

DEPARTMENT OF TRANSPORT AND REGIONAL ECONOMICS

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A framework for ex-post evaluation**

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THE ECONOMICS OF PORT AUTHORITY REFORM A FRAMEWORK FOR EX-POST EVALUATION

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ABSTRACT

The activities of a port authority form but one of several factors that can contribute to the competitiveness of a port. A port authority can increase its contribution by optimising the various functions it performs in a facilitating and entrepreneurial manner. Port authority reform matters in that it must set the right governance framework for port authorities to achieve their full potential contribution to the competitiveness of their ports. The objective of this paper is to complement existing literature and empirical research on the role of port authorities with a theoretical perspective on how to measure the specific economic impact of port authority reform and understand the process of reform and post-reform governance. The paper outlines a comprehensive analytical framework to assess both elements in a quantitative and qualitative manner. The centrepiece of the framework is based on welfare economics concepts. It introduces a methodology based on techniques of cost-benefit analysis and generalised costs to measure the economic impact of port authority reform on the competitiveness of a port. The application of the framework for ex-post evaluation will allow policy-makers to identify areas of further improvement and will offer useful insights for those envisaging new reform schemes.

KEYWORDS

Port reform; port authorities; port governance; port competitiveness; welfare economics; generalised cost

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1. INTRODUCTION

Port reform has been a topical issue since the 1970s. The technological revolution introduced by the container fundamentally changed the port concept, with far-reaching implications in terms of operations, scale and market structure. Ports evolved from places where cargo was loaded and unloaded to nodal points in logistic chains. At the same time, the societal context in which ports function has been marked by important shifts in stakeholder acceptance. Due to growing environmental consciousness and NIMBY ('Not In My Back Yard') attitudes, port development met with increasingly sceptical – and often downright hostile – reactions from society. Also the attitude of governments changed. Today, the understanding that what is good for the port, is good for the city, region and/or country does no longer automatically uphold.

Together with globalisation of trade and new philosophies on public management, the changed technological, market and societal environment have created the context and drivers for port reform programmes all over the world (Brooks and Cullinane, 2007). Early adopters could be found in countries with Anglo-Saxon roots, such as the UK, Australia and New Zealand, where reforms were often quite radical, leading to full-blown privatisation of ports. Global institutions such as the World Bank have however promoted a more balanced reform scheme, which brings in private operators for the provision of cargo-handling services, which have a contractual relation with a publicly owned, but commercialised or corporatised, port authority that owns or manages the basic infrastructure and port land (World Bank, 2010). This idealised form of the so-called 'landlord model' has found widespread followers and has even become somewhat of a panacea, although its implementation in reality differs substantially.

Global experience with port reform has demonstrated that results are not always satisfactory. One of the principal difficulties is to link port reform to port performance, a problem which is even more for outspoken for the specific economic impact of reforming port authorities (Brooks and Cullinane, 2007).

In this paper, we aim to explore theoretical foundations and possible ways of isolating and measuring the economic impact of reforming port authorities. We focus in that respect on the transshipment function of a port, i.e. its position within the broader transport chain, and not so much on its industrial or logistics location function². To understand the impact, we must also understand the reform process itself and the post-reform governance framework (Australian Competition and Consumer Commission, 2010). In section 3, we develop a comprehensive framework for ex-post evaluation of port authority reform which consists of four key elements. These are elaborated in individual sections of the paper: the economic impact of reform on the productive efficiency of the port authority in section 4, the economic impact of reform on the competitiveness of the port in section 5, the analysis of the reform process in section 6 and the assessment of post-reform governance in section 7. We consider the method for assessing economic impact of reform on the competitiveness of the port to be the most significant and original part of the framework, which is why we are giving section 5

² One could argue that the location function of a port is in fact derived from, and therefore subordinate to, the transshipment function.

considerably more attention than the others. An introductory section 2 discusses existing literature and empirical evidence on port authority reform. We conclude the paper with reflections on the practical use of the framework (section 8) and research implications (section 9).

The paper is essentially theoretical in nature and does therefore not include empirical applications. We will however occasionally use examples from practice to illustrate certain points. These examples are mainly drawn from experience in Europe.

2. EVALUATING PORT AUTHORITY REFORM

We define a ‘port authority’ in generic terms as a body with statutory responsibilities that manages a port’s water and land-side domain, regardless of its ownership or legal form (De Monie, 2004). In this section we will first situate port authority reform in the wider context of port reform. We will then identify the contribution that a port authority can theoretically make to the overall competitiveness of a port. This is followed by a brief overview of previous experience in empirically evaluating port authority reform.

2.1. The port reform context

Port reform covers many elements of which port authority reform is only one. The most visible elements are those related to ownership, operations and services. Privatisation of port ownership is overall a rather exceptional phenomenon, but one that is widely commented on, as we for instance can see from the vast amount of literature that exists on the privatisation of UK ports (Verhoeven, 2014). A number of countries have also witnessed decentralisation, whereby central government cedes ownership of ports to lower government levels (as happened a few years ago in France for ports of regional importance). Vertical unbundling of operations often occurs in the port sector, which is in fact the essence of the landlord model. In some cases horizontal unbundling has occurred as well, whereby national port authorities were split up into local ones. Vertical unbundling has often been preceded or gone hand in hand with liberalisation of port services, e.g. the abolishment of port labour restrictions. The reform of port authorities may be less visible, but it is certainly quite common and substantially discussed in literature (for an overview, see Verhoeven, 2010). Here again, privatisation is the least common form, with corporatisation and commercialisation being much more widespread. Both aim at establishing the port authority as a separate and more autonomous (legal) entity from government, the difference being that corporatisation involves the creation of share capital. Port authority reform is often part of a wider reform package and introduced simultaneously with other port reform elements. This may make it therefore rather difficult to evaluate its economic impact.

2.2. Competitiveness of ports and reform of port authorities

Now that we have framed port authority reform into the wider context of port reform, the question arises why this particular type of reform matters. In other words, why would we want to improve the role of port authorities?

A port does not exist in isolation. It is an essential element in a wider logistics chain (Meersman, et al., 2010). This implies that a port that contributes most substantially to reducing the generalised cost, i.e. monetary and non-monetary cost, of the relevant chains is most likely to be chosen as a port of call. The fact that a port is part of a wider logistics chain however also implies that its competitiveness depends on a multitude of both internal and external factors (Van de Voorde and Winkelmann, 2002). A port authority is therefore only one of many actors that contributes to the competitive advantage of a seaport (Haezendonck and Notteboom, 2002). This precisely constitutes the main challenge when evaluating the economic impact of port authority reform. For Goss (1990a), the contribution of a (public sector) port authority to the competitiveness of a port lies in the ability to deal with many instances of ‘market failure’ in the processes of planning, controlling externalities and promoting competition that would occur if these issues were left wholly to the private sector. He implies that, to achieve this objective, port authority reform ought to result in lean and focused port authorities that adhere to the landlord model. Haezendonck and Notteboom (2002) find that ‘customer-led’ seaports are most likely to succeed in the 21st century, i.e. seaports that really understand customer needs, offering ‘best-in-class’ performance. They believe that port authorities should therefore identify, cultivate and exploit their core competencies. A port authority can be a catalyst, even though its direct impact on cargo flows is limited. We would add that a 21st century port authority also needs to understand non-commercial stakeholder needs if it wants to retain and improve the competitiveness of the port. Next to reviewing their traditional landlord, regulator and operator functions, port authorities therefore also need to develop their ‘community manager’ function. In addition, there exists considerable scope for port authorities to extend their activities beyond the local port perimeter, at regional or even at global level (Van der Lugt and De Langen, 2007).

Verhoeven (2010) identifies a typology with three hypothetical options for a port authority: to be a ‘conservator’, a ‘facilitator’ or an ‘entrepreneur’ (see Table 1). A ‘conservator’ port authority concentrates on being a good housekeeper and essentially sticks to a rather passive and mechanistic implementation of the traditional port authority functions, confined to the local level of its own port. Because of this low-profile attitude, conservator port authorities may run the highest risk of becoming extinct in the future as their contribution to the competitiveness of their ports is very limited. A ‘facilitator’ port authority profiles itself as a mediator and matchmaker between economic and societal interests, which translates itself, among other things, in a well-developed community manager function. Facilitator port authorities also look beyond the port perimeter and try to engage in strategic regional partnerships. It is the type of port authority which so far seems to find most support in literature. The ‘entrepreneur’ port authority combines the main features of the facilitator with a more outspoken commercial attitude as investor, service provider and consultant on local, regional and global level (Verhoeven, 2010).

Table 1: Hypothetical typology of port authorities

	Conservator	Facilitator	Entrepreneur
Landlord	Passive real estate “manager”	Active real estate “broker” Mediator in B2B relations Strategic partnerships beyond port perimeter	Active real estate “developer” Direct commercial B2B negotiations Direct investments beyond port perimeter
Regulator	Passive application and enforcement Rules set by others Financial revenue on “tariff” basis	Active application and enforcement Other + own rules Provide assistance in compliance Tariffs + differential charging options to promote sustainability	Idem facilitator Idem facilitator + commercialising expertise and tools outside port Financial revenue on commercial basis
Operator	Mechanistic concession policy	Dynamic concession policy “Leader in dissatisfaction” Provide public services / specialised services	Dynamic concession policy Shareholder in private service providers Provide commercial and public services
Community manager	Not actively developed	Solve economic bottlenecks Provide public goods Solve conflicting interests Promote positive externalities	Idem facilitator but more direct commercial involvement
	Local	Local + Regional	Local + Regional + Global

Source: Verhoeven (2010)

The application of this typology to European port authorities shows that most of them do have the ambition to develop as ‘facilitators’ or even ‘entrepreneurs’ (Verhoeven, 2011). Success however depends on the existing governance frameworks which can either enable or hamper these ambitions. This is where port authority reform comes in.

2.3. Previous experience in evaluating port authority reform

Extensive research has been done on the impact of reform on the efficiency of ports, but this mainly concerns the impact of ownership reform, privatisation of terminal operations and liberalisation of services (for a comprehensive overview see González and Trujillo, 2007 and Bichou, 2007). The terminal often forms the unit of analysis of these studies. Most of them

make use of econometric methods, such as stochastic frontier analysis (SFA), or non-parametric methods, such as data envelopment analysis (DEA). There is however very little quantitative research dealing with the economic impact of reforming port authorities. A noteworthy exception is the paper of Cheon et al (2009) which tests the hypothesis that a port authority with a more decentralised corporate structure and administration would make a port more efficient in its terminal operations. Using the Malmquist Productivity Index, they however do not find evidence for this hypothesis. De Langen and Heij (2014) analysed performance effects of the corporatisation of the Port of Rotterdam Authority by comparing a series of performance indicators for the port authority prior and after corporatisation. They found that, in terms of yearly growth rates before and after corporatisation, improvements were most significant for market share, turnover per employee, operating costs and EBITDA.

The impact of port management reform has mostly been studied in qualitative terms. Baltazar and Brooks (2001 and 2007) used contingency theory to devise a ‘matching framework’ that predicts the impact of the fit (or misfit) between environment, strategy and structure on organisational performance. It was initially applied to Canadian and Philippine ports and then used by other authors in qualitative case studies covering ports in various parts of the world (papers brought together in Brooks and Cullinane, 2007). Since then, other qualitative studies were made on reforms in specific countries (for an overview, see De Langen and Heij, 2014).

3. A COMPREHENSIVE FRAMEWORK FOR EX-POST EVALUATION OF PORT AUTHORITY REFORM

From the previous section, we retain that the activities of a port authority form but one of several factors that can contribute to the competitiveness of a port. A port authority can increase its potential contribution by optimising the various functions it performs in a facilitating and entrepreneurial manner. Successful port authorities are those that understand both commercial and non-commercial stakeholder needs and find the right balance between the landlord, operator, regulator and community manager functions, going beyond port boundaries where appropriate. Port authority reform matters in that it must set the right governance framework for port authorities to achieve their full potential contribution to the competitiveness of their ports. So far, there exists little quantitative research dealing with the economic impact of port authority reform. This is not surprising, given that isolating the impact of this specific element of port reform, which is often part of a wider reform package, is indeed a tricky process.

By developing a multi-layer framework, which has both an impact and process dimension, we try to provide a comprehensive way to evaluate port authority reform ex-post, producing both quantitative and qualitative results that complement each other. The design of the framework is inspired by frameworks that governments use to evaluate infrastructure reform programmes. Especially the Australian government has developed extensive guidance in this field that puts efficiency of reforms centre-stage, using sound theoretical and methodological insights (Australian Competition and Consumer Commission, 2010 and 2011).

The impact dimension consists of two elements. First, we identify a number of indicators that measure the impact of reform on the productive efficiency of the port authority itself. The second element is the centerpiece of the framework. It builds on welfare economics concepts

and introduces a methodology based on techniques of cost-benefit analysis and a generalised cost concept in order to measure economic impact of port authority reform on the competitiveness of the port. The process dimension aims to understand both how the reform programme was devised and delivered, seeking to evaluate its effectiveness, i.e. to evaluate whether reform achieved what it set out to do and explain why it did (or did not). It also consists of two elements, an assessment of the actual port reform process and assessment of post-reform governance.

Figure 1 summarises the interaction between the different elements of the framework. Figure 2 represents these elements from a timeline perspective, showing the consecutive order in which port authority reform is prepared and implemented. The following four sections of the paper elaborate each element in detail.

Figure 1 : Interaction elements evaluation framework

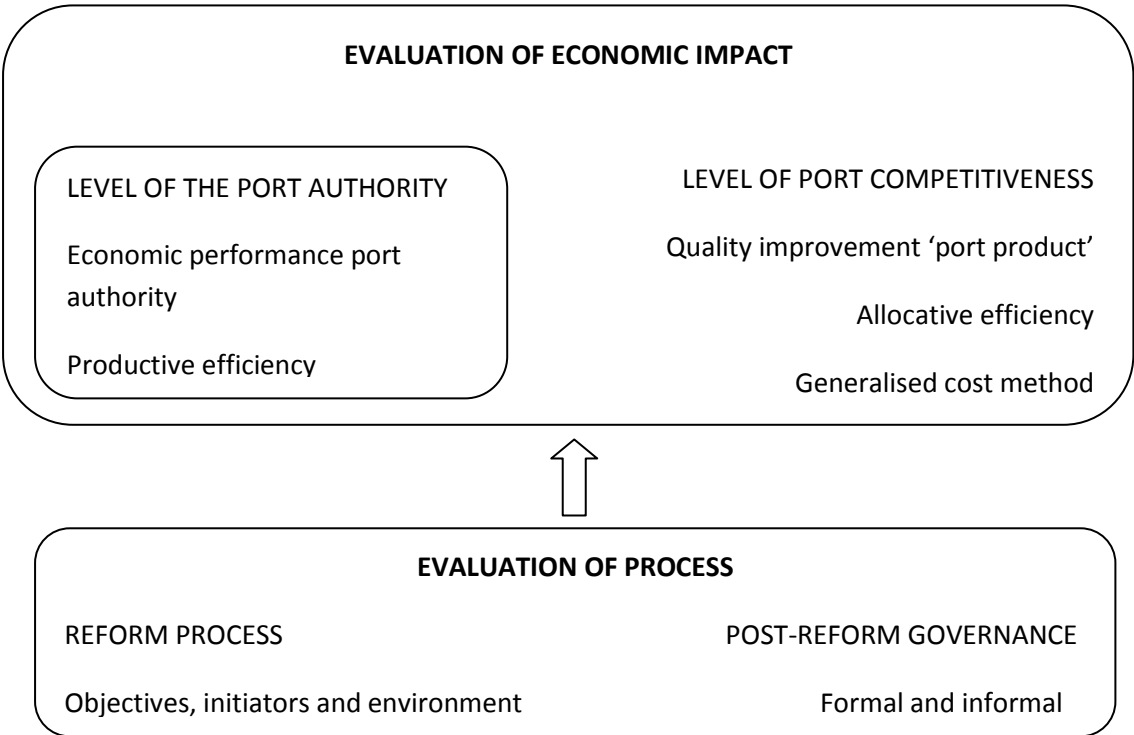
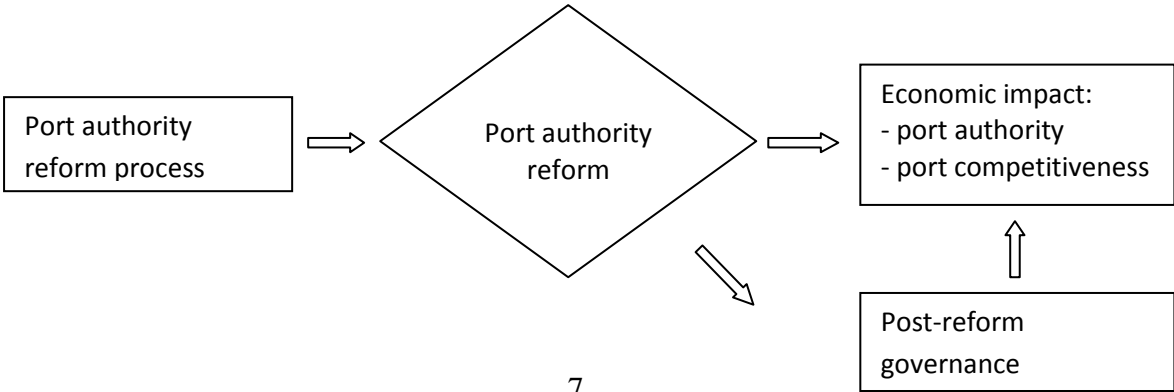


Figure 2: Timeline perspective of the elements of the evaluation framework



4. ECONOMIC IMPACT ON THE PORT AUTHORITY

Port authority reform will in the first place have a direct impact on the economic performance of the port authority itself. In this section, we first devise a theoretical basis as well as a number of performance indicators that can measure the impact on the productive efficiency of the port authority. We then discuss their use in practice.

4.1. Theoretical basis and performance indicators

Exploring the economic impact of reform at the level of the port authority boils down to measuring the impact on the productive efficiency of the port authority. Principal-agent theory has been widely used to explain why privatisation of firms would lead to higher productive efficiency (Parker and Saal, 2003). Port authority reform can take the form of privatisation, but overall – and certainly in Europe – this is rather exceptional (Baird, 2002; Verhoeven, 2011; Verhoeven and Vanoutrive, 2012). Reform more commonly results in commercialisation or corporatisation of the port authority. The practical difference between these forms is not important for our analysis, which is why we will simply refer to the generic term ‘corporatisation’ as a way to make the port authority more autonomous, whilst keeping it in public hands.

Bilodeau et al (2006) specify that, in addition to the formal status change, corporatisation almost always involves a portfolio of other changes, such as narrower task domains, explicit performance measures and targets, a greater focus on the chief executive to deliver on these targets and greater discretion for chief executives to manage budgets and employees. The authors argue that, similar to privatisation, principal-agent theory may also explain improved performance of corporatised firms, due to reduced asymmetric information at government-firm level and firm-employee level, the firm being embodied in the person of the chief executive. To assess changes in organisational behavior and performance of corporatised government agencies, Bilodeau et al (2006) develop a series of hypotheses – or rather expectations – that are translated in performance indicators. These are summarised in Table 2.

Table 2 : The impact of corporatisation – expectations and performance indicators

Expectation	Performance indicator
1. Corporatisation increases the total output supplied by agencies	total output
2. Corporatisation increases the total revenues collected by agencies	total revenue
3. Corporatisation improves the revenues-to-expenditures ratio	total revenue / total expenditure
4. Corporatisation improves cost-efficiency of agencies	total output / total expenditure
5. Corporatisation improves the employee productivity of agencies	total output / total number of employees

Source: Bilodeau et al (2006)

To measure the impact of corporatisation on Canadian government agencies, the authors apply a statistical approach which essentially tests for a structural break in a relatively long time series, whereby the structural break in this case is the corporatisation ‘event’. The methodology thus boils down to a ‘before / after’ comparison of the performance indicators listed in Table 2.

4.2. Discussion

The paper of Bilodeau et al. (2006) forms an interesting point of departure to measure the impact of port authority reform on the productive efficiency of port authorities. Nevertheless, we have to make some important caveats that must be considered before embarking on an empirical exercise.

First, with regard to the principal-agent theory, we have to recognise – as the authors do as well – that it can cut both ways. If corporatisation decreases political control, without significantly increasing market controls, it might lead to worse performance. This is why it is important to analyse the reform process and post-reform governance as well, as we will discuss in sections 6 and 7.

Second, we should understand that the performance indicators related to the first two expectations (increased output and revenue) do not provide an indication of productive efficiency. Output and revenue may be indicators that have an important perceptive role towards principals and other stakeholders (compare with the obsession that exists in the port sector with throughput of cargo or passengers or the focus of shipping interests on tonnage), but they do not say anything about their relation to inputs or costs. The three other indicators do provide information on technical and economical efficiency, but some caution is needed here as well if we want to apply them to port authorities. This is notably the case for the selection of variables. A first problem concerns the output of port authorities. Throughput of cargo or passengers may seem an obvious choice, but in a landlord configuration it is not the port authority that is directly responsible for handling operations. Relating volumes to input of port authority employees would therefore be problematic. If cargo or passenger volume is nevertheless selected as a proxy variable for output, then this assumes that the corporatised port authority has powers to increase the efficiency of terminal operators and that it is able to attract more business to the port. Further research may yield an alternative output variable, that can be attributed more directly to the port authority. Next to the labour input, capital and land may be relevant inputs as well. Revenues and expenditures are more straightforward, although it may be difficult to obtain or compare data with the situation prior to reform. We might consider adding profitability as an indicator. Contrary to other government agencies, port authorities are to a considerable extent active on competitive markets. The selection of output and input variables may generally have to be linked to the economic objectives of the port authority (Suykens and Van de Voorde, 1998).

Finally, as the authors mention themselves, a ‘before/after’ comparison has the fundamental disadvantage that it does not control for other changes that might occur in the period during and after reform. The authors remedy this bias by having inherent variability in the sample of agencies, first by having agencies from two independent levels of government, second by having agencies that were corporatised at different periods in time and third, in several cases

the event windows cross administrative changes. Our framework however follows a single-agency (port authority) approach. Given that we address the performance of the port authority itself here, and not the wider economic impact discussed in the next section, it may however be easier to single out the effect of the reform by comparing the effects on the indicators with qualitative information on events that took place in the period during and after reform that may also have had an effect on the performance of the port authority.

5. ECONOMIC IMPACT ON PORT COMPETITIVENESS

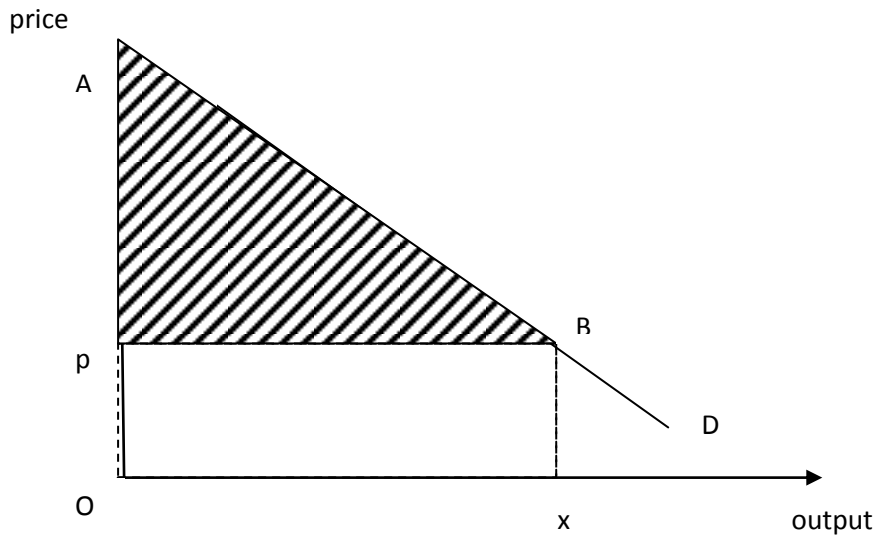
We now arrive at the centrepiece of our evaluation framework. Reforming the port authority should not be a goal in itself. The ultimate aim should be an improvement of the competitiveness of the port. We can translate this as a quality improvement of the port product as we explain in the first, conceptual, part of this section, where we use theoretical insights of welfare economics and allocative efficiency. We then develop a methodology to measure that quality improvement by using techniques of cost-benefit analysis and the generalised cost concept. Finally, we discuss some critical issues that will emerge when applying the methodology in practice.

5.1. Conceptual basis: improving the quality of the port product

Goss (1990b) stated that the economic function of a port is to provide benefits to the original producers of the exports and the ultimate consumers of the imports passing through the port. This definition of the ‘port product’ rightly implies that a port is an element in a wider logistics chain. The author further holds that the economic function would be fulfilled by reducing the generalised transport cost of moving goods through the port. Improving the economic efficiency of a port will enhance economic welfare by increasing the producers’ surplus of the originators of the goods being exported and the consumers’ surplus for the final consumers of the goods being imported.

This means that the contribution of a port authority exists in creating an environment in which (a) the port remains competitive, (b) the user has to pay ‘acceptable’ prices (compared to competing ports / chains) and (c) the overall benefits for society are maximised. These benefits represent the total willingness to pay of the users of the port and can be graphically illustrated by the surface under the demand curve. Figure 3 illustrates this.

Figure 3: Benefits of the port product

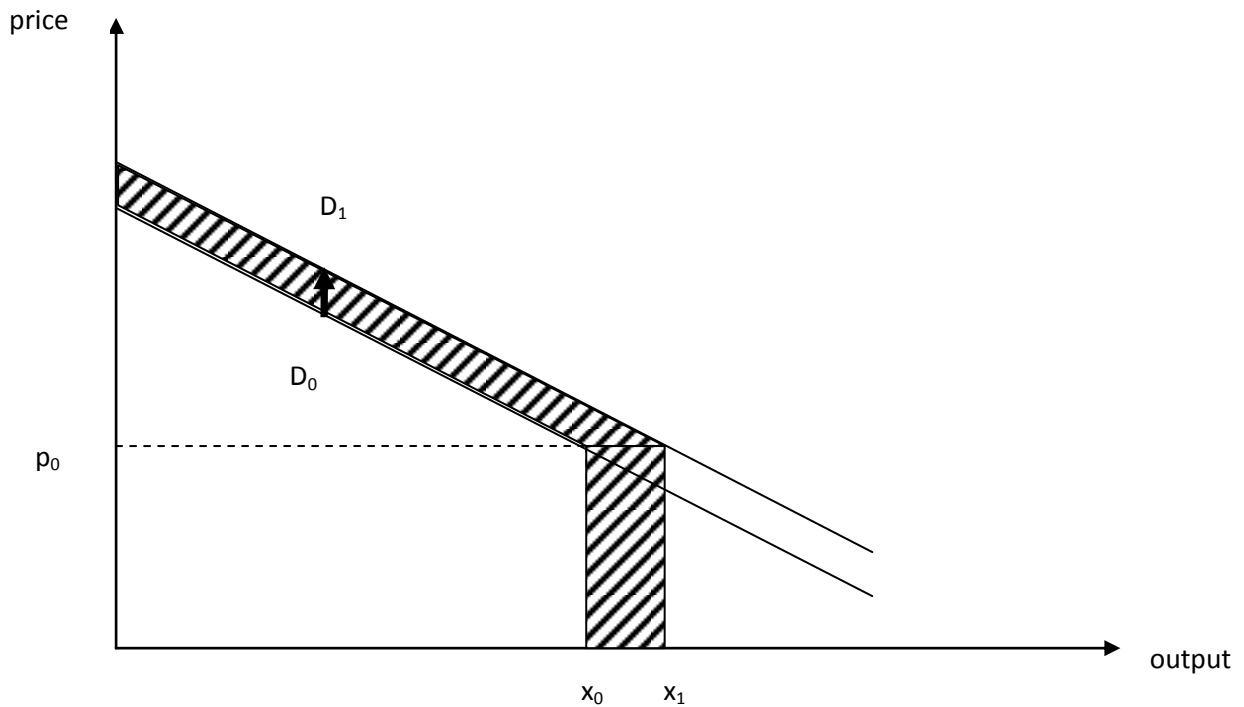


The horizontal axis represents the output of the port, which can be measured in cargo or passenger throughput, ships tonnage, number of ship calls or a combination of those. The vertical axis represents the theoretical price which users pay for the port product. The surface under the demand curve (D) consists of revenue generated by the port authority and the other providers of the port product (rectangular surface $pBx0$) and the consumer surplus (triangular surface ABp). Consumer surplus is the difference between what consumers are willing to pay for a certain good or service and what they actually pay for it in the market place.

If port authority reform is to improve the quality of the port product, then this improvement should shift the demand curve for the port product from D_0 to D_1 , as illustrated in figure 4. If we assume that the theoretical port price remains unchanged, the quantity of demand will increase from x_0 to x_1 . The benefit of the quality improvement is the increase in user satisfaction with the port, represented through the shaded surface, which consists of the increase in total revenue for the port authority and other providers of the port product and the increase in consumer surplus (Blauwens, 1986 and 1988) ⁽³⁾.

³ We have to be aware of the fact that figures 3 and 4 represent benefits in a perfect economy, which does not exist in reality. Nevertheless, some economists claim that, even in an imperfect economy, benefits should be limited to the surface under the demand curve, which represents the first-best approach to measure for benefits. Political reality may however have its own logic (Blauwens, 1986 and 1988) and, applied to our case, governments may pursue port authority reform to remedy certain imperfect elements in the economy such as unemployment.

Figure 4: Quality improvement through port authority reform



Source: adapted from Blauwens (1986 and 1988)

5.2. Methodology: estimating the impact of port authority reform on demand

In welfare economics, the classic methodology to measure allocative efficiency is cost-benefit analysis (CBA). CBA was originally developed to measure the economic impact of infrastructure works, but it is nowadays also frequently used to evaluate the impact of policy decisions in general, and forms as such often part of regulatory impact. In this section we use CBA techniques to determine how benefits can be concretely measured⁽⁴⁾.

Now that we have established that port authority reform should ultimately aim at improving the competitiveness of the port product, we return to the generalised cost concept that Goss (1990b) used in his definition of the economic function of a port. The competitiveness of a port increases if the generalised cost of passing cargo or passengers through the port decreases. The concept of 'generalised cost' is extensively used in transport economics as a way to capture all relevant components affecting transport performance. It implies that not

⁴ In our ex-post evaluation, we do not explicitly address the costs of port authority reform. Costs are generally represented by the surface under the supply curves of input factors. In CBA practice, the simplifying assumption is often made that marginal costs are constant and supply curves are therefore horizontal. The producer surplus then disappears. By buying input factors for the project, the prices are assumed not to increase. The costs of the project or policy measure then simply consist of the expenses and there is no producer surplus to be subtracted (Blauwens 1988). Expenses associated with port authority reform would relate, inter alia, to social restructuring, including adaptation of remuneration schemes, modernisation of IT and managerial systems, rebranding as well as studies, legal advice, meetings and lobbying processes to get the reform programme adopted.

only the direct, out-of-pocket, monetary cost is considered, but that also non-monetary costs are included, that play a role in perception and selection of a transport mode, such as time and reliability and also those that impact on environment. These costs are then expressed in a monetary value so that they can be added to the out-of-pocket costs (Button, 2010; Marchese, 2010; Grosso, 2011). In our case, we would have to look at all costs, monetary and non-monetary, that influence port competitiveness, i.e. the choice of a port.

A reformed port authority should effectively contribute to reducing the generalised cost of the overall port product. By combining the impact on generalised cost with price elasticities, we can estimate the effect on demand for the port product, as visualised in figure 4 above. Table 3 summarises the main steps involved. These are then elaborated further in specific sub-sections.

Table 3: Measuring effect of port authority reform on demand for the port product

1. Define generalised cost elements
2. Identify indicators to measure the generalised cost elements
3. Estimate the effect of port authority reform on the indicators
4. Calculate the effects on generalised port call cost (monetisation)
5. Determine price elasticities and calculate effect on demand for port product
6. Sensitivity testing of results

5.2.1. Define generalised cost elements

Given that a port does not exist in isolation, several factors influencing port competitiveness are not within reach of a port, let alone that they can be influenced by the port authority. It is therefore essential in this first step to identify those cost elements on which a port authority can have direct / indirect impact, an impact which should in theory be improved through port authority reform. We will list here a potential range of costs, since the actual choice will depend on the objectives of the port authority and the objectives of reform. We focus here on the monetary and non-monetary costs directly associated with a port call.

If we first look at out-of-pocket costs associated with a port call, most port authorities will have some degree of direct influence on the port dues (C_{pd}), i.e. the charges levied to the ship and/or cargo for the general use of port infrastructure, although this is not always the case. In some countries port dues have a fiscal status and are set at government level. Port authorities normally have direct influence on the charges for services they provide in-house (C_{sp}) and may have indirect influence on the charges of service providers with whom they have a contractual relationship, e.g. through a concession, a lease contract or a license (C_{ss}).

For the non-monetary cost elements a distinction is usually made between those related to time, risk and reliability.

Time-related costs are threefold: the time the ocean carrier (T_{oc}) spends in port, the time the inland carrier spends in port (T_{ic}) and the time-related costs incurred by shippers while their shipments are in port (T_{sh}) ⁵ (Talley, 2007). We could also add time-related costs incurred by passengers (T_{px}) where applicable. Time-related costs do not fully depend on the port

⁵ We must be aware however that the time cargo shipments spend in a port may be influenced by free cargo storage periods offered by port authorities or terminal operators.

authority, but the port authority can work on the reduction of these costs, by providing adequate infrastructure and hinterland connections, information systems and catalyst actions to reduce waiting times (e.g. coordination programmes developed in some ports to reduce barge waiting times).

Risk costs are usually related to damage users encounter in the port, which can be split into damage incurred by the ocean carrier (D_{oc}), the inland carrier (D_{ic}), damage to cargo shipments (D_{sh}) and damage to passengers (D_{px}). The port authority again has no full control over the damage risk, but will be able to minimise it, for instance by ensuring an effective harbour masters' service and enforcing an adequate safety and security policy for the port.

A port will be perceived to be reliable when it provides a seamless service, free from incidents. A stable labour environment, e.g. where there are no interruptions through strikes, is one of the key elements in this respect. The port authority will of course have a direct influence on its own staff (R_{sp}), but it may also play a role in social dialogue between service providers and their personnel (R_{ss}), either through direct involvement in sectoral negotiations or indirectly through its moral leadership, influence of public opinion etc. which would incite employers and employees to agree on (reforming) labour conditions. Although less evident, the port authority may also have an influence on the reliability of other authorities (R_{sa}), e.g. state pilot services, customs authorities, ... As an advocate of the port sector it can plead with government for efficient services, warding off strikes etc. Reliability will also be determined through the safety and security record of the port, which we covered through the damage factors.

If we bring the monetary and non-monetary cost elements together, we can formulate the generalised cost function as follows:

$$G = g(C_{pd}, C_{sp}, C_{ss}, T_{oc}, T_{ic}, T_{sh}, T_{px}, D_{oc}, D_{ic}, D_{sh}, D_{px}, R_{sp}, R_{ss}, R_{sa})$$

G = generalised cost function

C_{pd} = port dues

C_{sp} = service charges port authority

C_{ss} = service charges service providers

T_{oc} = time ocean carrier spends in port

T_{ic} = time inland carrier spends in port

T_{sh} = time cargo shipments spend in port

T_{px} = time passengers spend in port

D_{oc} = damage incurred by ocean carrier while in port

D_{ic} = damage incurred by inland carrier while in port

D_{sh} = damage incurred by cargo shipments while in port

D_{px} = damage incurred by passengers while in port

R_{lp} = reliability staff port authority

R_{ls} = reliability staff service providers

R_{sa} = reliability staff other authorities

This function represents a range of cost elements on which a port authority can have direct or indirect impact. The list is not exhaustive ⁽⁶⁾. Depending on the concrete case to be assessed, some elements may even have to be omitted from the analysis, because the port authority is not able to exercise direct or indirect impact (port authorities are not providing services in full landlord configurations, some ports may not have passenger traffic etc).

5.2.2. Identify indicators to measure the generalised cost elements

When the selection of generalised cost elements on which the port authority may have direct or indirect influence is made, the next step consists in selecting the potential indicators that can measure the effect of port authority reform on the cost elements. Table 4 presents a series of potential indicators.

Table 4: Potential indicators for generalised cost elements

Cost element	Indicator
C_{pd} (port dues)	Annual average port dues per gross tonnage
C_{sp} (charges port authority)	Annual average service charges port authority per unit of calculation
C_{ss} (charges service providers)	Annual average service charges service providers per unit of calculation
T_{oc} (time ocean carrier)	Annual average time ocean carrier spends in port
T_{ic} (time inland carrier)	Annual average time inland carrier spends in port
T_{sh} (time cargo shipments)	Annual average time cargo shipments spend in port
T_{px} (time passengers)	Annual average time passengers spend in port
D_{oc} (risk ocean carrier)	Annual average number of damage incidents incurred by ocean carriers in port
D_{ic} (risk inland carrier)	Annual average number of damage incidents incurred by inland carriers in port
D_{sh} (risk cargo shipments)	Annual average number of damage incidents incurred by cargo shipments in port
D_{px} (risk passengers)	Annual average number of damage incidents incurred by passengers in port
R_{sp} (reliability staff port authority)	Annual average number of strikes due to personnel of the port authority
R_{ss} (reliability staff service providers)	Annual average number of strikes due to personnel service providers
R_{sa} (reliability staff other authorities)	Annual average number of strikes due to personnel other authorities

Source: own compilation based on Talley (2007)

⁶ Although usually not included in a generalised cost approach, one could also consider taking up transaction costs, i.e. costs related to information exchange, and environmental costs. This would make sense given the assumption that a successful port authority needs to focus both on easing business and improving societal integration. More importantly, port customers are increasingly paying attention to the green profile of a port, which is therefore becoming an element of port choice. Environmental costs associated with ports are manifold. They typically include noise, dust, waste, emissions, water pollution, energy efficiency, land contamination and loss of biodiversity. Contemporary port authorities are expected to raise the environmental performance of their ports. The European Sea Ports Organisation (2012) identified five ways in which they can do this, through exemplifying, enabling, encouraging, engaging and – as a last resort – enforcing.

The final selection must meet criteria of (a) conciseness, (b) consistency with the cost element one wants to measure, (c) data availability, (d) data collection and time, (e) measurability, (f) minimisation of uncontrollable factors and (g) robustness (Talley, 2007). Some of the indicators may have to be specified further, e.g. according to cargo type, to the ship type or to the type of service provided.

5.2.3. Estimate the effect of port authority reform on selected indicators

In estimating the effect that port authority reform will have on the selected indicators, we suggest to initially follow a single-port approach, i.e. evaluating performance over time. A multi-port approach would have to be done with great care, given that ports operate in very different economic, social and fiscal environments (Talley, 2007).

But also the single-port approach needs caution. By comparing the evolution of port call costs over time, we engage in a before/after comparison which has the principal disadvantage that bias may occur due to other factors influencing generalised port call costs. In other words, it may be difficult to single out the effect of reform. Also, we must take into account that a reform programme always has a certain transitional and running-in period. The time series should therefore be sufficiently long, both before and after the moment of reform. Data availability may be one of the most important limitations here.

5.2.4. Calculate the effects on generalised port call cost (monetisation)

To fully compare the effects on generalised port call costs, the non-monetary cost elements of time, risk and reliability need to be put in monetary terms. This means we have to combine the respective time, risk and reliability indicators with the monetary value they represent.

The value of time spent by ocean and inland carriers in port can be monetised by taking into account depreciation of ships and vehicles, fuel and labour costs. The time shipments spend in port can be calculated on the basis of inventory costs such as insurance, obsolescence and depreciation costs (Talley, 2007). The value of time passengers spend in ports can be derived from research done into the passengers' choice (e.g. modal choice) and value of time in air travel.

The value of risk incurred by ocean and inland carriers can be derived by estimating damage and repair costs to ships and vehicles. Damage of cargo shipments is a function of the value of the cargo and the damage to passengers is a function of the value of life, in case of mortal accidents, or the cost of injuries, as well as the value of their luggage.

The value of reliability is based on the cost a day of strike causes to a port. Apart from foregone income to the port authority, service providers and users, this also needs to include costs of policing, potential damage etc.

We should be aware that risk and reliability are somehow interrelated with the time element, i.e. we must assess the variance they have on the time element.

5.2.5. Determine price elasticities and estimate effect on demand for the port product

For the penultimate step in the process, we need to estimate the effect of the change that port authority reform causes on the demand for the port product. For that, we must determine the price elasticity of demand for the port product. This elasticity will differ according to cargo commodities. Container throughput responds for instance more sensitively to flows that are related to transshipment via the hinterland. This greater sensitivity is due to the fact that shipping companies can switch from one transshipment port to another fairly quickly (Meersman et al., 2002; Meersman et al., 2003)

5.2.6. Sensitivity testing of results

To assess the robustness of the results, a sensitivity test can be applied, varying assumptions and choices made. This can be limited to the most sensitive variables.

5.3. Discussion

Even though the methodology we described here is less demanding than a full cost-benefit-analysis, it still represents a number of important challenges, such as data availability over a sufficiently long period, the elimination of bias caused by other elements, monetisation of impact and the determination of price elasticities. Depending on the case at hand, concessions may therefore have to be made. Available quantitative data should be complemented by qualitative information on the selected indicators. These can be gathered by means of structured interviews of stakeholders that have driven and undergone the reform process.

6. ANALYSIS OF THE PORT AUTHORITY REFORM PROCESS

To analyse the port reform process, we focus on the objectives, driving forces and environment factors that are behind the reform, bringing in concepts of bounded rationality and path dependency. These factors play a key role in the well-established model of public management reform of Pollit and Bouckaert (2011) which we discuss at the end of this section as a possible framework to analyse port authority reform process.

6.1. Objectives

Throughout this paper we already hinted at the fact that port (authority) reform may not always be driven by objectives of economic efficiency and competitiveness. Reform may for instance aim at tackling imperfect elements in the economy, such as unemployment. Whereas the first best solution would exist in a general measure, for instance reducing salary costs, governments may look at reform as a second best solution (Blauwens, 1986). Another driver may be to generate income for the state, which explains why port reforms are often pursued in times of economic crisis. This is for instance very much the case in some European countries today (Verhoeven, 2014). Pragmatic governments confronted with the need to cut public

expenditures, are forced to turn to the private sector for assistance in financing investments (Estache, 2001). In short, reforms may be carried out for short-sighted political aims, ‘milking for cash, not for trade’ (Sherman, 1995). The difference in objectives of port reform may also relate to different perspectives on the economic function of a port (Suykens and Van de Voorde, 1998). Finally, ideological and legal motivations can play a significant role as well (Van Thiel, 2010).

6.2. Initiators: formal initiators and stakeholders

Whereas government will almost always be the formal initiator of port authority reform processes, informally there may be other actors that have actually given the spark of ignition in a bottom-up way, either within the wider port community or outside. It is therefore important to clearly identify the principal stakeholders involved in the reform process, their actual objectives and the lobbying influence they may have had. The existence of regulatory capture and rent-seeking behaviour deserves specific attention. The implicit initiator may also be a supra-national body. In the European Union, both the European Commission and the European Court of Justice have for instance been at the origin of port authority reforms in Italy and Finland. The economic crisis has led the so-called ‘Troika’ (European Commission, European Central Bank and International Monetary Fund) to push for port reforms in Greece, Cyprus and Portugal that will also affect the position of port authorities (Verhoeven, 2014). Some EU countries have adopted a ‘wait and see’ policy on reform, since following EU-level decisions minimises political costs. The double failure to establish an EU legal framework on market access to port services has in that sense been a lost opportunity for several governments, reinforcing the position of those stakeholders that oppose reform (Psaraftis and Pallis, 2012; Verhoeven, 2009). The Commission’s third and relatively ‘lighter’ attempt to regulate the port sector remains equally controversial.

6.3. Environment: bounded rationality, path-dependency and cultural factors

Organisational and institutional theories may help to better understand the realities of reform processes. Although more than fifty years old, Linblom’s science of ‘muddling through’ (1959) still provides some extremely useful insights in this respect. He found that policy-making is anything but a methodological and rational process, but rather one that is marked by successive limited comparisons through a non-comprehensive analysis, addressing policy options that only differ incrementally, limiting the focus on small, marginal variations from present policy. A ‘good’ policy is then in the end one that finds agreement, i.e. a compromise. In that respect, it is not irrational for an administrator to defend a policy as being ‘good’, without exactly being able to say why.

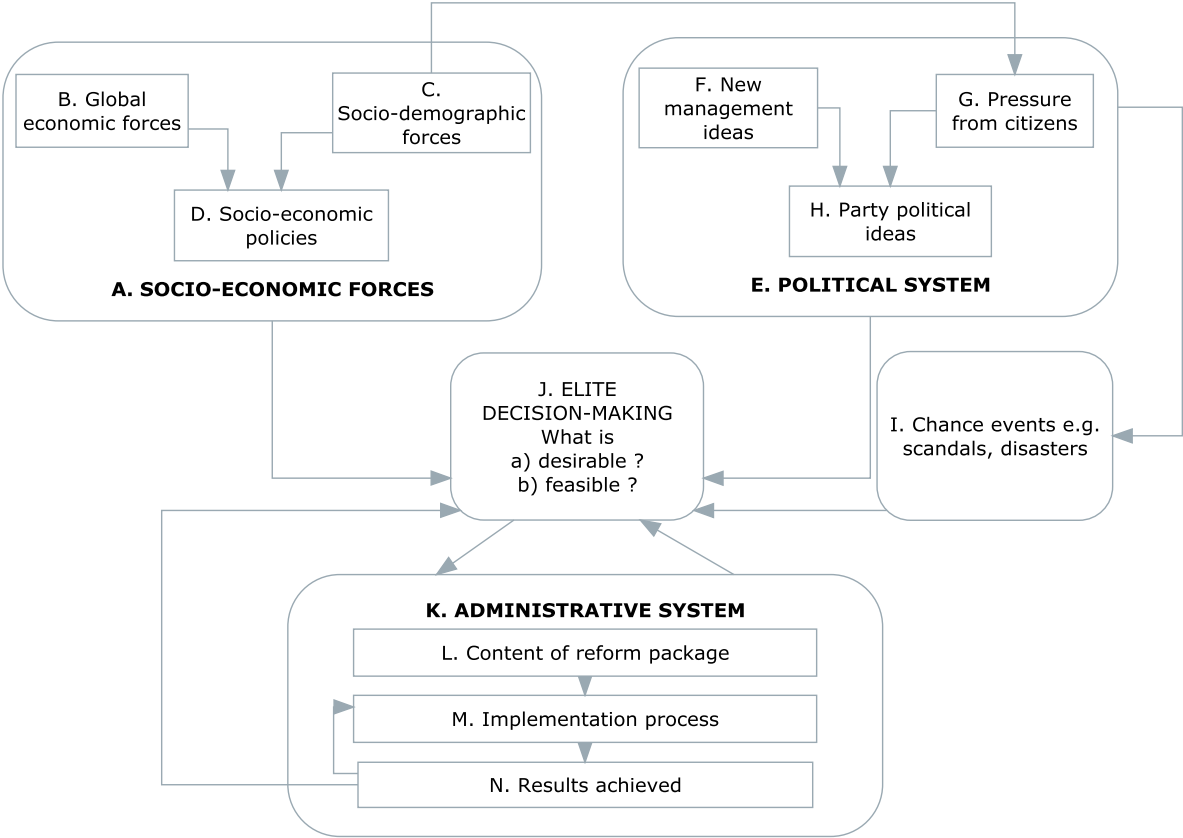
Path dependency and historical institutionalist theories (Pollitt and Bouckaert, 2011) would furthermore explain why more radical reforms are possible in countries with a majority, single-party government like the United Kingdom. Notteboom et al. (2013) applied the mechanisms of path dependency to port governance and concluded that a process of institutional stretching takes place when port authorities see a need to develop new capabilities and activities. In this process, new layers are added to existing arrangements,

gradually leading to a formalised governance reform without breaking out of the existing path of development. Ng and Pallis (2007 and 2010) refer to political culture and argue that newly established seaport governance structures follow a path largely affected by the local and/or national institutional frameworks and the political traditions in place. The concepts of path dependency and institutionalism can indeed be linked to existing port governance traditions. In Europe, the three major geographically-based traditions (Hanse, Latin, Anglo-Saxon) identified by Suykens (1988) still appear to explain a great deal of governance diversity today (Verhoeven and Vanoutrive, 2012).

6.4. Model of public management reform

The above discussion of objectives, initiators and environment are at the core of the model of public management reform developed by Pollit and Bouckaert (2011) represented in figure 5, which forms a potential basis to analyse port authority reform process.

Figure 5: A model of public management reform



Source: Pollit and Bouckaert (2011)

The centre of the model is the process of elite decision-making, distinguishing between what is desirable and what is feasible. Surrounding the elite decision-making are three groups of

influential factors. In the top left there is a group of economic and socio-demographic factors. In the top right there is a group of political and intellectual factors. In the bottom half of the figure there is a group of administrative factors. It is from the interplay between these three groups that reforms emerge. The model focuses on the government of a single country, which to some extent is an over-simplification because of international influences, e.g. of supra-national institutions such as the EU. Also, for our case, it ignores that decisions are in some countries taken at local government level. Nevertheless, the interplay between different forces provides useful insight to assess the various dimensions of the reform process. The role of the administrative system and the implementation process makes the link to the final element in our evaluation framework, which looks at post-reform governance.

7. POST-REFORM GOVERNANCE

To complete the evaluation framework, we must analyse the governance system that applies after reform. Post-reform governance is one of the factors explaining why reforms, or policy in general, may not work (Pressmann and Wildawsky, 1973). Applied to the port sector, Everett (2003) argues that political interference is not the cause of port inefficiency, but an effect of something more endemic, of a model and legislative framework which is not appropriate for any commercially-focused operation. A bad implementing framework may give rise to numerous problems, adverse principal-agent effects, rent-seeking behavior etc. Governments appear too often focused on getting the reform deal done, but do not seem to care much about their role after reform (Estache, 2001).

Stern and Holder (1999) developed a check-list for assessing the performance of regulatory systems, which they use to assess the regulation of Asian infrastructure industries. The checklist can be easily adapted to appraise the governance of ports following port authority reform. The appraisal framework is based on three formal and three informal aspects, as represented in table 5.

Table 5: Appraisal framework for regulatory systems

Formal appraisal criteria	Informal appraisal criteria
Clarity of roles and objectives	Participation
Autonomy from political intervention	Transparency
Accountability	Predictability

Source: Stern and Holder (1999)

The formal appraisal criteria include clarity of roles and objectives, autonomy and accountability. Key issue in clarity of roles and objectives is to ensure separation of regulation from both (a) policy-making and (b) the commercial management of companies. This is particularly relevant for port authorities which, given their hybrid nature, often combine regulatory and commercial tasks. Autonomy from political intervention is equally relevant. Many so-called ‘autonomous’ port authorities maintain close ties with politicians, who are often represented in the board of directors, and port authorities often need political contacts to secure public funding. Accountability requires that decisions of port authorities can be challenged in an effective way. Participation refers to effective contribution of stakeholders to

decisions of the port authority, rather than being invited to state views on decisions that have been made already. Port authorities should be transparent in the decisions they make, which is essential for ensuring effective accountability ⁽⁷⁾. It will also help to secure more effective participation. Finally, predictability is essential where firms are undertaking investments which need to be recovered over a number of years. It means these firms can be reasonably confident that the rules of the game will not suddenly change. Predictability should also include the ability to achieve evolutionary change in regulatory methods and practices to meet changes in circumstances in an orderly and consistent way (Stern and Holder, 1999). The application to port authorities is obvious, e.g. when concluding port concession agreements with private terminal operators. The recent dispute in the port of Antwerp about terminal operators not being able to meet contractual performance criteria due to the economic crisis is a good example.

8. PRACTICAL USE OF THE EVALUATION FRAMEWORK

Port authorities have the potential to improve the competitiveness of their ports and thus generate more demand for the overall port product. To release this potential, reform is often needed, in order to enable port authorities to perform their various functions in an efficient and effective manner. Experience with port authority reform in Europe and elsewhere in the world indicates that results are not always satisfactory and often disputed (Brooks and Cullinane, 2007). Measuring the economic impact of port authority reform is therefore a necessary but challenging task, given that several other internal and external factors influence the competitiveness of a port. Port authority reform is furthermore often part of a wider reform package, which makes its particular impact even more difficult to measure.

The multi-layered framework for ex-post evaluation that we have presented in this paper gives governments and other stakeholders the basis to develop a pragmatic tool to objectively and quantitatively evaluate the economic impact of reform on both the actual performance of the port authority and the competitiveness of the port. By adding a process dimension, governments and stakeholders will furthermore be able to understand why the reform scheme worked or not. Applying the framework in practice still has several methodological challenges, as we discuss in the next and final section of this paper. But the framework in itself offers a solid basis to bring in adjustments or revisions of reform if and where necessary. The framework can address all types of port authority reform, including commercialisation, corporatisation and privatisation. Port authorities can furthermore use some of the indicators we developed internally, as part of their own performance monitoring.

The framework could easily be adapted to measure the economic impact of reforming entities with similar responsibilities as port authorities, e.g. airport authorities, rail infrastructure managers etc.

Finally, with a number of modifications, the framework could also be used for ex-ante evaluation of planned reform schemes, similar to traditional cost-benefit analysis. This however requires solid forecasting methods to anticipate the results expected from reform.

⁷ An extreme form of non-transparent behaviour would be corruption, a phenomenon which even leading European ports have been confronted with.

9. SCHOLARLY CONTRIBUTION AND FURTHER RESEARCH

Present economic literature on the impact of port authority reform is mostly of qualitative nature. The few quantitative studies that exist focus on specific impacts or specific cases. In this paper we have discussed methodologies to measure both impact of reform on the productive efficiency of port authorities themselves and the broader impact on port competitiveness. We consider the latter to be the main scholarly contribution of the paper. Using insights of welfare economics, we conceptually defined port authority reform as a quality improvement of the port product which will increase demand for that product. Using techniques of Cost-Benefit Analysis, we have devised a methodology which estimates the effects of port authority reform on the generalised costs associated with a port call. In combination with price elasticities, this allows to estimate the impact of port authority reform on demand for the port product. Combining the quantitative aspects of the framework with a qualitative process dimension allows making a full ex-post evaluation.

We are fully aware that the practical application of this theoretical framework remains a challenging task, especially where it concerns the measurement of economic impact. The collection of data is the first hurdle to take. Whereas this may appear to be relatively straightforward for variables to measure the productive efficiency of the port authority, information on revenue, expenditure and staff employed may not always be available for the period prior to reform, or may not be calculated in the same way as port authority reform often involves a change in accounting methods. The variables needed to calculate generalised cost are the most difficult to obtain. Even the out-of-pocket costs may not be readily available because of commercial sensitivity and may pose numerous comparison problems. The same goes for the variables measuring effects on time, risk and reliability which pose the additional difficulty of monetisation. To measure the effect on demand, correct price elasticities have to be estimated as well.

The second major challenge is the elimination of bias caused by other internal and external factors that occurred during and after reform. The ideal way to do so is through the construction of a counterfactual, which is however a very demanding exercise. By collecting qualitative information on relevant events that happened in the period during and after reform, it should however be possible to draw meaningful conclusions, at least for the evolution in the productive efficiency of the port authority itself. The analysis of the reform process and post-reform governance will furthermore allow to explain why reform had the impact it had. But also gathering qualitative information may have its problems. Information on process and post-reform governance will inevitably require some form of structured interview with relevant stakeholders and experts that were involved in the period prior to, during and after reform. Given that the period of analysis is fairly long, these people may be hard to find.

Depending on the case to be assessed, methodological rigor may therefore need to be offset with pragmatic alternatives. The application of the framework to a concrete port authority reform case, which is the next step in our research plan, will reveal the actual challenges more clearly, allowing to adjust the analytical framework where necessary.

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