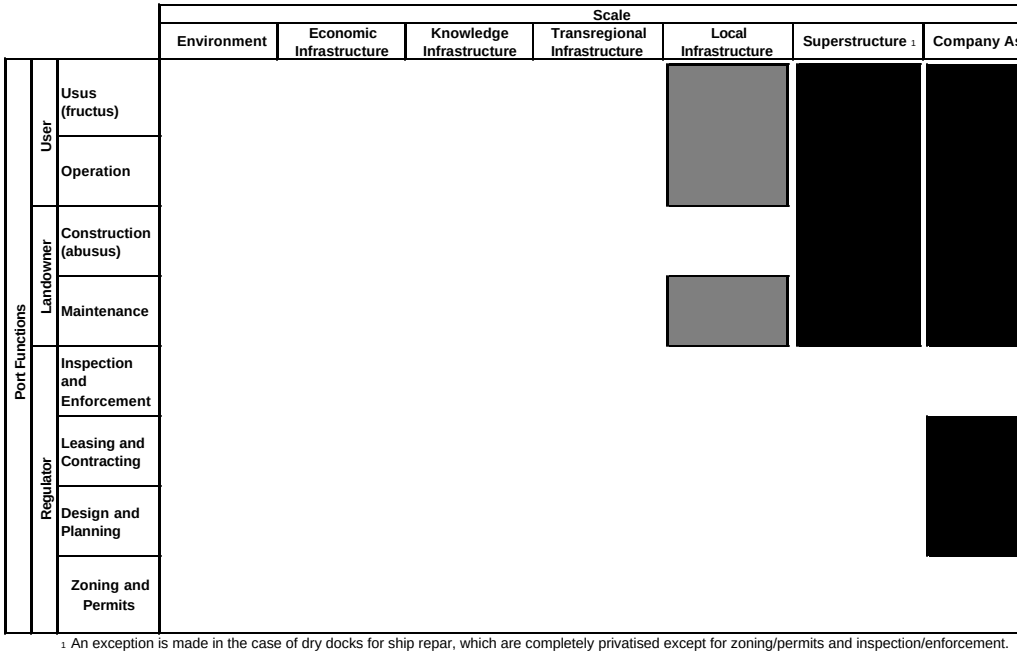


Figure 3: The port of Rotterdam



1 An exception is made in the case of dry docks for ship repar, which are completely privatised except for zoning/permits and inspection/enforcement.

Figure 4: The port of Antwerp

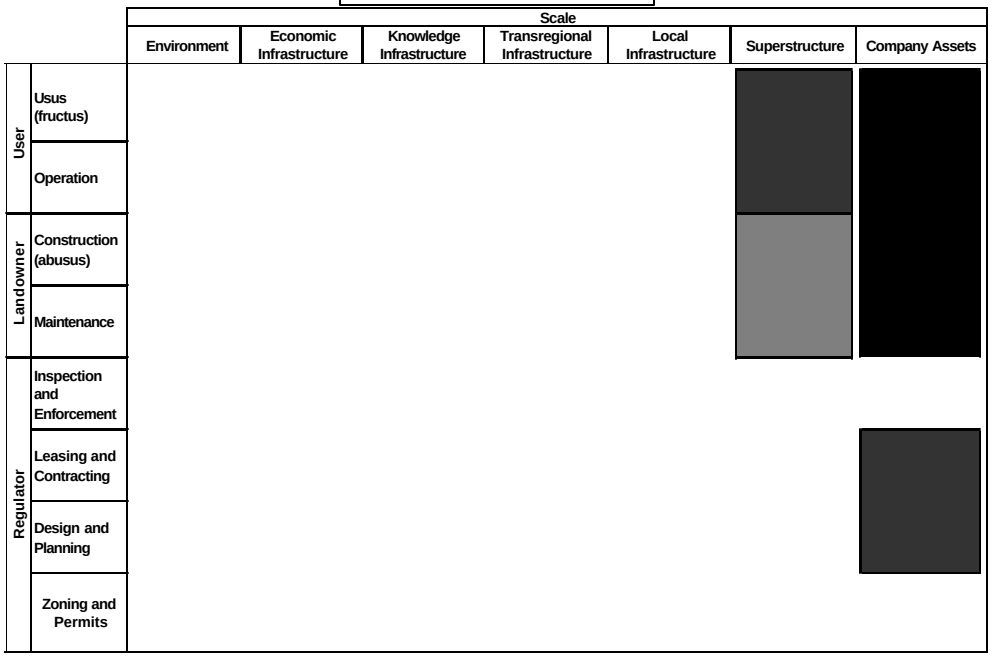


Figure 5: The port of Hamburg

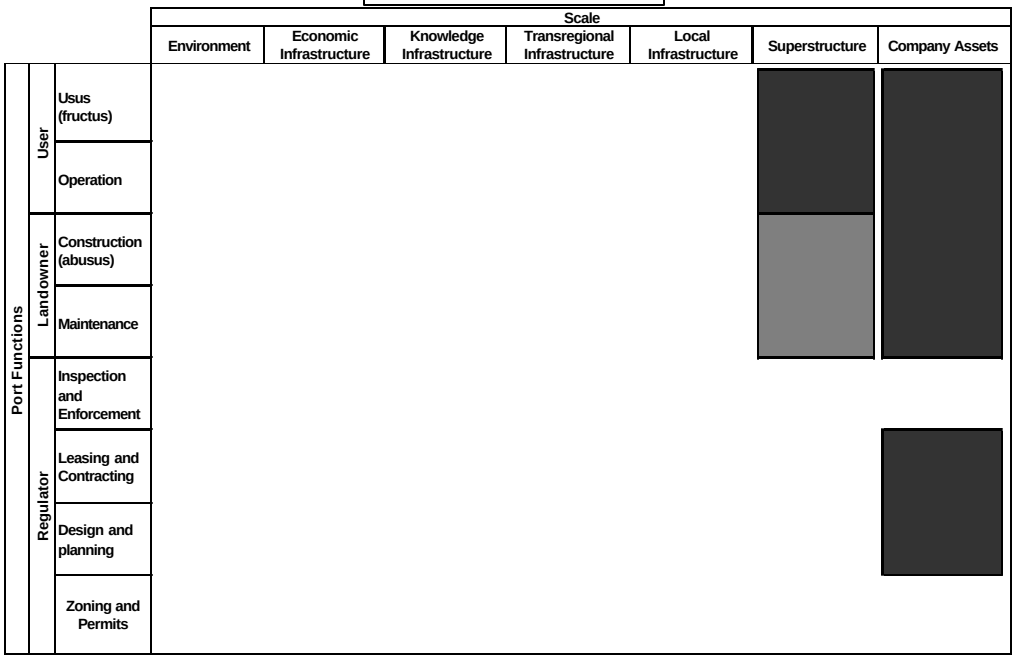


Figure 6: The port of Bremen

Black = Private; Gray = Public/Private Mix; Blank = Public

the AMPA to grant concessions rather than leases to port land. As shown by van de Velde (1999) in section 2, private concessions come from a public authority initiative. Such concessions arise from a more strongly controlled public port institution in comparison to market initiated port institutions that are regulatory oriented, such as the port of Rotterdam.

These facts are reflected in the classification of the port of Antwerp in figure 4. This shows that while private actors have almost complete control of their own *Assets* and *Superstructures*, they have little involvement in the *Local Infrastructure* port functions and almost none in the other infrastructure categories. In general, this means that private companies in the port of Antwerp have extensive rights to their property, but the scale of property that they are involved in is limited.

The ports of Hamburg and Bremen

Due to the fact that both the ports of Hamburg and Bremen have extremely similar institutional forms, they will be addressed here together. Both the port of Hamburg and Bremen have the status of *Bundesland* or city-state. This means that the city is responsible for the port's administrative and economic policy.

As a river port, Hamburg is situated 120 kilometers southeast of the North Sea along the Elbe river. The port covers approximate 7,500 ha of land, roughly one tenth of city of Hamburg's territory. The port of Hamburg is currently facing a dilemma of access, dues to the channel depth constraints. As a consequence, the extraordinarily high costs of deepening the river Elbe is being passed on in the form of a road tax for surface transport and dock charges for the total coasts of port facilities. This will certainly negatively effect the container industry in the port of Hamburg, who as of 1997 had the highest container terminal handling charges in the Northern Europe (Drewry, 1998).

Bremen is located on the river Weser and is the most southerly located port in Germany. Unlike Hamburg, Bremen has an extension 60 kilometers upstream at Bremerhaven. Bremen is best known as Europe's leading vehicle handling port and has one of Europe's largest cold storage centers and is Germany's leading port in the fish industry. With 3000 meters of quay at its disposal, Bremen handles an approximate 3 million TEUs per year.

Since these two ports are each part of their own state, it is this public body that governs the ports. Furthermore, unlike Antwerp and Rotterdam, there is no separate port authority in charge of these ports. The relationship between the public and private actors in the ports of Hamburg and Bremen are regulated by the Port Planning Byelaw (*Hafenordnung*). As a general rule, this byelaw states that only some of the industrial activities and some of the superstructure is under the auspices of the private actors.

Other port functions are city controlled, such as the major container terminals in both cities. In Hamburg the container terminal giant *Hamburger Hafen- und Lagerhaus-Aktiengesellschaft* (HHL) (Hamburg Docks and Warehouses Limited) has a 60% share of the Hamburg container market. In Bremen, it is the Bremer Lagerhaus-Gesellschaft (BLG) that is two-thirds owned by the city-state (Drewry, 1998). Since 1970, however, the *Utility* functions of HHL have been privatized, while the non-*Utility* functions remain public. Similarly, in 1997, plans were made for the restructuring of BLG to allow for a minority private ownership. These developments are shown in Figure 5 and 6.

Also as shown in Figure 5 and 6, the private actors in Hamburg and Bremen have absolutely no role in any of the infrastructures above the scale of *Company Assets* and *Superstructure*. Furthermore, in such cases as the HHL and BLG, even some of the superstructure is in the hands of the city.

The Port of Felixstowe

Located in a rural corner of south-east England, there are several reasons that make the port of Felixstowe attractive to the shipping industry (Planco Consulting/NEA Transport Research and Training, 1995; Felixstowe Dock and Railway Company, 1996; Baird, 1999). Not the least of the advantages of Felixstowe are the deep berths and entrance channel and unrestricted entry and departure. Further advantages to the port of Felixstowe include excellent road and rail connections.

Although the port of Felixstowe's physical infrastructure is as standard as the rest of the Hamburg-Le Havre range's, it is the privatization of the port functions that make the port of Felixstowe stand apart. It was the genesis of the port of Felixstowe in 1875 by an Act of Parliament that set this privatization tone. It was soon thereafter in 1879, in a further Act of Parliament, that the Felixstowe Dock and Railway Company (FD&RC), the port authority of the port of Felixstowe, was created. Later owners of FD&RC included a grain merchant named Gordon Parker (1951), European Ferries Plc., P&O Group (1987) and Hutchison Whampoa (1991).

As illustrated in Figure 7 below, the privatization within the port of Felixstowe is much more extensive than any of the other ports in north-west of Europe. All port functions relating to the infrastructures *Company Assets*, *Superstructure*, *Local Infrastructure* and *Knowledge Infrastructure* are performed by the FD&RC except for the *Zoning and Permits* of *Superstructure* and *Local Infrastructure*. This is due to the fact that the port still needs Parliamentary approval for expansions as well as local district (Suffolk Coastal District Council) and county (Suffolk County Council) council approval. These district and county councils in most cases support the FD&RC (Baird, 1999).

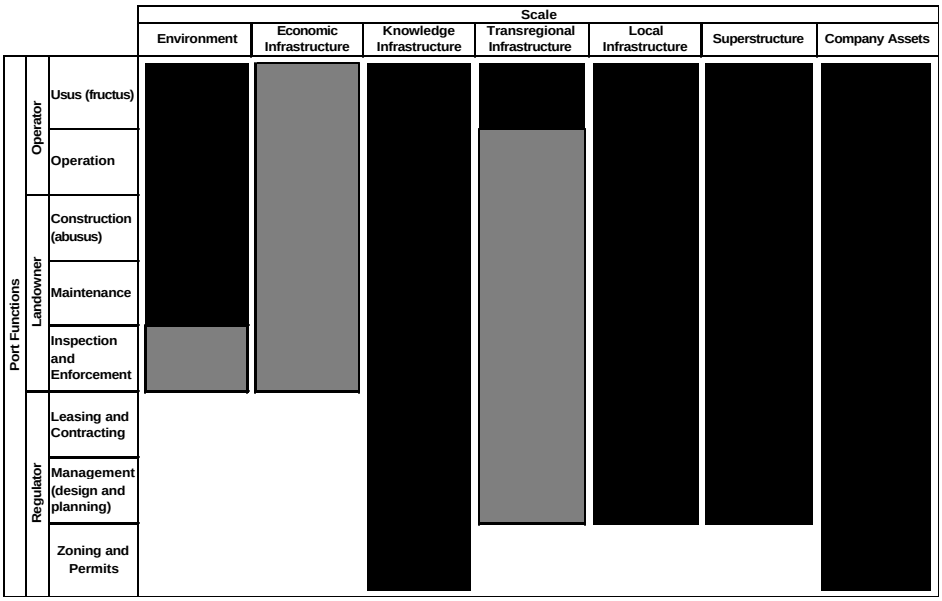


Figure 7: The port of Felixstowe

While the private actors in the port hold extensive responsibilities, the public authority is not completely left out. The most active public actor in the port of Felixstowe is the Harwich Haven Authority (HHA). The HHA is a public trust organization which maintains that the external channels remain navigable. As recent as 1996 the HHA undertook a £19 million dredging operation, the costs of which are passed on through fees on vessels. Another actor responsible for *Transregional Infrastructures* is the central government that funded the A14 trunk road in the 1970's and the A1-M6 road link upgrade in 1994.

The national government is also involved in the *Environment* and *Economic Infrastructure*. The Department of Environment, Transport and Regions (DETR) is responsible for the security and safety matters in the port itself, the Health and Safety Executive (HSE) is responsible for the landside and the Marine and Coastguard Agency (MCA) is responsible for the enforcement of maritime regulations.

The Port of Le Havre

Like the port of Felixstowe, the port of Le Havre is truly unique to the rest of the range. While all the other ports discussed in the range (including Felixstowe) are either run by the local government or have a local government that implicitly promotes and supports the port, the port of Le Havre is often run contrary to the desires or without the consent (and in at least one case without even the knowledge) of the local government. This is due to the centralization logic of the French national government that sets up in key French ports an independent port authority. This port authority is only responsible to and is wholly sponsored by the French State.

Created in the 16th Century by the French State at the mouth of the Seine, the port of Le Havre is in light of containers the busiest port in France. Currently, close to 60 millions tons of goods are loaded and unloaded in Le Havre annually. This is mainly thanks to the Fordist ideology that the port acts as a rapid transition between land and sea with as little barrier to throughput as possible. The port of Le Havre is seen merely as a link in the logistic chain for the French hinterland and not as a Hub port for Europe.

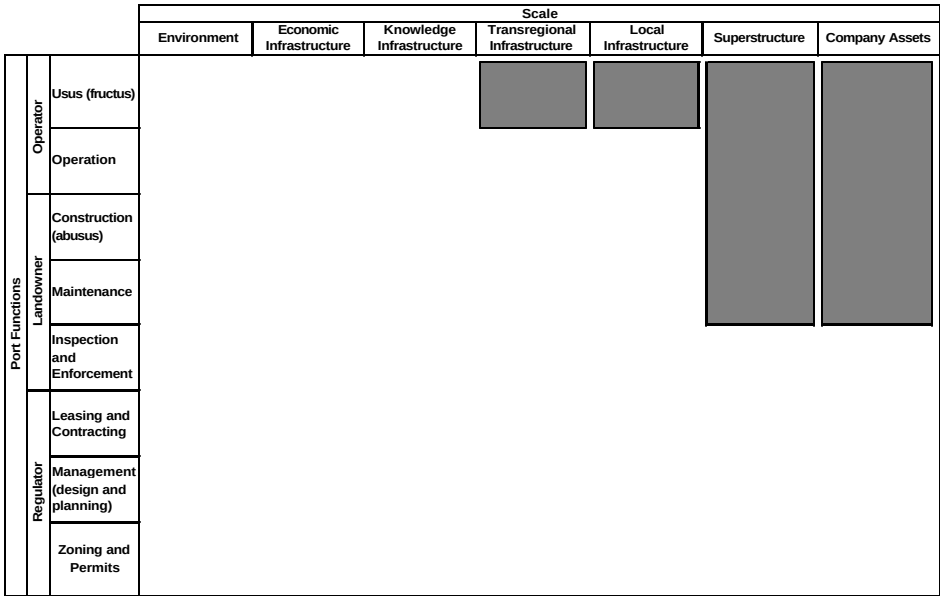


Figure 8: The port of Le Havre

As illustrated in Figure 8 above, there is very little private involvement in port functions in the port of Le Havre. This is primarily due to the fact that there is an almost total lack of private companies in Le Havre. Since the port is seen purely as a transition point for French internal businesses, no other services, such as warehousing and break-bulk services, were offered until only recently and then only limitedly. Some researchers believe that this is the reason why Le Havre's conventional traffic "fell to its current (ridiculously low) level (Baudouin and Collin, 1998)".

The argument is that the current maritime markets demand storage, processing and the other general Hub port activities that the port authority (Port Autonome du Havre) does not offer or will not allow private companies to offer. This, it is pointed out, is due to French property laws.

5. Conclusions

The following points take into consideration lessons that can be drawn from the research discussed in this article as well as future research possibilities that this research opens.

Over-generalized models do not offer a depth of analysis of the port institutional situation sufficient enough to make policy recommendations. Furthermore, if one is to promote models of port privatization, much more must be considered than only infrastructure or only actor privatization or only property rights relationships. One must understand all three in order to come to models that work. It is asserted that this can be done with empirical research centered on evaluating both economic and infrastructural efficiency and production.

A port is a conglomeration of various infrastructures. These structures do not work apart, but in a network. The network of activities that go on in a port use these structures. It is therefore paramount to understand what these infrastructures are and which actors perform what duties to these myriad infrastructures in order to understand the port itself and how it functions.

Privatization is not ownership. Ownership by itself does not mean anything. The property rights that are attached to the ownership or use of the land that is more important. This can either be set out in contracts, as in a lease or in concessions, or by a legal system that sets the rights that an owner has to enjoy the rights and responsibilities of that space.

This analysis of port privatization of property rights does not seek to evaluate models, rather it seeks to find models. In the future, these models can be tested with indicators. When this further economic and infrastructure analysis is performed, it is hoped that it will shed light on the strengths and weaknesses of each model. This in turn will allow conclusions to be drawn on such issues as growth and land use port planning. Furthermore, advice can be given on the best model to implement for any given land use strategy.

In this article, privatization and port management was modeled vis-à-vis the private actors. This does not necessarily have to be the case. One could also model management of a port with reference to a regional or national authority. In the future it would be useful to see what public actors perform which functions with relation to each other. In this way, the functions of the private actors are not modeled, but that of the various port authorities are.

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